

A CASE STUDY FOR THE USE OF INTEGRATED PROJECT DELIVERY AND BUILDING INFORMATION MODELING FOR THE ANALYSIS AND DESIGN OF THE NEW YORK TIMES BUILDING

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A Case Study for the Use of

Integrated Project Delivery and Building Information Modeling for the Analysis and Design of The New York Times Building

A Thesis in Architectural Engineering submitted to the faculty of

The Pennsylvania State University

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EXECUTIVE SUMMARY

The Pennsylvania State University Architectural Engineering Department, in conjunction with Thornton Tomasetti Foundation and The Leonhard Center for the Enhancement of Engineering Education developed the first multidisciplinary engineering design thesis, incorporating Integrated Project Delivery and Building Information Modeling. Three students from each of the Architectural Engineering disciplines were selected to work collaboratively to investigate The New York Times Building as an academic case study. This report involves the year long work of one student from each of the four options; Construction Management, Lighting/Electrical, Mechanical and Structural.

The lateral system was changed from a braced frame system to concrete shear walls with coupling beams. This was changed in order to eliminate the out riggers, thermal trusses, and x-bracing to increase transparency of the building. The periods of vibrations were determined to be 6.46 seconds and 6.64 seconds in the west-east and north-south directions respectively. It was also determined that the total building drift is H/690 and the acceleration is 14.6 milli-g's. From these results, the system was deemed acceptable.

In order to make room for this added structure, the electrical feeders were switched from conduit to bus duct. This reduced the access space required, but increased the cost by approximately \$500,000.00 for aluminum bus duct. Mechanical duct work was also rerouted due to the increased structural space requirements. Due to 3-D modeling of these systems, early detection of possible problems were found. In response to the structural changes, the architectural layouts of the spaces within the core were also changed. Even with the increased structural requirements, transparency through the building was maintained by protecting the circulation space within the core.

Comparing the original steel core to the proposed concrete core resulted in a cost savings of approximately \$20,000,000.00 for the immediately affected steel members replaced by the proposed structural core redesign. These savings were achieved by comparing the original and proposed systems within the Building Information Model for material takeoffs. When including the schedule and general conditions, the overall cost savings from this analysis resulted in approximately \$16,500,000.00.

The existing curtain wall system was changed from a single façade layer with a ceramic rod shading system to a dynamic curtain wall system incorporating motorized louvered shades and operable windows. The new design was modeled in AutoDesk Revit using nested families and parametric parameters to accurately depict the way in which the facade would work. The daylighting study resulted in a 72% reduction in lighting energy use within the first two rows of lighting around the entire floor plan. This proposed redesign created a cost savings of \$56,280 per year for the entire building. An exterior lighting redesign incorporated LED fixtures, which saved approximately 10,000 watts per side of the building. These savings resulted in a cost savings of \$17,520 per year.

The BIM model was utilized to investigate interoperability with energy analysis software. IES<VE> successfully imported geometries from Revit and was used to analysis the performance of the existing and proposed glazing, proposed shading and reduced lighting

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power densities within the office. An energy analysis resulted in a reduction of building ambient loads translating to an estimated annual cost savings of \$45,136.09.

Hybrid Ventilation was investigated as a possible design solution for the New York Times Building to reduce energy usage and costs, as well as increase the sustainability profile of the building. The analysis concluded the addition of 18 operable window curtain wall panels on office floors above Level 21, excluding floors 28 and 51. Additionally, a control sequence was developed describing the operation of the windows in response to environmental and space conditions. Natural ventilation would reduce energy usage by an estimated 35% resulting in an annual energy savings of \$145,419.

Using the data generated from the original and new Revit envelope models, an additional cost of applying louvers was found to be approximately \$8,400,000.00. When applied to the cooling load savings generated by the louvers, a payback period of 14 years was achieved. A study into incorporating photovoltaics into the facade was completed simultaneously. The analysis showed that incorporating a photovoltaic system into parts of the west and south facades would add approximately \$2,500,000 to the cost of the facade. This addition showed a payback of approximately 25 years. Finally, the incorporation of operable windows cost an additional \$2,500,000.00. A payback period of 15 years was found when analyzed for additional cooling load savings on top of the savings due to the louvers.

Using Integrated Project Delivery and Building Information Modeling, the layout of tenant spaces changed. This change is a result of enclosing the exposed steel within the interior of the building to eliminate thermal differentials. This resulted in an increase of rentable area averaging approximately 2,000 square feet per floor. When the increased area was applied to New York City leasing costs for Class A offices, an average revenue increase of approximately \$1,275,000.00 per floor per year was achieved for the Forest City Ratner Companies' spaces.

The goal of reducing structural members per bay was not met due to vibrations. It was determined that the redesigned floor system resulted in a total structural depth increase of 3/4" and an increase cost of \$1.58 per square foot. The floor framing system was decreased by 7.5 psf and all columns were disengaged from the lateral system. This change decreased column sizes. Built-up columns were required in the cantilever bays in order to keep with the Architect's vision of no columns at the storefront, however they are not as large as the existing columns.

A proposed interior lighting redesign incorporated task lighting into the design. The proposed redesign would use .469 Watts per square foot. If these savings were applied to the entire building, the resulting energy savings would be approximately \$462,200.00 per year.

A ducted side-wall displacement ventilation system was selected to replace the existing unducted Underfloor Air Distribution (UFAD) system to improve the indoor environment for the building occupants by minimizing distribution of dust and contaminants that may collect in the open plenum space. The system was sized utilizing load factors determined by ASHRAE, and a 3D model was created in Revit MEP to ensure space requirements were met with the raised floor system.

BARBEN | CASEY | DUBOWSKI | MILLER The New York Times Building 620 Eighth Avenue New York New York 10018 The New York Times Company Forest City Ratner Companies Class A office space plus ground floor retail 52 Stories | 1,500,000 ft² Ow СМ AMEC Construction Management, Inc. (Core & Shell) Approximately \$1 Billion Turner Construction (NYTimes Interiors) 48 story cruciform plan tower above 4 story pedistal Renzo Piano Building Workshop Archi Exposed structural system **FXFOWLE** Architects Open air birch and moss garden Gensler (Interior TheTimesCenter cultural center and performance space Thornton Tomasetti Flack & Kurtz Mechanical Structural Air Distribution UFAD system for NYT floors (2-27) Foundation 6,000 psi spread footings on bedrock Overhead ducted system for floors (29-50) 24-inch diameter steel-encased concrete cai Floor-by-floor VAV air handlers Superstructure Composite beam & girder floor system with 3' metal deck & 2 1/2" normal-weight concrete Cooling 6000 ton central chilled water plant Typical bay size is 30' x 40' (5) 1150 ton centrifugal chillers Beam and girder sizes range from W18 to W21 (1) 250 ton single stage absorption chiller Dog-legged beams extend through facade for UFAD system Heating ssure steam throughout building Low pr Steam coils in floor-by-floor air handlers Box columns anchor the building at corner Heating hot water for perimeter heat Steel core in tower consisting of K-braces and chevron braces Lateral System Cogeneration 1.4 MW cogeneration plant on-site Outriggers on mechanical floors (28 & 51) to engage all columns in lateral system (2) parallel natural gas-fired reciprocating engines ed pretensioned rods contribute to the arency of the building Waste heat for absorption chiller and perimeter beating Connections Built-up knuckle connection for exterior X-braces Miscellaneous Building Automation System is Si Outriggers oriented in weak direction for ease of connection Automatic wet sprinkler and standpipe syst Waterless urinals and low-flow fixture **Construction Management** Lighting/Electrical Delivery Design/Bid/Build and CM-at-risk hybrid Daylighting Automated roller shading Daylighting sensors Horizontal exterior ceramic rods spaced at variable center-to-center distances Enclosure Ceramic tube double-skin curtain wall array ultra-clear glass Fluid applied asphalt roof with 24"x24" precast roof pavers and stone ballast Lighting Lutron "Quantom" Controls system for integrated daylighting, dimming, and shading control 18,000 DALI Dimmable Ballasts Life Safety stem with automatic wet sp alved outlets on each floor with autom Year Average .38 watts/s.f. Lighting Power Density Base Class E addressable fire alarm system along with ADA compliance on each floor Electrical 6 watts/s.f. demand lighting and power Transportation tch elevator system. cting stairs in NYT spaces Telecom. Main telephone distribution facility Multiple service providers Ben Barben Erika Bonfanti Andres Perez Peter Clarke Nicole Dubowski Kyle Horst Casey Leman Lig Justin Miller Construction Craig Casey Matt Hedrick Dan Cox Chris Wiacek 09 10 Integrated Project Delivery Building Information Modeling

THE NEW YORK TIMES BUILDING

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1 INTRODUCTION

The Pennsylvania State University Architectural Engineering Department, in conjunction with Thornton Tomasetti Foundation and The Leonhard Center for the Enhancement of Engineering Education developed the first multidisciplinary engineering design thesis, incorporating Integrated Project Delivery and Building Information Modeling. Three students from each of the Architectural Engineering disciplines were selected to work collaboratively to investigate The New York Times Building as an academic case study. This report involves the year long work of one student from each of the four options; Construction Management, Lighting/Electrical, Mechanical and Structural.

The New York Times Building was selected for this case study by the Penn State Architectural Engineering Department and Thornton Tomasetti, who was the structural engineer.

With industry moving towards a more integrated design approach with use of Building Information Modeling tools, this academic exercise is meant to prepare the design team for practical application expanding through the future of the industry. The application of an Integrated Project Delivery design process and Building Information Modeling platforms are beginning to gain importance through the industry for the benefits associated with improving the life cycle of buildings.

This thesis contains proposed design ideas, detailed engineering analysis, and construction concepts with documentation of the collaborative working process.

1.1 Introduction to IPD/BIM

1.1.1 **Objectives**

The purpose of this report is to investigate the use of an Integrated Project Delivery process and Building Information Modeling tools on the design and analysis of The New York Times Building.

1.1.2 Methodology

The first part of the process consisted of an in depth analysis of the existing conditions of The New York Times Building. This was completed through the collaborative effort of all members from each discipline. After the design team completed these analyses, a proposal was developed to investigate alternative designs and construction strategies.

1.1.2.1 BIM Ex Plan

1.1.2.1.1 *Overview*

Building Information Modeling is a growing term in the construction industry. The problem associated with BIM is that owners request it without proper knowledge of what BIM can do or what they would like BIM to do for their project. By developing a Building Information Modeling Execution Plan, owners, designers, engineers and management teams will know exactly what they will get out of BIM on their project as well as be able to plan and track the information flow throughout the project. A breakdown of the BIM Project Execution Planning Procedure provided by Penn State CIC Research can be viewed in Figure 1.



Figure 1: BIM Execution Planning Procedure

With the integrated approach of the IPD/BIM thesis, one major obstacle is the control of information and work of the team. By tracking the flow of information throughout the project, the collaboration between team members will be controlled for the project. Developing goals for the project and the team are a key to success of the project.

As a group, we worked together to develop a Building Information Model Execution Plan during the fall semester as a means of guiding the team through the analysis process. The team also used the plan to control the push and pull of information to and from different members of the team. This created a schedule with deadlines for when certain information is needed by, and which team members are responsible for supplying that information.

1.1.2.1.2 Process

Steps taken included:

- Updated and developed BIM goals and uses throughout spring semester. Shown in Table 1.
- Implemented and updated the BIM use analysis to determine which uses will be included in the research. Shown in Table 2.
- Develop a Overview Process Map to work as a schedule for the Team. Shown inFigure 2.
- Modify and update the Process Map throughout the spring semester.
- Continually enforce the Process Map to ensure team success.
- Continuously updated and enforced the Team 1 semester schedule. Shown in Figure 3.

1.1.2.1.3 Expected Outcome

It is expected that by developing, updating and enforcing the BIM Execution Plan, the project will become more efficient and provide a superior finished product. This Execution Plan will provide strict dates of completion which each team member must abide by to insure the other member's success. Transfer of information and collaboration between the team members will be critical to the success of this undertaking and the final deliverable will be a fully developed process model, an analysis of the BIM Execution process, advantages and disadvantages, and a successful team thesis.

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Priority (1-3)	Goal Description	Potential BIM Uses
1- Most Important	Value added objectives	
0	Pull all ideas together (Unification);(Sustainability)	ALL
1	Preserve Architectural Integrity (Desires of Owner)	Design Reviews, Design Authoring, Record Modeling
1	Emphasize Energy Efficiency (Carbon Neutral)	Energy Analysis, LEED Evaluation
1	Maintain/Exceed Occupant Safety/Health/Comfort	Energy Analysis, Daylighting Analysis, Code Validation, Structural Analysis, Disaster Planning
2	Optimize façade to meet goals	Energy Analysis, Lighting Analysis, LEED Evaluation, Site Analysis, Structural Analysis, Cost Estimation, Construction System Design
2	Optimize Electric Lighting to respond to Daylight	Lighting Analysis, Energy Analysis
2	Optimize Structural System for increased space, reduce construction duration, reduce cost	Structural Analysis, 4D Modeling, Cost Estimation, Construction System Design
3	Increase profitability of the building	Cost estimation, 4D Coordination, Digital Fabrication, Virtual Mockup

Table 1: IPD/BIM Team 1 BIM GOALS and Uses

BIM Use*	Value to Project	Responsible Party	Value to Resp Party	Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		Capability Rating		ility g	Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
	High / Med / Low		High / Med / Low	Sc (1	Scale 1-3 (1 = Low)				YES / NO / MAYBE																				
				Resources	Competency	Experience																							
Maintenance Scheduling	LOW	NONE							N																				
Building Systems Analysis	HIGH	Ben Craig Nicole	H H H			2 2 2			Y																				
Record Modeling	MED	Justin	L			1			N																				
Cost Estimation	HIGH	Justin	Н			2			Y																				
4D Modeling	MED	Justin	Н			3			Y																				
Site Utilization Planning	LOW	Justin	L			1			N																				
ayout Control & Planning	LOW	Justin	L	ļ		1			N																				
3D Coordination (Construction)	LOW	Justin	М			2			N																				
Structural Analysis	HIGH	Ben	н			3			Y																				
Mechanical Analysis	HIGH	Nicole	Н	<u> </u>		2			Y																				
_ighting Analysis	HIGH	Craig	Н			3			Y																				
Energy Analysis	HIGH	Nicole	н			2			Y																				
Site Analysis	HIGH	ALL	Н			2			Y																				
Design Reviews	HIGH	ALL	Н			2			Y																				
3D Coordination (Design)	HIGH	ALL	н			2			Y																				
Existing Conditions Modeling	HIGH	ALL	М			3			Y																				
Design Authoring	HIGH	ALL	н			3			Y																				
Programming	LOW	вов	Н			1			N																				
EED Evaluation	LOW	ALL	L			1			м																				
Construction System Design	MED	Justin	Н			1			м																				
√irtual Mockup	MED	All	Н			3			Y																				

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Table 2: IPD/BIM Team 1 BIM Use Analysis



Figure 2: IPD/BIM Team 1 Overview Process Map and Schedule



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Figure 3: Team Schedule Milestone 1 – Energy Model / Structural Redesign

Milestone 2 – Go / No-Go

Milestone 3 – Façade Redesign

Milestone 4 – Renewables/Energy Use/Feasibility

Milestone 5 – Finalize Report/Presentation

1.1.2.2 Charettes

Design team meetings were utilized consistently throughout the semester to allow for the exchange of central design information between members of the design team.

1.1.2.3 Interoperability

Each discipline explored various opportunities to utilize software interoperability specific to their respective analyses. The outcomes were documented and are discussed further in this report.

1.2 Building Statistics

1.2.1 Site and Architecture

The New York Times building is a 52 story tower located at 620 Eighth Ave., New York City. Jointly owned by The New York Times Company and the developer Forest City Ratner Companies, the first, twenty-eighth, and fifty-first floors are co-owned by both companies, with the first floor including retail, restaurant and performance spaces. The twenty-eighth and fifty-first floors are mechanical spaces serving both companies. The New York Times Company solely owns floors two through twenty-seven, and Forest City Ratner Companies owns floors twenty-nine and above. The building contains the new headquarters for The New York Times as well as several leasing companies in the Forest City Ratner Spaces.



Figure 4: New York Times Building Location, Source: Bing Maps

Architects Renzo Piano Building Workshop in association with FXFOWLE Architects locally, designed the building as a forty-eight story tower on top of a four story pedestal. The pedestal floors are approximately 79,000 sq. ft. and the tower floors average approximately 26,000 sq. ft. of Class A office space. The pedestal contains TheTimesCenter cultural center and performance space along with an open-air paper birch garden. The first floor also contains restaurant and retail spaces within the lobby. At

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746 feet tall, The New York Times Building took the architects vision of transparency to a new level by using an exposed steel structure and ultra clear glass from floor to ceiling on the facade. The facade also includes a ceramic rod shading system on the exterior to help control daylighting and heat gain throughout the spaces.



Figure 5: New York City Panorama

1.2.2 Structural Existing Conditions

1.2.2.1 Foundations

The New York Times Building was designed with a single basement level to limit excavation at the site. The foundation of the New York Times Headquarters combines typical spread footings with caissons to achieve its capacity. Below the building's 16-foot basement, the majority of the building sits on rock with an allowable bearing capacity of 40 ton per square foot. However in the southern region of the podium sits on rock with an allowable bearing capacity of 20 ton per square foot. After a final investigation was performed, it was discovered that a portion of rock at the southeastern corner of the site, which that tower sits on, had an allowable bearing capacity of 8 ton per square foot. As a result, 7 of the 30 columns are supported by 24-inch diameter 6,000 psi concrete-filled steel caissons of unknown length shown in Figure 6. Each caisson was designed to support a load of 2,400 kips.

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Figure 6: Foundation Location

The other 23 columns, indicated in Figure 6 are supported by spread footings with 6,000 psi concrete. The columns which fall in the cantilevered areas of the tower do not directly transfer load to the ground which removes the need for footings at these locations. The New York City Subway travels below Eighth Avenue which is located on the Northwestern side of the site. Though, the subway does not pass directly under the structure, vibrations may have impacted the design of the foundations and structure.

1.2.2.2 Floor System

The floor system is a composite system with a typical bay size of 30'-0" x 40'-0" surrounding a 90'-0" x 65'-0" core. Refer to Appendix 7.1, Figure 129 on page 212 for a typical floor plan. There are 60'-0" x 20'-0" cantilever bays on the Northeast and Southwest sides of the tower. The floor system is made up of 2 ¹/₂" normal weight concrete on 3" metal deck, typically spanning 10'-0" from W12s to W18s infill beams. The beams then span into W18 girders which frame into various 30" x 30" built-up columns. The exterior columns consist of two 30" long flange plates and two web plates inset 3" from the exterior of the column on either side. The flange and web plates vary from 4" thick and 7" thick respectively at the ground floor to 2" thick and 1" thick respectively at the fifty second floor. This is to account for the different steel areas needed for the higher forces at the bottom of the building. The yield strength of the plates also varies with tower height for needed strength. To maintain consistent proportions at all floors, a hierarchy of flange plate thicknesses was developed. The box column hierarchy can be seen in Figure 7.





Figure 7: Box Column hierarchy, courtesy of Thornton Tomasetti

Framing of the core consists of W12 and HSS shapes framing into W14 and W16 shapes which frame into W33 girders that frame into the core columns. These columns are a combination of built-up plate sections and rolled shapes. Column locations stay consistent throughout the height of the building, and every perimeter column is engaged in the lateral system which will be described later.

In the New York Times spaces, the structural slab is 16" below the finish floor and the spandrel panel, due to the raised floor system for the under floor mechanical systems. For all the exterior steel of the building to maintain a centerline at the center of the spandrel panel, a crooked connection or 'dog-leg' was used. The 'dog-leg' connection allows for the end of the beam to rise 10" before it leaves the interior of the building and penetrates the building envelope. Figure 8 shows the 'dog-leg' prior to metal deck installation and Figure 9 shows the 'dog-leg' connection penetrating the building envelope.



Figure 8: 'Dog-leg' beam prior to metal deck installation, courtesy of Thornton Tomasetti

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Figure 9: 'Dog-leg' penetrating building envelope

1.2.2.3 Vierendeel Frame

To prevent columns obstructing the glass storefronts at the ground level, a Vierendeel system was used at the 20'-0" cantilever sections of the tower. The middle lines of the cantilevered bays have beams moment connected to the columns engaging every floor except at the outrigger levels. At the outrigger level; floor twenty eight and fifty one, large diagonal braces tie the middle line back to the core through the outrigger trusses. In extreme loading conditions, this provides a redundant load path. See Figure 11 and Figure 12 for Vierendeel frame location. At the exterior beam lines of the cantilever, 2" diameter steel rods were connected from the columns to the ends of the beams to control deflection at every floor. This allowed the beams to be designed only for strength, thus avoiding bulky exterior members.



Figure 10: Cantilevered bays from exterior

1.2.2.4 Lateral System

The main lateral load resisting system for the tower of The New York Times Building consists of a centralized, steel braced frame core, with outriggers on the two mechanical floors. The structural core consists of concentric braces behind elevator shafts and eccentric braces at the elevator lobby entrances. The core configuration remains consistent from the ground level to the twenty seventh floor as shown in Appendix

Figure 136 on page 214.







Pre-Tensioned Steel Rod X-Bracing (1) Concentric Chevron Core Bracing (2) Eccentric Chevron Core Bracing (3) Single Diagonal Brace (4) Outrigger Bracing (5) Vierendeel System at Cantilever (6) Thermal Trusses (7)

Above the twenty eighth floor, the low rise elevators were no longer required, and the number of bracing lines in the North-South direction was reduced from two to one, shown in Appendix

Figure 136 and Figure 137 on page 214 and 215. The outriggers consist of diagonal braces shown in Figure 11 and Figure 12 on the next page 24, which increases the stiffness of the tower by engaging the exterior and interior columns in the lateral system. For elevations and construction pictures of the outriggers refer to Appendix

Figure 130 through Figure 135 on page 212 through page 213.



Figure 12: 51st Floor Mechanical Floor Framing Plan

In order to reduce lateral drift and acceleration, the double story steel rod X-braces were utilized instead of increasing the member sizes of the main lateral force resisting system which were sized for strength. The high strength steel rods shown in Figure 12 transition from 2.5" to 4" in diameter and were prestressed to 210 kips. With the addition of the X-braces in the main lateral force resisting system, the calculated deflection of the tower due to wind was L/450 with a 10 year return period and a building acceleration of less than 25 milli-g's for non-hurricane winds.

1.2.2.5 Thermal Differentials

Thermal differentials had to be considered due to interior steel members being maintained at room temperature and exposed steel members undergoing continual temperature changes. Using the National Building Code of Canada and a Rowan Williams Davies and Irwin, Inc report, the structure was designed using a range of -10°F to 130 °F. As a result thirty different thermal load combinations were applied to one side of the building which had more differential temperatures than the other sides. In addition, these combinations also reflect potential differential temperatures in the box columns and steel rods. In the initial analysis, it was determined that outriggers on the fifty first floor in the West-East direction were adequate in limiting the differential deflections between the exposed box columns and the interior columns. However in the North-South direction differential deflections exceeded L/100 due to lack of outriggers. To combat these thermal differentials, a thermal belt trusses was utilized at the twenty eighth and fifty first floors. These trusses shown in Figure 11 and Figure 12 on page 23 and 24 provide bonus redundancy and limited deflection to L/300.

1.2.3 Mechanical Existing Conditions

The New York Times building was designed to meet the plaNYC 2030 initiative, which strives to improve the built environment by reducing green house gas emissions by 30 percent. There were several integrated design approaches taken to meet these goals. Flack and Kurtz worked alongside architects Renzo Piano and FXFOWLE to provide Mechanical, Electrical, Plumbing, Fire protection and Telecommunications design for the core and shell. Flack and Kurtz also partnered with Gensler to design the interior fit-out. Using an integrated approach, a high performance facade was developed which uses low iron clear glass and ceramic rods for passive external shading.

The building cooling load is served by a 6250 ton chilled water system, which consists of five 1,200 ton centrifugal chillers and one 250 ton single stage absorption chiller. The chilled water is pre-cooled by the absorption chiller before it enters the centrifugal chillers. A natural gas-fired cogeneration plant with two parallel reciprocating engines provides the waste heat to run the absorption chiller. Both the chilled and condenser water system utilizes a variable flow primary pumping scheme, and a water-side economizer which provides "free cooling" and increased energy savings. Heating for the building is provided via high-pressure steam purchased from Consolidated Edison. Low-pressure steam is then distributed to each floor-by-floor air handler's heating coil. At an added cost, the New York Times Company also uses steam to humidify outdoor air.

Air distribution is achieved via variable air volume boxes for interior zones and fan powered boxes with heating coils for exterior zones. The floors occupied by the New York Times utilize an UFAD system. Swirl diffusers were installed to provide occupant control, while in high occupancy spaces perforated floor tiles provide a more visually pleasing layout. A traditional overhead ducted system was implemented on the Forest City Ratner floors. Demand controlled ventilation is achieved via carbon dioxide and VOC sensors located in the return ducts for each floor. Outdoor air is brought in through

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outdoor air units in the two mechanical penthouses on the 28^{th} and 51^{nd} floors, and then is distributed throughout the building.

The cogeneration plant provides 1.4 MW of electricity for the building year-round, and is located on the 5th floor roof of the podium building. With an efficiency of 85%, the plant provides 40% of the power needs of the New York Times Company. The plant waste heat is used in an absorption chiller to pre-cool the chilled water for the electrical chiller plant. Waste heat is also used to produce perimeter heating hot water in the winter months. The cogeneration plant's primary purpose is an uninterrupted power supply for critical spaces such as the New York Time's data center. The cogeneration plant is not connected to the grid for re-metering, but the site is backed up by on-site diesel generators.

1.2.4 Lighting/ Electrical Existing Conditions

1.2.4.1 Lighting Design

The design concept for the New York Times Building was to set a new standard for high rise development. The architect, Renzo Piano, was focused on establishing an archetypal beacon in the New York skyline. The ideas that are apparent throughout the design are lightness and transparency. To keep consistency with those concepts, the lighting design needed to highlight the exterior façade and also give spectators a view of the interior spaces. For individuals inside the building, the architecture was aimed at providing unimpeded views to the exterior from any location on any floor. Daylighting was an important factor that guided much of the architecture. The building is able to reduce most of the lighting load during the day due to proper daylighting. This was further confirmed by the day to day data collection by NYT.

Upon entering the building, one is immediately pulled from the crowded urban streets and plunged into the colorful and spacious lobby. The space is filled with rich colors and instantly instills a sense of comfort and relaxation. The lighting is very subtle but provides a bright and warm atmosphere. Daylight also fills the space from the curtain walls surrounding the exterior, as well as the courtyard in the center of the podium.

Continuing through the building to the office spaces, the ideas of lightness and transparency are kept intact. The office floors are lit to promote activity but still have a comfortable feeling similar to the main lobby. Each floor continues to please individuals with warm, vibrant colors. Every floor offers daylight and views to the exterior from any location.

The lighting system is comprised of around 18,000 luminaires. This large quantity is simplified by the use of only 20 different luminaire styles. This manner of product selection helps reduce the complexity of the design and also provides a sense of consistency through each space. The entire building utilizes a digitally addressable lighting interface (DALI) system with dimmable ballasts to harvest the benefits of daylight. The system provides energy savings above 50 percent. There are 15 zones per floor, each with their own photosensor. Every luminaire within a zone takes input from

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the respective photosensor and dims accordingly. The system also allows for the programming of individual luminaires to accommodate to varying lighting needs.

The overall design is impeccable. The lighting strategy utilizes the most advanced lighting solutions to provide complete control over each space. This report takes an in depth look at the lighting systems and daylight integration controls.

1.2.4.2 Electrical Design

The New York Times building is comprised of two main tenants; The New York Times and the Forest City Ratner Companies (FCRC). These two tenants have two different distribution methods throughout the building. The New York Times tenants use conduit for all feeders throughout their part of the building, whereas the FCRC tenants run busduct throughout their part of the building.

A commonality between them is the shared incoming service. Though the system is metered for every tenant, including the per floor fit-out of the FCRC floors, Consolidated Edison provides a main utility entrance to the entire building. The service entrance is located in the cellar and distributed from there to each of the floors above. The New York Times tenants also have a co-generation plant, 1.4 Megawatts, to supplement the utility need. Due to the importance of servers in the New York Times spaces, a UPS system is also located in the cellar and distributed accordingly. The entire building has a main diesel generator for emergency use. The building has the ability to have remote generators connected at street level, should the generator need to be serviced.

While the lighting, appliance, and mechanical panels are on a floor-by-floor design, the emergency panels are located every third floor. In addition, the UPS system has panels spaced out in a similar design. Each floor contains an east and west electrical room. The loads are ran to the nearest electrical room. Each floor also houses a mechanical room and a server room. The mechanical is believed to contain certain mechanical panels, though no information is available.

1.2.5 Construction Management Existing Conditions

1.2.5.1 Project Schedule

The detailed schedule represents the important activities that occurred during the construction of the New York Times Building. Below are some key durations and milestones, shown in Table 3, and Table 4 respectively, that were used in the General Conditions Estimate, shown in Table 13. A summary schedule is located below in Figure 13, and a detailed construction schedule is located in Appendix 7.1 on page 216.

ΑCTIVITY	YEARS	MONTHS	WEEKS	WORK DAYS
Construction Duration	3.5	42	182	910
Tower Crane	1.25	15	65	325
Material Hoists	2	24	104	520
Demolition	0.5	6	26	130
Foundations	1.5	18	78	390
Steel	1.5	18	78	390
Concrete	0.75	9	39	195
Curtainwall	1.25	15	65	325
Mech./Plum.	3	36	156	780
Electrical	2	24	104	520
Interiors	1.75	21	91	455

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Table 3: Key Construction Durations

DURATIONS	DATE	DURATIONS	DATE
Start of Construction	12/1/2003	Concrete Fill / Tower Topout	8/23/2006
Start Demolition	12/1/2003	Curtainwall - Poduim Finish	3/13/2006
Finish Demolition	6/30/2004	Curtainwall - Tower	1/3/2007
Start of Excavation Foundations	4/19/2004	MP - Start	5/3/2004
Finish Foundations	9/12/2005	MP - Finish	4/23/2007
Start of Steel Erection (Tower)	5/2/2005	Electrical - Start	8/19/2005
Start of Steel Erection (Podium)	7/26/2005	Electrical - Finish	4/12/2007
Steel Top Out	5/24/2006	Interior Finishes - Start	10/3/2005
Mobilize Podium Concrete	10/24/2005	Interior Finishes - Finish	6/20/2007
Podium Concrete Finished	12/6/2005	Remove Tower Cranes	7/25/2006
Mobilize Tower Concrete	7/18/2005	Remove Hoists	5/31/2007
Pour Concrete 51,52	7/24/2006	Project Closeout	6/20/2007

Table 4: Key Construction Deadlines

ID	Task Name	Duration	Start	Finish	2001		2002		2003	
					H1	H2	H1	H2	H1	H2
1	Owner Acquisition	657 days	Mon 7/2/01	Tue 1/6/04						
2	Documents Available	609 days	Mon 7/2/01	Thu 10/30/03		-				
3	Bid and Award	223 days	Tue 8/19/03	Thu 6/24/04						
4	Site Mobilization/Abatement and Demo	140 days	Mon 12/1/03	Fri 6/11/04						4
5	Foundations	330 days	Mon 12/22/03	Fri 3/25/05						5
9	Superstructure	1058 days	Mon 3/3/03	Wed 3/21/07					-	
10	Steel and Metal Deck	699 days	Fri 9/19/03	Wed 5/24/06						
19	Concrete	590 days	Fri 2/6/04	Thu 5/11/06						
24	Intumescent Paint Fireproofing	288 days	Thu 4/28/05	Mon 6/5/06						
29	Spray Fireproofing	291 days	Wed 3/23/05	Wed 5/3/06						
34	Curtain Wall	1058 days	Mon 3/3/03	Wed 3/21/07					_	
45	Roofing	354 days	Mon 6/6/05	Fri 10/13/06						
51	Building Systems	827 days	Wed 2/11/04	Thu 4/12/07						
52	Utilities	242 days	Thu 10/14/04	Fri 9/16/05						
53	MEP Coordination	214 days	Wed 2/11/04	Mon 12/8/04						
54	BATC	469 days	Mon 6/27/05	Thu 4/12/07						
55	HVAC	618 days	Wed 9/1/04	Fri 1/12/07						
56	Plumbing	367 days	Wed 9/1/04	Thu 1/28/06						
57	Fire Protection	432 days	Tue 5/10/05	Wed 1/3/07						
58	Electrical	432 days	Tue 5/10/05	Wed 1/3/07						
59	Fire Alarm	404 days	Mon 6/27/05	Thu 1/11/07						
60	Interior Finishes	434 days	Wed 6/15/05	Mon 2/12/07						
61	Core Program	434 days	Wed 6/15/05	Mon 2/12/07						
62	Perimeter Program	304 days	Thu 7/21/05	Tue 9/19/06						
63	NYT - Interior Program - Floor Handover	128 days	Tue 12/27/05	Thu 6/22/06						
64	FCRC - Tumovers	86 days	Mon 10/9/06	Mon 2/5/07						
65	Finish and Closeout	446 days	Mon 8/22/05	Tue 5/8/07						

Figure 13: Construction Summary Schedule



1.2.5.2 Project Estimate

Information was fairly difficult to obtain with regards to the New York Times Building Project. Much of the following information has been compiled and calculated using some conservative assumptions. The figures in the following section will include sources or assumptions from which the information has been found or calculated. The Architectural Record Project Portfolio of the New York Times Building states that the cost of the building "exceeds \$1 billion." For the purposes of remaining consistent in this report, the construction cost of the project will be assumed to be \$1 billion. A brief cost breakdown is shown in Table 5 :

Construction Cost	Construction Cost per Square Foot
\$ 1,000,000,000.00	\$667 / ft ²

There is not a detailed breakdown of actual systems cost for this project. A breakdown of systems cost will be outlined in the parametric cost estimate section below. This will provide a reference for approximately how much the systems of the building cost.

1.2.5.2.1 PARAMETRIC ESTIMATE WITH D4COST

There are very few buildings in the world that are similar to the New York Times Building in size and distinction. Because of its uniqueness, it was difficult to obtain similar buildings within the D4Cost estimation software that compare. The following four projects were selected in order to get a representative parametric estimate for the project. The buildings used for analysis are shown below in Table 6 :

Project Name	Project Location	Building Use	Size	Floors	Cost	Comparison to NYT
la-Lo Headquarters	Niles, IL	Office	267,334 ft ²	7	\$40,134,138	Building Type, Tower Form
YS DOT Region One Headquarters	Schenectady, NY	Office	125,000 ft ²	4	\$18,914,056	Building Type, LEED Silver
Preston Point Dffice/Retail/Condo	Louisville, KY	Office	105,768 ft ²	8	\$8,505,277	Building Type, Tower Form
SRO Residence	New York, NY	Residential	23,853 ft ²	5	\$2,830,057	Location

Table 6: D4 Building Selection

The first three projects were mainly chosen for their building type and relative size. There were not many tower structures in D4Cost and there were no "skyscrapers" in the project database. The NYS DOT project was especially useful in the estimate because it was a LEED Silver certified building. Increases in the systems cost due to the sustainable features of the New York Times Building can be found in the NYS DOT project. A smart averaging function was run with these projects selected, which produced a cost breakdown that would be similar to the New York Times Building. D4Cost came up with a total project cost of **\$432,957,936** with a square foot cost of **\$288.64/SF**. The estimate

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also includes costs of each division of the project. A detailed breakdown is available in Appendix 7.1, on page 221. The following is a breakdown of the costs of the major systems in the building, shown in Table 7:

System	Percentage of Project Cost	Cost per ft ²	System Cost for Total D4 Estimated Cost (\$432,957,936)	System Cost Projected for \$1 Billion Project Cost	
Electrical	19.97%	\$57.65	\$86,467,871	\$199,700,000	
Mechanical	17.49%	\$50.48	\$75,721,782	\$174,900,000	
Site Work	2.03%	\$5.87	\$8,801,948	\$20,300,000	
teel and Concrete	17.93%	\$51.77	\$77,657,644	\$173,300,000	

Table 7: Major Systems Cost Breakdown

Due to the change in CSI MasterFormat, multiple divisions had to be combined in order to come up with the systems costs. These systems costs are broken up in order to gain an accurate picture of the estimated costs of each of the systems and the projected cost of the systems actually installed in the New York Times Building.

1.2.5.2.2 RS MEANS SQUARE FOOT ESTIMATE

In order to obtain a more relevant square foot estimate in RS Means, a large amount of assumptions were required to be made. R.S. Means has no estimate for an office building that is more than 20 stories similar to the New York Times Building. The estimate was formed from the 11-20 story office building square foot estimate breakdown. The building system profile that was used was a double glazed heat absorbing tinted plate glass panels with a steel frame construction that had an area of 800,000 SF and a perimeter of 820 LF. This yielded a base cost per SF of \$139.50. The following adjustments were made to fit the profile of the New York Times Building, shown in Table 8:

Parimeter Adjustment 1,150 - 820 = 330 LF 330/100 * 1.3 = \$ 4.29 per SF Story Height Adjustment 14' - 10' = 4 ft 4'* 0.95 = \$ 3.80 per SF Total Cost per SF Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Parimeter Adjustment 1,150 - 820 = 330 LF 330/100 * 1.3 = \$ 4.29 per SF Story Height Adjustment 14' - 10' = 4 ft 4'* 0.95 = \$ 3.80 per SF Total Cost per SF Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
330/100 * 1.3 = \$ 4.29 per SF Story Height Adjustment 14' - 10' = 4 ft 14' * 0.95 = \$ 3.80 per SF Total Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Story Height Adjustment 14' - 10' = 4 ft 14' - 0.95 = \$ 3.80 per SF Total Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Story Height Adjustment 14' - 10' = 4 ft 4' * 0.95 = \$ 3.80 per SF Total Cost per SF Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
4'* 0.95 = \$ 3.80 per SF Total Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Total Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Total Cost per SF \$ 147.59 per SF Total SF Cost \$ 221,385,000
Total SF Cost \$ 221,385,000
Total SF Cost \$ 221,385,000
Basement Adjustment Basement Area 72,000 SF
Add per SF \$ 36.40 per SF
Total \$ 2,620,800

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Elevator Adjustment 4000# Capacity

			Base Elevator	Stops To	\$ per	Add Stop	Total Elevator
	Quantity	Stops	Cost (Each)	Add	Add Stop	\$ (Each)	Cost
Podium	3	4	\$ 433,000	-6	\$ 13,600	\$ (81,600)	\$ 1,054,200
Low Rise	6	15	\$ 433,000	5	\$ 13,600	\$ 68,000	\$ 3,006,000
Mid-Low Rise	6	28	\$ 433,000	18	\$ 13,600	\$ 244,800	\$ 4,066,800
Mid-High Rise	8	39	\$ 433,000	29	\$ 13,600	\$ 394,400	\$ 6,619,200
High Rise	6	52	\$ 433,000	42	\$ 13,600	\$ 571,200	\$ 6,025,200
Service	2	53	\$ 433,000	43	\$ 13,600	\$ 584,800	\$ 2,035,600
						Total	\$ 22,807,000

Total Square Foot Estimate\$246,812,800

Table 8: R.S. Means Cost Data

1.2.5.3 Existing Site Plan

The New York Times Building is located in downtown Manhattan, directly across 8th Ave. from the Port Authority Bus Terminal and approximately eight blocks Northwest from the Empire State Building. Due to a time lapse with regard to updating satellite imagery some visual data of the site when it was in construction can still be acquired through using Google Maps and Google Maps Street View, and several inferences can be made with regard to site logistics and temporary structures. A summary of the existing site plan is show n below in Table 9. For a more detailed site plan, refer to Appendix 7.1 on page 225.

The site was originally occupied by a variety of different functional areas, ranging from grade-level parking to multi-story mixed-use commercial and residential buildings. The site is bordered by two subway structures on the west and north sides. The 8th Avenue subway runs beneath 8th Avenue to the west, and the Flushing Local subway line runs beneath West 41st street to the north. The subway structure is roughly a box shape in the case of the 8th Avenue subway, while the subway was bored through the bedrock itself for the Flushing Local. Additionally, there is a pedestrian passageway constructed above the subway using cut and cover methods.

The building is surrounded by a variety of different building types, and coupled with the urban environment this creates significant pedestrian and vehicular traffic. Fencing around the perimeter of the site was erected to keep a secure site, as well as temporary Jersey Barriers to provide a temporary sidewalk in the surrounding streets. Pedestrian safety was a major concern during construction, and building codes required temporary structures for pedestrian protection as shown in Appendix 7.1 on page 226.

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Table 9: Existing Site Plan

1.2.5.4 Project Delivery Method

The New York Times Building utilizes a hybrid system of a Design-Bid-Build with a Construction Manager at-risk delivery. The core and shell delivery is by AMEC construction. Turner Construction Company delivers the interiors for the New York Times spaces. Floors 29 and above are owned by the developer Forest City Ratner Companies, and are to be constructed to the needs of the tenants. In a CM-at-risk delivery method, the owners hold contracts with the design team, architects and engineers, while the CM-at-risk holds contracts with the subcontractors. The construction management firm holds all risk by guaranteeing the cost and schedule to the owners. The hybrid system comes from the involvement of the design and construction teams having collaborative meetings to review and change the building design before construction while the owners were holding contracts with the parties. Architects Renzo Piano Building Workshop, along with architects FXFOWLE held design review meetings with interiors architect Gensler, as well as structural engineer Thornton Tomasetti and MEP engineers WSP Flack & Kurtz to discuss the design. These meetings were held before construction as well as throughout the construction of the building. There is also early involvement from specialty contractors, most notably with the curtain wall system. The early involvement from the interiors architect as well as specialty contractors is crucial to the success of the project.

1.2.5.5 Contract Types

While the owners did not release the exact contract types, three main contract types were most likely utilized. These three types are cost plus fee, guaranteed maximum price and lump sum.

The New York Times Company and Forest City Ratner Company most likely held a GMP contract with AMEC Construction and The New York Times Company may have held a cost plus fee contract with Turner due to the repetitive nature of the interiors construction. While this is not exactly known, these are reasonable assumptions toward the delivery of the project.

With a typical Design-Bid-Build / CM-at-risk delivery method, the construction manager is contractually bound to the subcontractors. While not confirmed, it can be assumed that AMEC Construction holds contracts with the subcontractors, most likely being a lump sum contract. A organizational chart is located below in Figure 14.



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1.2.5.6 Site Layout Planning

The New York Times Building is located in the Times Square District of Manhattan, directly across 8th Ave. from the Port Authority Bus Terminal and approximately eight blocks Northwest from the Empire State Building. There were four phases for the construction process- demolition, foundations (two parts), superstructure, and interior turnover. Please refer to Appendix 7.1, page 227, for more detailed information regarding the site layout planning for The New York Times Building site. General descriptions of major site logistics issues with a particular phase are outlined below. Please note that site layout plans were only obtained for the AMEC portion of the construction process as Turner plans were not obtained. It is assumed that the site layout plan remained largely the same following turnover for interior fit out.

1.2.5.6.1 Demolition

This phase consisted of the abatement of the existing structures on the block that the New York Times Building would ultimately occupy. Safety scaffolding was placed above the entirety of the 8th Avenue portion of the site, and partially along both the West 41st Street and West 40th Street site boundaries.

1.2.5.6.2 Foundations – Part I

The eastern portion of the site was demolished first- excavation then followed with the placement of the ramp in the northeast corner. The entire excavated area was surrounded with site fencing, and scaffolding was placed around the western cluster of existing structures that were still undergoing abatement. During this process, the foundation was placed (including deep foundations were placed in the southeast corner of the site).

1.2.5.6.3 Foundations – Part II

The remaining western portion of the site was demolished in the second portion of the foundation placement phase. The western portion of the site was then excavated (Ramp in NW corner) and foundations were placed.

1.2.5.6.4 Superstructure

The entirety of the steel erection took place during this phase. One tower crane was placed in the center of each of the northwestern and southwestern quadrants of the site. Personnel site access was allowed through the northern portion of the site, with staging areas on the northern and southern site boundaries. The subway exit could be closed on a provisional bases based on a permit obtained by the construction team.

1.2.5.6.5 Interior Turnover

For this phase, AMEC turned over the project to Turner Construction to complete the interior fit out of the project. It was assumed by the project team that the site layout plan would remain largely the same, for this portion of the project.

1.2.5.7 Detailed Structural Estimate

Note: Please reference Appendix 7.1, page 232, for a more detailed version of the structural systems estimate.

1.2.5.7.1 Foundations

The foundations of The New York Times Building consist of spread footings over the footprint of most of the site in addition to caissons located on the southeast side of the building. The exact size, locations and quantity for the deep foundation system is unknown, however several assumptions were made from based on the results from D4 cost analysis and RS Means Costworks. The total foundations cost came to approximately \$21,344,000.00 based on these assumptions.

1.2.5.7.2 Structural Steel Framing

Structural steel member sizes and lengths were taken from the existing Revit model, which were updated according to the provided structural drawings. Specialty columns are used throughout the structure, primarily consisting of the built-up plate columns within the core of the building in addition to flanged box columns on the exterior of the building. The structural steel framing estimate is summarized in Table 10 below.

QUANTITY	Unit	DESCRIPTION	PRICE
		STRUCTURAL STEEL MEMBERS	
398.55	L.F.	HSS6x4x3/8	\$30,758.10
53.7	L.F.	TT14x99	\$13,908.67
673.67	L.F.	W4x13	\$35,905.27
41.33	L.F.	W10x26	\$3,340.66
887.43	L.F.	W12x19	\$58,635.16
18.29	L.F.	W12x26	\$1,387.46
951.23	L.F.	W14x22	\$71,027.39
37.72	L.F.	W14x30	\$3,235.02
57	L.F.	W14x43	\$6,812.53
30	L.F.	W14x48	\$4,339.23
70.47	L.F.	W14x82	\$16,823.16
179.26	L.F.	W14x90	\$42,794.38
134.38	L.F.	W14x109	\$42,251.62
151.18	L.F.	W14x120	\$47,533.86
123.34	L.F.	W14x132	\$41,672.76
22.74	L.F.	W14x257	\$15,186.41
101.25	L.F.	W14x283	\$78,253.80
398.86	L.F.	W16x26	\$29,751.77
114.96	L.F.	W16x31	\$10,151.54
260	L.F.	W16x36	\$29,130.92
2310.15	L.F.	W18x35	\$233,606.99
364.18	L.F.	W18x40	\$41,313.31
280	L.F.	W18x50	\$39,064.76
120	L.F.	W18x60	\$21,241.08
120	L.F.	W18x65	\$21,241.08
72.49	L.F.	W18x71	\$14,827.11
160	L.F.	W18x76	\$32,726.40
174.12	L.F.	W18x106	\$48,734.10
56.5	L.F.	W18x130	\$10,042.54
123	L.F.	W18x143	\$21,862.51
260	L.F.	W21x50	\$35,763.00
122.12	L.F.	W21x57	\$20,506.76
60	L.F.	W21x101	\$15,970.08
78	L.F.	W21x132	\$24,829.90
225	L.F.	W24x76	\$45,424.58
60	L.F.	W33x130	\$20,272.14
60	L.F.	W33x141	\$21,924.00
120	L.F.	W33x221	\$70,898.52
		TOTAL	\$1,323,148.55

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QUANTITY	Unit	DESCRIPTION	PRICE
		STRUCTURAL COLUMNS	
110	L.F.	C-Channel-Column: C10X33	\$30,617.40
27.5	L.F.	W-Wide Flange-Column: W14X257	\$13,809.68
110	L.F.	FB-Flanged Box-Column: FB30X1116	\$235,974.53
55	L.F.	BU-Built Up-Column: W23X1168	\$123,408.30
27.5	L.F.	BU-Built Up-Column: W22X1032	\$54,210.38
13.75	L.F.	BU-Built Up-Column: W24X985	\$25,989.08
13.75	L.F.	BU-Built Up-Column: W23X729	\$19,133.06
55	L.F.	BU-Built Up-Column: W29X2063	\$216,841.46
27.5	L.F.	BU-Built Up-Column: W25X1401	\$73,981.23
55	L.F.	W-Wide Flange-Column: W14X665	\$70,154.59
55	L.F.	W-Wide Flange-Column: W14X730	\$76,532.28
		TOTAL	\$940,651.99

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Table 10: Structural Steel Estimate Summary

1.2.5.7.3 Slab System

In the slab estimate, structural concrete with a compressive strength of 4000 psi was used. The structural slab takeoff was generated through the common Revit model after applying a metal decking (18 gauge, 2" depth with 3.5" topping). An additional 5% was added to the concrete takeoff to account for waste in the construction process. Without knowing the exact welded wire fabric that was used in the project, a medium-sized fabric was selected (W2.9xW2.9, 42lb per CSF). The structural slab estimate summary is outlined below in Table 11.

QUANTITY	Unit	DESCRIPTION	PRICE
		WELDED WIRE FABRIC REINFORCING	
2244	C.S.F.	W2.9 x W2.9 (6 x 6) 42 lb. per C.S.F.	\$308,018.17
		TOTAL	\$308,018.17
		NORMAL WEIGHT CONCRETE, READY MIX	
255	C.Y.	4000 PSI, 3.5" topping	\$43,114.89
		TOTAL	\$43,114.89
		FLOOR DECKING	
22440	C.Y.	2" D, 18 ga	\$153,624.24
		TOTAL	\$153,624.24

Table 11: Structural Slab Estimate Summary

RS Means pricing was used to acquire the pricing for steel, concrete and reinforcing materials. While some steel members are in RS Means, some were required to be increased price due to RS Means lacking data for members of that size. A multiplier was developed from the change in weight per linear foot, as well as the member size to extrapolate a value for the larger-sized members.

The eighth floor was chosen as the typical floor for the analysis. For the purposes of this estimate, the eighth floor structural system was analyzed and the results were then

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extrapolated over the entire building to develop a more complete structural estimate. The total cost for the 8th floor was found to be \$3,163,071.33. This cost was then multiplied by 56 (48 tower floors along with a 4 story podium floors which are about 2 times the square footage of the typical tower floor. The extrapolated cost came to \$177,131,994.66 for the entire building. Considering the foundations cost of \$21,344,000.00, the final structural system cost comes to \$198,475,994.70.

1.2.5.8 General Conditions Estimate

1.2.5.8.1 *Overview*

The general conditions estimate for the New York Times Building includes costs from field staff and facilities, temporary utilities, temporary site protection, clean up, and rigging and hoisting equipment for the project. The general conditions estimate will be used to assess any cost savings that could be seen if there is an acceleration in the project schedule.

There are a few assumptions made in order to put the general conditions estimate together:

- The total construction cost of the New York Times Building is \$1 Billion.
- The square footage of the building is \$1.5 million square feet.
- Only on site personnel is included in the general conditions.
- Site offices and crane equipment is rented for the project.
- Site protection has been purchased for the project.
- All lifts and equipment besides the hoists and cranes listed in the general conditions will be provided by the subcontractors.

1.2.5.8.2 Construction Durations

Below, in Table 12, are listed the construction durations that factored into the general conditions estimate. There are 12 months in a year, 52 weeks in a year, and 5 work days in a work week.

ΑCTIVITY	YEARS	MONTHS	WEEKS	WORK DAYS
Construction Duration	3.5	42	182	910
Tower Crane	1.25	15	65	325
Material Hoists	2	24	104	520
Demolition	0.5	6	26	130
Foundations	1.5	18	78	390
Steel	1.5	18	78	390
Concrete	0.75	9	39	195
Curtainwall	1.25	15	65	325
Mech./Plum.	3	36	156	780
Electrical	2	24	104	520
Interiors	1.75	21	91	455

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Table 12: Construction Durations

1.2.5.8.3 Cost Breakdown

The general conditions on the New York Times Building project totaled \$ 96,971,123. This accounted for approximately 9.71% of the overall project cost. The field personnel cost contributes \$22,865,985 to the general conditions. That adds up to 2.3% of the overall project cost. This is shown in Table 13. A more detailed General Conditions estimate is located in Appendix 7.1 on page 235.

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Division	Description	Unit	То	tal	Quantity	Total Co	st
01 31 13.20	Field Personnel						
0020	Clerk, 6	Week	\$	380.00	1,092	\$	414,960
0140	Field Engineer, 45	Week	\$	1,350.00	8,190	\$	11,056,500
0220	Project Manager, 20	Week	\$	2,175.00	1,781	\$	3,873,675
0280	Superintendant, 35	Week	\$	2,025.00	3,714	\$	7,520,850
						\$	22,865,985
01 51 13.80	Temporary Utilities						
0100	Heat, including fuel and operation, per week, 12 hrs	CSF Flr	\$	30.27	13,846	\$	419,123
0350	Lighting, including service lamps, wiring, and outlets, maximum	CSF Flr	Ś	27.70	15.000	Ś	415,500
0600	Power for job duration including elevator, etc., min	CSF Flr	Ś	47.00	15.000	Ś	705,000
0650	Power for job duration including elevator, etc., max	CSF Flr	Ś	110.00	15.000	Ś	1.650.000
			T.			\$	3,189,623
10 52 13.20	Office and Storage Space		T				
0020	Trailer furnished no bookups 20' x 8' rent per month 8 Trailers	Each	Ś	163.00	576	Ś	93 888
0700	AC rent per month add	Each	č	41.00	576	¢	23,616
0800	For delivery, add per mile	Mile	č	4 50	600	¢	2 700
0000		white	Ť	4.50	000	š	120,204
01 52 12 40	Field Office Expense	-	-			•	,
0100		Month	ć	155.00	384	ć	59 520
0100		Month	ç	85.00	384	¢	32,520
0120	T clophone hill; avg, hill nor month	Month	ې د	83.00	204	э с	20 720
0140		Month	ې د	150.00	204	э с	57,600
0100		WORUT	Ŷ	130.00	304	¢	190.490
01 54 40 50	Transfer Conner		-			*	100,400
01 54 19.50	Truck Crane	M and b	ć	14 100 00	16	<i>.</i>	225 (00
0600	Fruck Mounted, hydrolic, 100 ton capacity	Nionth	Ş	14,100.00	16	\$	225,600
	Crew	Day	Ş	104.90	320	> ¢	33,308
	Mandela Tarras Carras Carras		-			\$	223,000
01 54 19.60	Monthly I ower Crane Crew						
0100	C rane, climbing, 106' jib, 6000 lb. capacity, 410 FPM	Month	\$	13,200.00	60	\$	792,000
	I ower Crane Crew	Day	Ş	37.40	2,400	\$	89,760
4550	Hoist and tower, mast type, 6000 lb., 100' high, month	Each	Ş	4,136.60	86	\$	357,402
4570	for each added 10' section, add, month	Each	Ş	196.20	5,616	Ş	1,101,859
						\$	2,341,021
01 56 26.50	Temporary Fencing						
0020	Chain Link, 11 ga, 6' high	L.F.	\$	8.51	980	\$	8,340
	Plywood, painted, 4" x 4" frame, 8' high	L.F.	\$	18.20	980	\$	17,836
						Ş	26,176
01 56 29.50	Temporary Protective Walkways						
2200	Sidewalk, 2" x 12" planks, 2 uses	S.F.	\$	1.60	16,000	\$	25,600
2500	Exterior Plywood, 2 uses, 3/4" thick	S.F.	\$	0.95	16,000	\$	15,200
						Ş	40,800
01 58 13.50	Signs						
0020	High intensity reflectorized, no posts, buy	S.F.	\$	21.00	1,000	\$	21,000
01 74 13.20	Cleaning Up						
0040	Maximum	Job		0.8%	\$1 Billion	\$	8,000,000
0050	C leanup of floor area, continuous, per day, during construction	M.S.F.	\$	27.23	1,670	\$	45,485
0100	Final by GC at end of job	M.S.F.	\$	56.44	1,670	\$	94,277
						\$	8,139,762
			T				
	Subtotal		1			\$	74,313,871
	Adjusted for Location (New York City, 130.7)		1		İ	\$	97,128.230

Table 13: General Conditions Summary

1.3 Proposal Summary

1.3.1 Core Redesign

The analysis of the structural core was intended to optimize the structural system. This will have an effect on architecture, constructability, and MEP distribution, therefore these affects will be analyzed in a collaborative effort.

1.3.2 Envelope Redesign

The analysis of the building envelope was intended to improve the indoor environmental quality while decreasing building energy consumption. This will have an effect on architecture, daylighting, ambient loads, construction costs, and the building's life-cycle.

1.3.3 **Tenant Space Redesign**

The analysis of the tenant spaces was intended to decrease the building's life cycle cost. To accomplish this, the building mechanical, lighting and structural systems along with the architectural changes were all analyzed for the benefit to the owner.

2 CORE REDESIGN

2.1 Core Changes

The lateral system was changed from a steel braced frame system to concrete shear walls with coupling beams. These changes resulted in significant cost savings and required coordination with the mechanical and electrical systems as well as architecture and construction. The BIM model was utilized to calculate the changes to cost, schedule and architectural layouts between the original design and the proposed changes. Because the structural system required more space within core for distribution purposes, a switch to aluminum bus duct from conduit was proposed. Additionally, air distribution duct work was rerouted. The BIM model also allowed for clash detection with all of these proposed system changes.

2.2 Lateral System

The following section pertains to the redesign of the lateral system of The New York Times Building tower. Within this section as per the structural designer's MAE requirements a computer model was created in ETABs for a concrete core only option. In addition to the ETABs model, the structural designer utilized basic dynamic principles learned in CE 548: Structural Design for Dynamic Loads to analyze the redesigned lateral system's acceleration.

2.2.1 **Objectives**

1) Eliminate the outriggers, thermal trusses, and X-bracing to increase transparency of the building

2) Create a model of the lateral system in ETABs to aid in maintaining dynamic properties of the building.

3) Create a model of the lateral system in Revit to aid in structural takeoffs.

2.2.2 Process

Design-

Determine an appropriate concrete lateral system that maintains strength and serviceability requirements

Coordination-

Work with the design team and the architectural advisor to determine an optimal solution for the structural core.

Modeling-

Model potential lateral system designs in ETABs

Utilize PCA Column for flexural reinforcing in irregular shaped shear walls

Takeoffs-

Determine the weight and mass of the building for lateral design by utilizing Revit

Analysis-

Determine appropriate wind loads to be applied to the lateral system

Determine the seismic loads on the building using the take-offs from Revit

Design and analyze the concrete shear walls and coupling beams

Determine if building drift and acceleration requirements are met.

2.2.3 Codes, References, and criteria

2.2.3.1 Original Design Codes and Deflection Criteria

National Model Code:

1968 Building Code of the City of New York with latest supplements

Structural Standards:

ASCE 7-98, Minimum Design Loads for Buildings and other Structures

Structural Design Codes:

AISC – LRFD, Steel Construction Manual 2nd edition, American Institute of Steel Construction

National Building Code of Canada, 1995

Uniform Building Code, 1997

Lateral Deflection Criteria:

Total building sway deflection for ten year wind is limited to H/450

The shortening and elongating effects due to thermal fluctuations is designed to L/300

Building peak acceleration for ten year wind should be between 15-27 mg

2.2.3.2 Thesis Design Codes and Deflection Criteria

National Model Code:

2006 International Building Code

Structural Standards:

ASCE 7-05, Minimum Design Loads for Buildings and other Structures

Structural Design Codes:

ACI 318-08 American Concrete Institute Building Code Requirements for Structural Concrete and Commentary

Lateral Deflection Criteria:

Total building sway deflection for ten year wind is limited to H/450

Building peak acceleration for ten year wind should be between 15-27 mg

2.2.4 Materials

Concrete:

Shear Walls:

Compressive strength of 10,000, 8,000, and 6,000 psi, Normal Weight

Coupling Beams:

Compressive strength of 10,000, 8,000, and 6,000 psi, Normal Weight

Reinforcing:

ASTM A-615, Grade 60

2.2.5 **Building Loads**

2.2.5.1 Load Cases

The following LRFD load combinations equations from ASCE 7-05 are the controlling equations for the design of the lateral structural members:

$1.2D+1.6W+L+0.5(L_r \text{ or } S)$	Equation 1
1.2D+E+L+0.2S	Equation 2
0.9D+1.6W	Equation 3
0.9D+E	Equation 4

Since the building drift due to wind is limited to H/450 and checking serviceability using factored wind load is excessively conservative due to winds short term effects, ASCE 7-05 § CC.1.2 allows the use of the following equation for drift due to wind:

D+0.5L+0.7W

Equation 5

2.2.5.2 Gravity Loads

The following gravity loads have been determined through IPD and multiply iterations of the gravity system design. The determination of these loads is explained in further detail in section 4.3Gravity System.

2.2.5.2.1 Dead Loads

Typical Tower Floor Dead Loads				
Load Description	Desi	Design Loads		
Ceiling (ACT, Drywall, and Architectural Ceilings)	5	psf		
Mechanical, Electrical, Plumbing in raised floor system	10	psf		
Total Superimposed:	15	psf		
Allowance for Steel Framing + Fireproofing	10	psf		
3" Composite Deck 20 GA (3VLI20), Unshored clear span 13'-3"	2	psf		
with a capacity of 149 psf, unprotected				
3.25" Light weight Concrete (110 pcf)	44	psf		
Total Construction Dead Loads:	56	psf		
Total Floor Dead Loads:	71	psf		

Table 14: Typical Tower Floor Dead Loads

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Typical Mechanical Floor Dead Loads			
Desi	gn Loads		
5	psf		
10	psf		
15	psf		
10	psf		
2	psf		
44	psf		
56	psf		
71	psf		
	Desi 5 10 15 10 2 44 56 71		

Table 15: Typical Mechanical Floor Dead Loads

Roof Dead Loads			
Load Description		Design Loads	
Ceiling (ACT, Drywall, and Architectural Ceilings)	5	psf	
Mechanical, Electrical, Plumbing in raised floor system	8	psf	
Total Superimposed:	13	psf	
Allowance for Steel Framing + Fireproofing	20	psf	
3" Composite Deck	5	psf	
5.0" Normal weight Concrete (145 pcf)	80	psf	
Total Construction Dead Loads:	105	psf	
Total Floor Dead Loads:	118	psf	

Table 16: Roof Dead Loads

Exterior Tower Wall System Dead Loads (Elevation)			
Load Description	Desig	gn Loads	
Double Skin Façade	30	psf	
Total Exterior Wall Dead Load:	30	psf	

Table 17: Exterior Tower Wall System Dead Load

2.2.5.2.2 *Live Loads*

Live Loads			
Load Description		gn Loads	
Office	70 psf		
Technology Floors	100	psf	
Elevator Lobbies	75	psf	
Corridors above First Floor	75	psf	
All Other Lobbies & Corridors	100	psf	
Exit Facilities	100	psf	
Retail Areas	100	psf	
Kitchen	150	psf	
Cafeteria	100	psf	
Auditorium (with fixed seats)	100	psf	
Light Storage Area	100	psf	
Loading Dock	250	psf	
Mechanical Floors	150	psf	
Mechanical/Fan Rooms	75	psf	
Sidewalks	250	psf	
Roofs	20	psf	

2.2.5.2.3 Snow Loads

Snow Load				
Load Description	Design	n Loads		
Ground Snow Load	25	psf		
Roof Snow Load	19.3	psf		
Drift Snow Load	35.3	psf		

Table 18: Live Loads

Table 19: Snow Loads

2.2.5.3 Lateral Loads

2.2.5.3.1 Wind Loads per 1968 NYBC

The New York Times Building was design under the 1968 Building Code of New York City. In Article 5 of subchapter 904.0 structural frames and exterior components are to be designed to resist wind pressure found in reference standard RS 9-5. Within this section of the code, wind loads can be calculated by design wind pressures given in Table 20 on page 50 or by wind tunnel testing of the building. The resulting base shears due to Table RS 9-5.1 are 4075 kips and 3297 kips in the West-East and North-South direction respectively. After consulting with Jeff Callow at Thornton Tomasetti, the resulting base shears due to the wind tunnel test are 3450 kips and 2850 kips in the West-East and North-South direction respectively. It should be noted that these base shears are service values and therefore unfactored. Also under the 1968 building code, an importance factor of 1.0 was used for wind design.

Table RS 9-5.1 Design Wind Pressures on Vertical surfaces				
Height zone (ft. above curb level)	Design Wind Pressure on Vertical Surfaces (psf of projected solid surface)			
	Structural Frame Panels Glass			
0-50 (signs and similar constructions of shallow depth only)	15	-		
0-100	20	30		
101-300	25	30		
301-600	30	35		
601-1000	35	40		
Over 1000	40	40		

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Table 20: RS 9-5.1 Design Wind Pressure, 1968 NYCBC

2.2.5.3.2 Wind Loads per ASCE7-05

In lieu of having the wind tunnel test, ASCE 7-05 was used to determine the wind loads per the 2006 International Building Code and the 2008 New York City Building Code. The following assumptions had to be made in order use Method 2: Analytical Procedure of ASCE 7-05:

- 1) The tower was analyzed with a rectangular foot print instead of a cruciform shape. Area was added at the corners of the façade to simplify the corner notches.
- 2) The screens around each face of the roof top allow air flow through them. To consider the wind load transferred to the lateral system, the screens were first treated as if they were a solid face of the building. After the windward pressure was calculated on this "solid face", a multiplier of 0.5 was implemented to account for the permeability of the screen. The resulting pressure was then transferred to the building.
- 3) Due to the permeability of the screens, no leeward pressure would develop.

Table 21 on page 51 summarizes the wind parameters of Method 2: Analytical Procedure. The resulting base shears due to Method 2 are 8995 kip and 7001 kips in the West-East and North-South direction respectively. The periods of vibrations were obtained from the final lateral design model using ETABs and will be discussed later. It should be noted that the importance factor changes to 1.15. Please refer to Structural, Table 64 through Table 70 on page 237 through page 243 for in-depth calculations on Method 2: Analytical Procedure.

Method 2 Wind Parameters Summary						
Variable	Value	Unit/Comments				
V	110	mph				
K _d	0.85					
Occupancy Category	3					
Importance Factor	1.15					
Surface Roughness Category	В					
Exposure Category	В					
Kzt	1.0					
В	194	feet				
L	157	feet				
C	0.990	West-East Direction				
$G_{\rm f}$	1.024	North –South Direction				
ζ	2%					
	6.46 s	West-East Direction				
Period of Vibration	6.64 s	North –South Direction				
	4.41 s	Torison				

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Table 21: Method 2 Wind Load Design Variables Summary

2.2.5.3.3 Wind Loads Utilized

Wind Load Design Summary							
Variable Wind Tunnel 1968 NYCBC ASCE7-05							
V _{base,WE}	3450 kips	4075 kips	8995 kips				
V _{base,NS}	2850 kips	3297 kips	7001 kips				
Importance Factor	1.0	1.0	1.15				
Importance Factor1.01.15							

Table 22: Wind Load Design Summary

Table 22 above summarizes the base shears due to the wind loads from the wind tunnel test, the 1968 NYCBC, and ASCE 7-05. Since a building of this size and magnitude would be designed using a wind tunnel test the decision was made to use the wind tunnel test base shears with an importance factor of 1.15 to account for updated codes. The resulting base shears are 3968 kips and 3278 kips in the West-East and North-South direction respectively. These base shears were then used to proportion the loads developed by ASCE 7-05 Method 2. The wind force diagrams in the West-East and North-South directions can been seen in Figure 15 on page 52 and Figure 16 on page 53 respectively. Please refer to Structural, Table 71 and Table 72 on pages 244 and 245 for the proportioned wind loads. All four cases of wind loading were considered and their story force values can also be found in Structural, Table 71 and Table 72 on pages 244 and 245.

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24 k	Roof
121 k	Floor 51
83 k	Floor 50
80 k	Floor 49
80 k	Floor 48
80 k	Floor 47
79 k	Floor 46
79 k	Floor 45
79 k	Floor 44
79 k	Floor 43
78 k	Floor 42
78 k	Floor 41
78 k	Floor 40
77 k	Floor 39
77 k	Floor 38
77 k	Floor 37
76 k	Floor 36
76 k	Floor 35
76 k	Floor 34
75 k	Floor 33
75 k	Floor 32
74 k	Floor 31
74 k	Floor 30
111 k	Floor 29
	51
112 k	Floor 28
75 k	Floor 27
72 k	Floor 26
72 k	Floor 25
71 k	Floor 24
71 k	Floor 23
70 k	Floor 22
70 k	Floor 20
69 k	Floor 20
69 k	Floor 19
68 k	Floor 17
68 k	Floor 16
67 k	Floor 15
63 k	Floor 14
66 к	Elpor 13
68 K	Floor 12
64 K	Floor 11
63 K	Floor 10
03 K	Floor 9
02 K	Floor 8
01K	Floor 7
50 k	Floor 6
50 k	Floor 5
00 K	Floor 4
01K	Floor 3
61 k	Floor 2
77 k	10012
441-	Floor 1
44 K	1 607 070 514
	1,021,219 FHK
	3,968 k

Figure 15: West-East Wind Force Diagram

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209 k			Roof
	102 k		Floor 51
	70 k		Floor 50
	68 k		Floor 49
	67 k		Floor 48
	67 k		Floor 47
	67 k		Floor 46
	67 k		Floor 45
	66 k		Floor 44
	66 k		Floor 43
	66 k		Floor 42
	66 k		Floor 41
	65 k		Floor 40
	65 k		Floor 39
	65 k		Floor 38
	65 k		Floor 37
	64 k		Floor 36
	64 k		Floor 35
	64 k		Floor 34
	63 k		Floor 33
	63 k		Hoor 32
	63 k		Floor 31
	62 k		Floor 30
	93 k		Floor 29
			Elect 26
	94 k		F100F28
	63 k		Floor 27
	60 k		Floor 26
	60 k		Floor 25
	60 k		Fiber 24
	59 k		Floor 23
	59 k		Floor 22
	58 k		Fiber 20
	58 k		Floor 10
	58 k		Floor 18
	57 k		Floor 17
	57 k —		Floor 16
	56 k		Floor 15
	53 k		Floor 14
	55 K		Floor 13
	57 k		Floor 12
	54 K		Floor 11
	53 K		Floor 10
	52 K		Floor 9
	51 K		Floor 8
	51 K		Floor 7
	50 k		Floor 6
	40 k		Floor 5
	40 K		Floor 4
	50 K		Floor 3
	50 k		Floor 0
	63 k		F1001 2
	0÷ 1	-	Floor 1
	36 k -		
			1,330,808 FLK
			3278 k

Figure 16: North-South Wind Force Diagram

2.2.5.3.4 Seismic Loads

Since New York City is not a high seismic region the equivalent lateral force method was use to determine the seismic forces acting on the building. Due to the varying bearing capacities of rock on the site, the lower bearing capacity equated to soft rock or Site Class C in ASCE 7-05. Therefore, Site Class C was used in the analysis to be conservative.

The USGS Ground Motion Parameter Tool and ASCE 7-05 was used in calculating the design spectral response acceleration. This yielded S_{DS} and S_{D1} values that corresponded to a seismic design category B using Tables 11.6-1 and 11.6-2. Using the period of vibration calculated in ETABs, 6.46 and 6.64 in West-East and North-South direction respectively, it was found that C_uT_a controlled over the period of vibrations and $C_s = 0.01$. Revit was used to accurately determine floor weights and subsequently the total building weight which can be found in Structural in Figure 147 and Figure 148 on page 246 and 247. From the total weight, the base shear was determined to be 1806 kips. Please refer to Structural in Table 73 through Table 78 on page 248 through 250 for indepth calculations on the seismic loads. Table 23 on page 54 summarizes the seismic parameters and Figure 17 on page 55 shows the seismic forces on the building in both West-East and North-South directions.

Due to the height and location of The New York Times Building, it was expected that the lateral loading due to wind pressure would control over seismic loadings in both strength and serviceability requirement. After comparing the results of the two loading conditions, it was clearly evident that this was the case.

Seismic Parameter Summary					
Site Class	С				
Importance Fator	1.25				
S _{DS}	0.290				
S _{D1}	0.079				
Seismic Design Category	В				
R	4				
$T = C_u T_a$	4.85 s				
C _s	0.01				
V _{base}	1806 kips				

Table 23: Seismic Parameters

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97.60 k	Roof
	Floor 51
121,86 k	Elever 50
84,59 k	Floor 49
81.32 k	Floor 48
78.11 k	Floor 48
73,18 k	Floor 47
71.91 k	Floor 46
68.90 k	Floor 45
66.11 k	Floor 44
61.65 k	Floor 43
60.39 k	Floor 42
57.87 k	Floor 41
59.56 k	Floor 40
55.10 k	Floor 39
56.93 k	Floor 38
51.28 k	Floor 37
48.63 k	Floor 36
44.85 k	Floor 35
43,65 k	Floor 34
41.21 k	Floor 33
38.93 k	Floor 32
35.57 k	Floor 31
35.10 k	Floor 30
37,56 k	Floor 29
-	
47.22 k	Floor 28
20.26 k	Floor 27
27.14 k	Floor 26
25.07	Floor 25
23.87 K -	Floor 24
23.90 K -	Floor 23
22.01 K -	Floor 22
19.47 K -	Floor 21
16.37 K	Floor 20
10.65 K	Floor 19
15.07 K	Floor 18
13,06 k	Floor 17
11.80 k	Floor 16
10,45 K	Floor 15
9.22 k	Floor 14
8.12 K	Eloor 13
7.18 k	Elogr 12
5.92 k	Elogr 11
5.35 k	Floor 10
4.15 k	Floor It
3.49 k	Floor 9
2,78 k	Floor 6
2.15 k	Floor 7
1.54 k	Floor 6
1.15 k	Floor 5
0.77 k	Floor 4
0.40 k	Floor 3
0.17 k	Floor 2
0 k 🗎	Floor 1
	1000 -

Figure 17: West-East & North-South Seismic Force Diagram

2.2.6 Shear Wall and Coupling Beam Design

As stated before the proposed lateral system redesign investigated changing the existing eccentric and concentric chevron bracing in the core to a concrete core with shear walls and coupling beams. The primary goal of this system is to eliminate the outriggers, thermal trusses, and X-bracing to increase transparency of the building. However the architecture of the core needed to change in order to allow for an efficient lateral design. On numerous occasions the design team met with the architecture advisor and agreed upon architectural changes of the core which is discussed in section 2.3 Core Architecture on page 65. In addition to changes of the core architecture, the architecture of the tenant spaces changed as well bringing all the exterior structural framing inside the building thus eliminating temperature differential on the structure and the need for the thermal trusses. Addition architectural changes are mentioned in section 4.2 Architectural Layouts on page 152. Two computer models of the lateral system were created to analyze the shear walls of the core, one for strength and one for serviceability. For initial sizing, shear walls were sized to resist the factored direct wind loads using

$$t_{wall} = \frac{V_u}{\phi 3 \sqrt{f_c} \times l_{wall}}$$

and maintaining the target period of vibration of 6.75 seconds. The New York Times Building tower was split into three sections where wall thicknesses, coupling beam sizes, and concrete strength would change going up the building. The following assumptions were made to the lateral model:

- 1. Each floor was treated as a rigid diaphragm.
- The gravity system was excluded in the lateral model, but the mass/area of the gravity system was included to correctly analyze the lateral system's period of vibration. These values can be found in Structural Table 73 and Table 78 on page 249 and 250 respectively.
- 3. Both inherent and accidental torsion effects were taken into account.
- 4. Seismic forces were applied to the center of mass of each floor and also applied at a 5% offset to model torsion effects.
- 5. Wind forces were applied at the center of pressure of each floor. Each of the 4 wind load cases listed in ASCE7-05 involving both direct and torsion effects were included.
- 6. The structure was assigned as a fixed base due to the spread footings and caissons bearing on rock
- 7. Coupling beams were assigned to be fixed at both ends.
- 8. P-Delta effects based on mass were considered.
- 9. Member stiffness were modified for both wind and seismic; 70% and 50% of the gross section properties for the shear walls respectively and 35% of the gross section properties for the coupling beams, based on ACI 318 § 8.8.1.
- 10. Shear walls were modeled as shell elements and coupling beams were modeled as frame elements. The masses of both elements were not zeroed to allow for potential ease of architectural and structural changes.

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After various structural design iterations and consulting with the design team and architecture advisor, a shear wall core design soon emerged. Table 24 and Table 25 on page 57 summarize the iterative initial lateral designs of the shear walls and coupling beams. The table includes wall thicknesses, coupling beam dimensions, concrete strength, and period of vibration due to serviceability requirements.

Initial Iterations of the Lateral Design Summary						
Option 1 Option 2 Option 3 Option						
1-18 Wall thickness (in)	30	24	24	30		
19-30 Wall thickness (in)	30	24	24	24		
30-52 Wall thickness (in)	30	24	24	18		
1-18 Beam depth (in)	36	36	36	36		
19-29 Beam depth (in)	36	36	36	36		
30-52 Beam depth (in)	36	36	36	36		
1-18 Beam width (in)	30	24	24	30		
19-29 Beam width (in)	30	24	24	24		
30-52 Beam width (in)	30	24	24	18		
1-18 Concrete Strength (ksi)	10	8	10	10		
19-29 Concrete Strength (ksi)	8	8	10	8		
30-52 Concrete Strength (ksi)	6	8	8	6		
T_x (sec) w/ $f_{22}=0.7$ & $I_g=0.35$	4.12	7.95	6.18	5.52		
T_y (sec) w/ f_{22} =0.7 & I_g =0.35	3.83	6.43	7.13	6.77		
T_z (sec) w/ f_{22} =0.7 & I_g =0.35	2.15	5.04	4.28	4.25		

Table 24: Initial Iterations of the Lateral Design Summary, Part A

Initial Iterations of the Lateral Design Summary						
	Option 5 Option					
1-30 Wall thickness (in)	30	30				
31-40 Wall thickness (in)	24	24				
41-52 Wall thickness (in)	18	18				
1-30 Beam depth (in)	36	44				
31-40 Beam depth (in)	36	44				
41-52 Beam depth (in)	36	44				
1-30 Beam width (in)	30	30				
31-40 Beam width (in)	24	24				
41-52 Beam width (in)	18	18				
1-30 Concrete Strength (ksi)	8	10				
31-40 Concrete Strength (ksi)	8	8				
41-52 Concrete Strength (ksi)	6	6				
T_x (sec) w/ f_{22} =0.7 & I_g =0.35	6.82	6.64				
T_y (sec) w/ f_{22} =0.7 & I_g =0.35	6.40	6.46				
T_z (sec) w/ f_{22} =0.7 & I_g =0.35	4.63	4.41				

Table 25: Initial Iterations of the Lateral Design Summary, Part B

2.2.6.1 Center of Rigidity and Center of Mass

The center of rigidity or COR and center of mass or COM was calculated using the ETABs model. Since the tower floor plan and the lateral system are symmetrical in shape the COR and the COM are in the same location on all floors. Because the COR is exactly located at the COM, moments due to torsional shear will not exist.

2.2.6.2 Strength Checks



Figure 18: Concrete shear walls in the core

Strength spot checks were performed on shear walls SW1 & SW2 at ground level and all the coupling beams CB1 and CB2 at all floors. Shear forces and moments on each element were determined from the ETABs model. It was determined the coupling controlled the design of the lateral system. Due to large shear stresses in the coupling beams at floor 27 through 30, the depth of the beams were increased from 36 inches to 44 inches and the compressive strength of the concrete was increased to 10,000 psi in order to avoid using diagonal reinforcing in the coupling beams. The coupling beams were designed using force redistribution which was typically applied to groups of three coupling beams to decrease reinforcing in beams with higher forces and increase reinforcing in beams with lower forces. The controlling wind cases for the North/South and West/East direction were found to be from the direct wind. Hand calculations were used to design the shear reinforcing for SW1, SW2, CB1, and CB2. Table 26 and Table 27 shows a summary of the shear design of the walls, flexure design of wall SW2 and flexure and shear design of a few of the coupling beams.

Shear Walls	Horiz. Shear Reinf.	Vert. Shear Reinf.	Flexural Reinf.		
SW 1 Y	(2) # 9 @ 6 in	(2) # 9 @ 12 in	See DCA sutmut		
SW1X	(2) # 8 @ 18 in	(2) # 8 @ 18 in	See PCA output		
SW 2 Y	(2) # 7 @ 16 in	(2) # 7 @ 16 in	(2) # 10 @ 6 in		
Table 26: Shear Wall Reinforcing Summary					

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Coupling	Loval	f'c	Dimensions	Тор	Bottom	Shear
Beam	Level	(psi)	(in)	Reinf.	Reinf.	Reinf.
CB2	52	6000	18X44	(5) # 8	(5) # 8	#4 @ 8in
CB2	35	8000	24X44	(7) # 10	(7) # 10	#4 @ 4in
CB2	1	1000	30X44	(7) # 9	(7) # 9	#4 @ 9in
CB1	30	1000	30X44	(12) #10	(12) #10	#4 @ 2in
CB1	15	1000	30X44	(9) # 9	(9) # 9	#4 @ 6in
CB1	1	1000	30X44	(10) # 8	(10) # 8	#4 @ 8in

Table 27: Coupling Beam Reinforcing Summary

The flexural reinforcing for SW1 was designed using PCA column. Figure 19 through Figure 22 on pages 59 through 61 shows the moments and shears caused by the wind in each direction. These wind values were then combined with the axial load due to gravity on SW1. The controlling load combination for SW1 was Equation 3, 0.9D +1.6W. Please note that wind does not always act on a structure directly which is why SW1 was subjected to biaxial bending with 100 % wind in one direction and 30% wind in the other direction at the same time. For in-depth calculations on the design of the shear walls and coupling beam reinforcing refer to Structural Figure 149 through Figure 177 on page 251 through 274.



Figure 19: Moments due to wind in X-Direction

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Figure 20: Moments due to wind in Y-Direction



Figure 21: Shears Moments due to wind in X-Direction



Figure 22: Shears Moments due to wind in Y-Direction

2.2.6.3 Building drift and acceleration

Wind and seismic drifts were computed by ETABs using Equation 5, D + 0.5L + 0.7W for all wind cases and unfactored for seismic. The higher drifts were due to direct wind load which is expected in regions were seismic does not typically drive the design of structures. Wind drift was compared to $\Delta_{wind} = H/450$ for the entire building drift in the North-South and West-East directions. The following chart summarize the building drift due to wind based on ETABs output.

West/East Case1 Wind						
Story	Story Height Below (ft)	Displ. X (in)	Allowable Total Displacement (in)			
GEODY/20	26.02	10.070		$\Delta_{\text{wind}} = \mathbf{f}$	1/450	
STORY52	26.83	12.973	<	19.880	OK	
STORY51	14.42	12.257	<	19.164	OK	
STORY50	13.75	11.873	<	18.780	OK	
STORY49	13.75	11.508	<	18.413	OK	
STORY48	13.75	11.143	<	18.047	OK	
STORY47	13.75	10.780	<	17.680	OK	
STORY46	13.75	10.418	<	17.313	OK	
STORY45	13.75	10.058	<	16.947	OK	
STORY44	13.75	9.701	<	16.580	OK	
STORY43	13.75	9.346	<	16.213	OK	
STORY42	13.75	8.996	<	15.847	OK	
STORY41	13.75	8.650	<	15.480	OK	

STORY40	13.75	8.309	<	15.113	OK
STORY39	13.75	7.973	<	14.747	OK
STORY38	13.75	7.641	<	14.380	OK
STORY37	13.75	7.315	<	14.013	OK
STORY36	13.75	6.994	<	13.647	OK
STORY35	13.75	6.680	<	13.280	OK
STORY34	13.75	6.374	<	12.913	OK
STORY33	13.75	6.075	<	12.547	OK
STORY32	13.75	5.786	<	12.180	OK
STORY31	13.75	5.506	<	11.813	OK
STORY30	13.75	5.235	<	11.447	OK
STORY29	27.50	4.978	<	11.080	OK
STORY28	14.58	4.473	<	10.347	OK
STORY27	13.75	4.213	<	9.958	OK
STORY26	13.75	3.973	<	9.591	OK
STORY25	13.75	3.737	<	9.224	OK
STORY24	13.75	3.505	<	8.858	OK
STORY23	13.75	3.279	<	8.491	OK
STORY22	13.75	3.058	<	8.124	OK
STORY21	13.75	2.841	<	7.758	OK
STORY20	13.75	2.630	<	7.391	OK
STORY19	13.75	2.425	<	7.024	OK
STORY18	13.75	2.225	<	6.658	OK
STORY17	13.75	2.032	<	6.291	OK
STORY16	13.75	1.845	<	5.924	OK
STORY15	12.58	1.664	<	5.558	OK
STORY14	14.92	1.505	<	5.222	OK
STORY13	13.75	1.324	<	4.824	OK
STORY12	13.75	1.165	<	4.458	OK
STORY11	13.75	1.014	<	4.091	OK
STORY10	13.75	0.872	<	3.724	OK
STORY9	13.75	0.739	<	3.358	OK
STORY8	13.75	0.614	<	2.991	OK
STORY7	13.75	0.500	<	2.624	OK
STORY6	13.75	0.396	<	2.258	OK
STORY5	14.32	0.303	<	1.891	OK
STORY4	15.47	0.217	<	1.509	OK
STORY3	15.47	0.140	<	1.097	OK
STORY2	25.66	0.088	<	0.684	OK

Table 28: Case 1 West/East Wind Drifts

North/South Case1 Wind					
Story	Story Height	Displ. X (in)	Allowable Total Displacement (in)		
	Delow (II)		$\Delta_{\text{wind}} = \mathbf{H}/450$		
STORY52	26.83	12.973	<	19.880	OK
STORY51	14.42	12.257	<	19.164	OK
STORY50	13.75	11.873	<	18.780	OK
STORY49	13.75	11.508	<	18.413	OK
STORY48	13.75	11.143	<	18.047	OK
STORY47	13.75	10.780	<	17.680	OK
STORY46	13.75	10.418	<	17.313	OK
STORY45	13.75	10.058	<	16.947	OK

STORY44	13.75	9.701	<	16.580	OK
STORY43	13.75	9.346	<	16.213	OK
STORY42	13.75	8.996	<	15.847	OK
STORY41	13.75	8.650	<	15.480	OK
STORY40	13.75	8.309	<	15.113	OK
STORY39	13.75	7.973	<	14.747	OK
STORY38	13.75	7.641	<	14.380	OK
STORY37	13.75	7.315	<	14.013	OK
STORY36	13.75	6.994	<	13.647	OK
STORY35	13.75	6.680	<	13.280	OK
STORY34	13.75	6.374	<	12.913	OK
STORY33	13.75	6.075	<	12.547	OK
STORY32	13.75	5.786	<	12.180	OK
STORY31	13.75	5.506	<	11.813	OK
STORY30	13.75	5.235	<	11.447	OK
STORY29	27.50	4.978	<	11.080	OK
STORY28	14.58	4.473	<	10.347	OK
STORY27	13.75	4.213	<	9.958	OK
STORY26	13.75	3.973	<	9.591	OK
STORY25	13.75	3.737	<	9.224	OK
STORY24	13.75	3.505	<	8.858	OK
STORY23	13.75	3.279	<	8.491	OK
STORY22	13.75	3.058	<	8.124	OK
STORY21	13.75	2.841	<	7.758	OK
STORY20	13.75	2.630	<	7.391	OK
STORY19	13.75	2.425	<	7.024	OK
STORY18	13.75	2.225	<	6.658	OK
STORY17	13.75	2.032	<	6.291	OK
STORY16	13.75	1.845	<	5.924	OK
STORY15	12.58	1.664	<	5.558	OK
STORY14	14.92	1.505	<	5.222	OK
STORY13	13.75	1.324	<	4.824	OK
STORY12	13.75	1.165	<	4.458	OK
STORY11	13.75	1.014	<	4.091	OK
STORY10	13.75	0.872	<	3.724	OK
STORY9	13.75	0.739	<	3.358	OK
STORY8	13.75	0.614	<	2.991	OK
STORY7	13.75	0.500	<	2.624	OK
STORY6	13.75	0.396	<	2.258	OK
STORY5	14.32	0.303	<	1.891	OK
STORY4	15.47	0.217	<	1.509	OK
STORY3	15.47	0.140	<	1.097	OK
STORY2	25.66	0.088	<	0.684	OK

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Table 29: Case 1 North/South Wind Drifts

In addition to building drift, the structural designer utilized basic dynamic principles to analyze and check the acceleration of the building under wind loading. The acceleration of the building was checked according to Lawrence Griffis' paper titled "Serviceability Limit States Under Wind Load". For tall buildings it is necessary to check the acceleration, because even if drift limits are met acceleration issues can cause human discomfort. The hourly mean wind speed at the top of building was determined by back calculating the speed using the base shears due to wind and the excel spreadsheet

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developed for ASCE 7-05 Method 2 This speed was used in determining the drag, lift, and torsional root mean square acceleration of the building. From these accelerations, it determined that the peak acceleration of the building is 14.6 mili-g's. This acceleration is deemed acceptable due to the recommended range of peak acceleration being between 15 to 27 milli-g's for commercial buildings. Table 30 summarizes calculated acceleration values of the building. For more in-depth calculation refer to Structural Figure 177 on page 274.

Building Acceleration Summary				
Mean hourly roof wind speed	63.3 mph			
H/B	4.63			
T _L	6.46 sec			
T _D	6.64 sec			
T_{θ}	4.41 sec			
g _p	3.75			
$A_D(Z)$	1.86 milli-g			
$A_L(Z)$	2.72 milli-g			
$BA_0/SQRT(2)$	2.09 milli-g			
A_R	3.90 milli-g			
A _{peak}	14.6 milli-g			

Table 30: Building Acceleration Summary

2.2.7 Foundation Impacts

The overturning moment due to wind controlled the design of the shear wall SW1. This calculation can be seen in the PCA Column output. However, the foundations under the lateral system will have to change. With disengaging all of the columns in the lateral design, their foundations will most likely be smaller due to the removal of moments due to wind acting on the columns. Under the core, a mat foundation will be constructed to help distribute the added weight of the concrete shear walls. Due to the foundation not being part of the design team's scope, in-depth calculations were not performed.

2.2.8 **Conclusions**

Structurally the concrete core is an alternative feasible lateral design. The final design has 30 inch thick walls with 10,000 psi concrete at the base to the 30th floor, 24 inch thick walls with 8,000 psi concrete from the 31st to the 40th floor, and 18 inch thick walls with 6,000 psi concrete from the 41st to the roof. The coupling beams are all 44 inches deep and the width and concrete strength change with the shear walls. From this analysis, it was determined that the base shears were 3,968 kips and 3,278 kips in the west-east and north-south directions respectively. The periods of vibrations were determined to be 6.46 seconds and 6.64 seconds in the west-east and north-south directions respectively. It was also determined that the total building drift is H/690 and the acceleration is 14.6 milli-g's. From these results, the system was deemed acceptable and the goal of eliminating the out riggers, thermal trusses, and x-bracing to increase transparency of the building is achieved. Additional benefits of the concrete core can be seen in the cost and constructability.

2.3 Core Architecture

2.3.1 **Design Review**

Due to changing the core to concrete, there was issue between structural needs and the architectural desires to maintain a feeling of openness and transparency for occupants and casual observers of the building. The design team met with the architectural advisor and structural advisor to determine an effective solution in order to maintain the architect's vision. This can be seen in Figure 23.



Figure 23: Transparency of Lobby

2.3.2 **Codes**

With the changes to the core from steel to concrete, architectural layouts within the core were changed to account for the new dimensions of the core. Codes that were taken into account were mainly for the shifting of the emergency stairs toward the core walls as shown between Figure 24 and Figure 25. The code dictated that door to door swings in series must be at least 48" apart. This needed to be maintained with the new architectural changes. Core architecture is also discussed in section 4.2.



Figure 24 - Existing Emergency Stair

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Figure 25 - Proposed New Emergency Stair

Codes were also investigated for fireproofing of the new structural core walls and coupling beams. Code requires a 2-hr fire rating, and by having a 1 ¹/₂" concrete covering for the rebar, a 4-hr fire rating is achieved, which is twice the rating that code requires. This also allowed for framing the exposed areas of the metal stud wall with a single layer of GWB for a total thickness of 2" and a fire rating of 1-hr instead of a metal stud wall with two layers of double thickness GWB with a total thickness of 5" and a 2-hr fire rating. These areas would be framed for the purpose of supplying a structure for mounting interior finishes to the interior without drilling into the wall, and to avoid painting directly onto the concrete. This also gave a total fire rating of 5-hrs, which is well above the required rating of 2-hrs. This is shown in Figure 26.

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Figure 26 - Differenct in Wall Thicknesses

2.3.3 Conduit to Bus Duct

The following section discusses the change from conduit to bus duct within the New York Times tenant space.

2.3.3.1 Objectives

Goal of this evaluation/analysis/redesign

- 1) Minimize the space required for the vertical distribution up the building.
- 2) Lower the cost for the installation of the vertical distribution.

2.3.3.2 Process

Collaboration-

Work with the CM and Structural designer to determine the best location for the new bus duct riser.

Take off-

Quantify the length of conduit used in the existing vertical distribution by using PDF measuring tool.

Cost Analysis-

Create an excel sheet with inputs for cost and quantity to given floors. This will be done for both the existing conduit and the new bus duct distribution.

Modeling-

Model bus duct in the Revit model of the building to minimize clashes with other systems.

2.3.3.3 Assumptions

The cost data is taken from RS Means 2009 Electrical Cost Data.

		Material/Labor		
3.5" Steel Conduit		\$53.30		
500 MCM Conductor		\$21.45		
1600 Amp Al	5			
Plug-	in	\$624.00/ft		
Feed	er	\$598.00/ft		
90 L/	/R	\$3380.00/unit		
90 U	/D	\$3380.00/unit		
Cente	er Tap	\$4192.50/unit		
2500 Amp Al	5			
Plug-	in	\$923.00/ft		
Feed	er	\$910.00/ft		
90 L/	′R	\$4387.50/unit		
90 U	/D	\$4387.50/unit		
Cente	er Tap	\$5850.00/unit		

2.3.3.4 Design Intent

Due to increased structural space requirements within the core, a switch from conduit to bus duct was analyzed. The location on the floor where the current conduit is run is the location where the structure needs more room. Because of this, all of the vertical feeders need to be relocated into the electrical room. Due to the size of the electrical room, bus duct is needed to save room. The analysis took into consideration both space requirements and cost. The New York Times Company installed conduit throughout their part of the building. This was run throughout the entire riser. The Forest City Ratner Company ran bus duct in their riser. Because of this, it was thought that the switch to bus duct would be effective.



Figure 27: Bus Duct Model

The previous system consisted of 9 sets of 3.5" conduit with (4) 500mcm conductors per conduit. This was run to both the east and west electrical rooms. These were run into the 480Y/277V panel and to a 75kVA transformer for the 208Y/120 panels. There were also 6 sets of 3.5" conduit with (4) 500mcm conductors per conduit. These were run to the mechanical rooms. In total, the riser for the New York Times Company consisted of (24) 3.5" conduits. An estimate was done to get a baseline for the cost comparison. The total cost was estimated at \$1,199,876.60. The conduit runs to the electrical rooms totaled \$855,584.23 while the mechanical runs totaled \$344,292.37. (See Figure 243: Existing Conduit Cost Spread Sheet for Electrical Room Feeders and 342Figure 244: Existing Conduit Cost Spread Sheet for Mechancail Rooms on page 341)

It was assumed that each of the conduits were connected to a 320 amp breaker. To prevent over sizing the bus duct, 75% of the 320 amps was taken per feeder. This brought the ampacity per feeder to 240 amps. The nine electrical feeders per side totaled 2160 amps. The 6 mechanical feeders totaled 1440 amps. The sizing of the bus duct would be 2500 amps to the two electrical rooms and a 1600 amp bus to the mechanical room.

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As aluminum is the cheaper of the two types of bus duct, the analysis considered the cost difference between the existing conduit and switching to an aluminum bus. The take off was done from the existing riser diagrams. The cost data was taken from the 2009 RSMeans electrical cost data. All numbers were adjusted for the New York City area. All tap boxes and 90 degree turns were accounted for within the bus duct, but terminations of the conduit for existing costs were not included. Because of this, it is felt that the cost analysis of switching to bus duct is a conservative number.

The 1600 amp bus for the mechanical rooms cost \$448,162.00 for labor and materials. The 2500 amp bus for the electrical rooms each cost \$653,061.50. Since there would be one 2500 amp per side of the building, the total cost for the electrical rooms would be \$1,306,123.00. The final cost for this analysis would come to \$1,754,285.00. This proved that there are no cost savings, but actually an increased cost. Copper would save additional space, but because the aluminum bus already increased the cost, it was not analyzed.

	1600 Amps			2500 Amp			
	1 Set			1 Set per side			
	1-28			1-28			
	Length/#	Mat Cost	Lab Cost	Length/#	Mat Cost	Lab Cost	
Plugin	388	\$624.00		388	\$923.00		
Feeder	120	\$598.00		120	\$910.00		
90 L/R	3	\$3,380.00		3	\$4,387.50		
90 U/D	2	\$3,380.00		2	\$4,387.50		
Taps	28	\$4,192.50		28	\$5,850.00		
	Total	\$448,162.00		Total	\$653,061.50		
		System Choices					
		(1) 1600 Amp Sets & (1) 2500 Amp					
		Total Cost	\$1,754,285.00				

Figure 28: Aluminum Bus Duct Cost Spread Sheet

The space that the feeders take up was the driving force for this analysis. The existing conduits are 3.5" in diameter. For the electrical runs, this means there is a total of 86.59 square inches of conduit per side. For the mechanical room, there is 57.73 square inches of conduit. This totals 230.91 square inches of conduit. This seems small, but when they are spaced out throughout a wall, they take up a significant amount of space because of access room. The 1600 amp bus duct is 9.25" by 4.5 inches or 41.63 square inches. The 2500 amp bus duct is 15.5" by 4.5" or 69.75 square inches. The bus duct area would total 181.13 square inches. This may not seem like much, but the bus ducts have many
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benefits. There is virtually no turning radius for bus duct. The bus can be installed in 90 degree turns. In addition, the bus duct does not need pull boxes. Because of the amount of other material needed for the conduit, there are added space savings which have not been accounted for here.

A second benefit to switching to bus duct is its flexibility. If there are ever any additional electrical needs on any floor of the building, a panel could be added. As long as there is enough spare capacity, a simple tap onto the bus duct can be made. In order to add other panels with conduit, an additional run may have to be made. This can be a costly addition when a building is already constructed, enclosed, and finishes installed.

In order to complete this redesign, the distribution panels would also need to be redesigned. The existing feeder system runs power to multiple rooms on a given floor from the same distribution panel. This would need to be changed to have a single distribution panel per designated rooms up the building. From an installation point of view, this would be less complicated.

2.3.3.5 Conclusion

The aluminum bus duct design will be more expensive, but the bus duct has many advantages. For this reason, a switch to bus duct within the core of the building for the New York Times Company was completed. (See Figure 33: Resolved Bus Duct vs. Floor Slab Clash Result on page 78)

2.3.4 Mechanical Coordination

The following section discusses implications on the ducted air distribution layout resulting from the redesign of the core structure and architecture.

2.3.4.1 Objectives

1) Maintain adequate space for the air highway running through the core

2) Layout a schematic ducted design for the new air distribution system and run clash detection for possible obstructions to determine further rerouting.

2.3.4.2 Process

IPD coordination

Discussion with the Construction Manager and Structural designer to determine the best location to reroute ductwork through the core. Evaluate feasibility of maintaining existing air highway.

BIM coordination

Create 3D model of new ductwork in tenant space and through core to minimize clashes with other systems.

2.3.4.3 Assumptions

Space loads were calculated in IES <VE> and adjusted for the proposed Displacement Ventilation system. Diffusers and ductwork were sized and imported into the Revit MEP model. An in depth description of the air distribution analysis is discussed in Section 4.5. This 3D model was then exported to Navisworks for clash detection.

2.3.4.4 Design Coordination

In the New York Times Building, heating, cooling and ventilation is achieved through an air distribution system. The floors occupied by The New York Times Company utilize an under floor air distribution (UFAD) system. A traditional overhead ducted system was implemented on the floors occupied by Forest City Ratner. Fresh air is brought in through outdoor air units in the two mechanical penthouses on the 28^{th} and 51^{nd} floors, and is then distributed throughout the building to each floor air handler. The existing air highway through the core delivers air from the floor air handling unit to the space.

It was determined that the location of the existing air highway provided the optimal location for the each floor main duct branch. The proposed air distribution system, discussed in detail in Section 4.5 required sufficient space for ductwork. Therefore, this main branch of ductwork was also utilized for the displacement ventilation distribution. Due to the implementation of the concrete core shear walls, this location was obstructed and the ductwork required rerouting, as shown in Figure 29: Ductwork Penetration through Concrete Core Wall. The interior corridors through the core did not provide access to the Air Handling Units located in the utility rooms. Therefore, the ductwork was rerouted, shown in Figure 30 - Rerouting of Ductwork, after discovering duct-through-concrete penetrations visible in the 3D Revit model.



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Figure 30 - Rerouting of Ductwork

2.3.4.5 Conclusion

Through the early collaborative coordination and visualization of the BIM software, including the modeling of proper duct sizes and locations, the design team caught potential design problems before they would become costly to redesign.

2.3.5 Clash Detection

Clash detection is a very useful tool, and its implementation on a project can be very beneficial to a projects success. By utilizing a Building Information Model and clash detection software, problems can be found before construction of the building starts instead of in the field during construction. The result is a reduction in rework and

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material expenditure as well as eliminating conflict between trades in the field. While some owners, designers and contractors are still avoiding the implementation of Building Information Modeling due to unfamiliarity, higher upfront costs, and skepticism toward delivering a better finished product.

2.3.5.1 Objective

The goal of this research was to investigate the possibility of utilizing the created Building Information Model to find clashes prior to construction of the building to avoid conflict in the field.

2.3.5.2 Process

IPD Coordination-

Structural, Electrical and Mechanical input to locations of primary building components.

Model Input-

Completed structural model.

Electrical bus duct risers.

Mechanical risers.

Typical $8^{\rm th}$ floor mechanical duct branches and terminations .

Exportation of individual 3D elements to Navisworks file format.

Analysis-

Compile all files in Navisworks Manage.

Complete clash detection between primary structural, electrical and mechanical components.

Review clashes to determine most critical issues, or if found clashes are not true clashes, i.e. clashes equal to a clash length of 0'-00''.

Hold meetings between the design team members to determine the possible solutions to found clashes.

Repair the clashes within the model.

Re-run clash detective to confirm solutions to clashes.

2.3.5.3 IPD/BIM Coordination

The first meetings were held to agree that major duct branches from the mechanical rooms would not go through the proposed concrete core walls or concrete coupling beams, but through openings between the core walls. Because of this, the decision was made to keep the raised floor system, but run ductwork between the plenum created between the structural concrete slab and the raised floor. This would eliminate the need for any penetrations through the concrete shear walls, shown in Figure 31.



Figure 31: Initial Mechanical Coordination Through Core

2.3.5.4 Clash Results

A clash detection and report test was run between the proposed electrical bus duct risers in the core and the new riser openings of the concrete floor slabs. This was chosen in order to eliminate problems in the field with bus ducts not lining up to travel vertically through the floor openings which extend the height of the entire building. The first result, show in Figure 32, found that the modeled bus duct and connection and support structure conflicted with the concrete floor slab.

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Figure 32: Original Bus Duct vs. Floor Slab Clash Result

By moving the location of the bus ducts ¹/₂'' through the entire height of the building, it was possible to resolve the found clashes everywhere. This is shown below in Figure 33. While this may not be as large of a problem in the field, it shows the capability of the technology to properly detect the problems in the model, and to resolve and eliminate potential problems in the field before there are additional costs.

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Figure 33: Resolved Bus Duct vs. Floor Slab Clash Result

2.3.5.5 Conclusion

By using an incorporation of the Building Information Model and clash detection software, there would be very beneficial outcomes during construction of The New York Times Building core. Looking at the case of bus ducts, a clash was found in the Building Information Model and a simple fix for the problem was implemented before construction started. This would avoid conflicts on the job site, would eliminate the RFI and change order to correct the problem, and would eliminate the costs associate with changing the installed bus ducts.

2.4 Construction Implications

2.4.1 **Objective**

The objective of this analysis is to perform detailed structural take-offs and apply pricing for labor and material to the original core and changes to the core of the building. The analysis will also include the cost changes as well as schedule implications and general conditions implications due to the lateral system changes.

2.4.2 Process

Model-

Develop an accurate structural model with the structural engineer showing the changes to the structure in Revit Structure

Analysis-

Develop electronic material take-offs from the Revit model

Apply R.S. Means cost to existing core and proposed redesign

Schedule implications due to concrete on site before steel

General conditions implications due to proposed concrete core

2.4.3 Structural Material Take-off

Some assumptions were made when considering the difference between the original and proposed core changes. They are as follows:

Foundations were not included between the original and proposed changes takeoffs, only superstructure.

Connections were considered to remain approximately the same and were thus not included between the original and proposed changes take-offs.

Using the structural model developed by the structural engineer, detailed electronic takeoffs were developed in Revit Structure and exported to Microsoft Excel. Electronic R.S. Means cost data was then tied into the electronic tower shear wall material schedules to give accurate cost, which could be updated quickly if specific materials or dimensions were changed due to the structural analysis. The steel framing which was selected for the analysis was only the steel immediately replaced by the concrete shear walls. This included columns, beams and bracing. The proposed concrete structural core is highlighted in Figure 34. The core cost includes the different strengths of concrete, rebar, labor, slip forming, two changes to the slip form for the shear wall thickness changes, and A summary of the costs for the original structural steel core and the proposed concrete

core is shown in Table 31, and Table 32 respectively. In depth take-offs are located in Appendix 7.5 on page 401.



Figure 34: 3D Proposed Structural Core



	Ext. Mat.		Ext. Labor		Ext. Equip).	Ext	. Total		Ext. Ma	t. 0&P	Ext.	Labor O&F	Ext.	Equip. O&P	Ext. Total O&P
Building Total	\$	8,855,631.75	\$	3,276,027.75	\$	33,794.34	\$		11,955,381.88	\$	9,789,884.20	\$	5,220,710.32	\$	36,270.10	\$ 14,816,240.03
									1	\$	14,8	16,	240.03	ļ		

Table 32: Concrete Core Take-off Summary

2.4.4 Schedule Implications

From the analysis of the existing schedule, and discussion with industry members and faculty, keeping to a schedule of forming, reinforcing, placing and curing two stories of the core every two weeks would keep construction on schedule. The original schedule allowed for an average of 9 work days per 2 stories for steel erection. The first floor

tower portion is a double height space and was allotted the typical construction time for 2 typical floors. The mechanical floors, 28 and 51, were allotted additional time also, due to being double height spaces as well. Construction for the original all steel core began erection on 2/25/05 and was completed 4/25/06. A summary schedule for the original steel core is shown below in Figure 35.



Figure 35: Original Steel Core Summary Schedule

The changes to the core were also held at the same standard of 2 stories every 2 weeks for forming, reinforcing, placing the shear wall concrete. The ability to mobilize concrete earlier than steel was also taken into account for the schedule changes. Due to the earlier mobilization, the tower cranes needed to be mobilized earlier than the original schedule. By starting the core construction 2 months earlier than the original schedule, the tower cranes also needed to be mobilized and on site 2 months longer. Additional changes to the schedule were the result of the reduction of steel erection, discussed later in section 4.3.10. The schedule was updated according to the earlier on site mobilization for the FRP for the core, along with the earlier mobilization of the tower cranes. The proposed change to the core would begin construction on 1/3/05 and would be completed on 4/25/06. This would include the concrete core along with the steel columns and framing. A summary of the core change schedule is listed below in Figure 36.



Figure 36: Core Change Summary Schedule

By beginning the concrete core 2 months earlier, the original completion and top-out date for the superstructure would remain exactly the same, finishing 4/25/06.

2.4.5 General Conditions Implications

The general conditions would also be affected by the proposed change to a concrete core. After discussion with faculty and industry professionals, the major changes would occur with the additional time on site for the tower cranes, and the need for temporary heat during the winter months for the proper curing of the concrete core. Information from an interview with an industry professional and faculty advisor who has worked on high rise construction in New York City supplied an added cost between \$1.8 million and \$2.0

million for temporary heat for concrete core placement for each winter. From the existing general conditions, a tower cost was acquired at \$13,200 per tower per month. Crew for each tower was \$37.40 per day.

2.4.6 **Cost Changes**

The total cost of steel which would be replaced by the concrete core was found to total \$34,680,590.56 over the height of the building. The total cost of the proposed concrete core was found to total \$14,816,240.03. The difference of \$19,864,350.53 is a total savings if a concrete core was utilized instead of a steel core.

The proposed concrete placement will begin halfway through the first winter and would completely span a second winter. By using the maximum of \$2.0 million as a conservative cost, the total additional cost of approximately \$3,000,000.00 would be added to the general conditions for temporary heat.

From the addition of 2 months to the duration of each of the tower cranes, and an additional cost per month for the on-site tower crane duration of \$13,200.00 per crane per month, an additional cost of \$52,800.00 would be added to the general conditions. The cost for the crane crew at \$37.40 per day and an increased duration of 80 days, an additional cost of \$2,992.00 would also be added to the general conditions. This is a total of \$55,792.00 added cost to the general conditions for the added on-site crane durations.

2.4.7 **Conclusions**

There are several benefits to utilizing a concrete core within the New York Times Building. When determining the difference in cost between the two systems, a concrete core would save approximately \$20 million in material and labor costs compared to the steel columns, framing and bracing that it would replace. By utilizing an early start to the schedule, and the same criteria for FRP for the concrete as with the structural steel framing following the core, construction could remain on schedule. One problem would be the additional costs associated with the increased time on site for the tower cranes and crew along with the requirement for temporary heating during the winter months. These costs are associated with the general conditions and result in an addition of approximately \$3,060,000.00. With \$20 million being removed from construction already, the addition of these costs would still result in a conservative savings of \$16.5 million.

3 ENVELOPE REDESIGN

3.1 Envelope Changes

The existing curtain wall system was changed from a single façade layer with a ceramic rod shading system to a dynamic curtain wall system incorporating motorized louvered shades and operable windows. These changes resulted in significant cost savings and required coordination with the mechanical and electrical systems as well as architecture and construction. The BIM model was utilized to investigate interoperability with energy analysis software. In addition to the energy modeling, families were created within the Revit model to properly portray the proposed system in comparison with the existing. The BIM model allowed the entire team to understand the proposed changes and the influence of BIM tools.

3.2 Daylighting

The following section discusses the façade redesign and the daylighting analysis of the 8th floor. This was the MAE section of the lighting/electrical report.

3.2.1 **Objectives**

Goal of this evaluation/analysis/redesign

- 1) Optimize daylight control for occupant comfort
- 2) Reinforce the architectural appeal of the building by maintaining views to the exterior
- 3) Determine energy savings from electric lighting controls
- 4) Pass lighting load profiles to mechanical designer for energy modeling

3.2.2 Process

Literature Review-

Review case studies as well as computer modeling analyses. Apply concepts from literature to the redesign.

Design-

Determine appropriate daylight control system

Modeling-

Apply floor plan changes from the tenant and core changes to the AutoCAD model.

Create geometry files for use in Daysim.

Create material files for use in Daysim

Download/Create all necessary input files for Daysim

Simulation-

Use the newly updated Daysim software for analysis.

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1_mode	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.0.1	
12	-2851.1334 -2851.1334 -2851.1334 -2851.1334	-434.66123 -434.66123 -638.66104 -638.66104	0 120 120 0	
1_mode	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.1.1	
12	-2851.1334 -3373.1331 -3373.1331 -2851.1334	-434.66123 -434.66123 -434.66123 -434.66123 -434.66123	0 0 120 120	
1_mode	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.2.1	
12	-3373.1331 -3373.1331 -3373.1331 -3373.1331 -3373.1331	-434.66123 1461.3381 1461.3381 -434.66123	0 0 120 120	
1_mode	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.3.1	
12	-3373.1331 -2851.1335 -2851.1335 -3373.1331	1461.3381 1461.3381 1461.3381 1461.3381	0 0 120 120	
1_mode 0	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.4.1	
0 12	-2851.1335 -2851.1335 -2851.1335 -2851.1335 -2851.1335	1461.3381 1665.3379 1665.3379 1461.3381	0 0 120 120	
1_mode	l-temp_outerwal	l polygon l_mod	l-temp_outerwall.5.1	
12	-2851.1335	1665.3379	0	
				4

Figure 37: Eighth Floor Rad Geometry File

material - Notepad	
File Edit Format View Help	
##This file is strictly for materials for OfficeFloor.rad IPD/BIM Thesis	
void plastic l_model-ceiling 0 0 5 .80 .80 .80 0 .05	
void plastic l_model-columns 0 0 5 .50 .50 0 .05	
void plastic l_model-desk_black 0 0 5 .1 .1 .1 .02 .05	
void plastic l_model-desk_wood 0 0 5 .6 .5 .4 0 .05	=
void plastic l_model-desk_work_plane 0 0 5 .8 .8 .8 .0 .0	
void plastic l_model-door_elevator 0 0 5 .9 .9 .0 .9	
void glass l_model-door_glass 0 0 3 .7628 .7628 .7628	
void plastic l_model-door_plain 0 0 5 5 .5 .0 .0	
void plastic l_model-floor 0 0 5 0 .0 .0 .0 .0	
void glass l_model-glazing_inner_lite 0 0 3 .85 .85 .85	
void glass l_model-glazing_interior 0 0 3 .7628 .7628 .7628	
void glass l_model-glazing_outer_lite 0 0 3 .5 .5 .5	
	•

Figure 38: Eighth Floor Rad Material File

3.2.3 Literature Review

Kacel, S., & Yener, A.K. (2008). The Effect of Facade Design on Lighting Energy Consumption in Offices: A Case Study in Turin, Italy. *Architectural Science Review*, 360-368.

This article goes through the process for designing buildings in response to daylight. It discusses the need for the daylighting to be taken into account at early stages in the design. Using building information modeling software to complete analysis of the building to inform decisions is also a highlight of the paper. Another important point is the need for an integrated approach during the early design stages. In addition to the process for design, the paper discusses systems and controls. The paper discusses three main ways for control: inactive occupant control, active occupant control, and automatic control.

Parys, W., Saelens, D., & Hens, H. (2009). Impact of Occupant Behaviour on Lighting Energy Use. *Eleventh International IBPSA Conference*, (pp. 1143-1150). Glasgow, Scotland.

An important consideration for a high performance building is controls. It is necessary to understand not only the external factors of the building, but also the way the occupants will interact with the building. In this paper, the topic of occupant behavior is discussed. Multiple situations are simulated through the use of Daysim (old version). The results showed that if an occupant can interact with the lights, such as in a private office, continuous dimming savings are overestimated by ten percent. Another topic was the issue of how to turn on the lights. Significant savings were discussed when forcing the occupant to turn on the lights as opposed to automatically turning on the lights. If the occupant can see a bright sky, they are less likely to turn the lights on, even if the light levels inside the space may require it. Further discussions were in regards to baselines for savings. The paper determines that it is important to compare a continuous dimming system to a room that is switched by active-active occupant. An active-active occupant is one that correlates switching decisions to the ambient daylight conditions and determines what to do with the blinds based on the ambient daylight conditions. This is important when determining savings, because a cost analysis should be based on how a space will function with occupants.

Robinson, L., & Athienitis, A. (2009). Design Methodologoy for Optimization of Electricity Generation and Daylight Utilization for Facade with Semi-transparent Photovoltaics. *Eleventh International IBPSA Conference*, (pp. 811-818). Glasgow, Scotland.

This paper went over a series of simulations and physical mockups to verify the savings found from incorporating semi-transparent photovoltaics into the curtain wall system. The study compared the total energy savings from using either semi-transparent photovoltaics or opaque photovoltaics. The study showed that even at low transparencies, there were still savings from the electric lighting. Even though the efficiency of the panels decreases when moving to semi-transparent photovoltaics, the energy saved from putting them on them into the glazing results in significant lighting savings. The curtain wall should be comprised of three sections for this to be effective.

The bottom third of the window should be an opaque spandrel panel. The middle third should be clear viewing glazing. The top third should incorporate the semi-transparent photovoltaics. The optimal energy savings came from covering the top third 80-90% with the semi-transparent photovoltaics.

3.2.4 Assumptions

The reflectances are assumed as in the interior lighting section of the report

The illuminance level needed to be maintained is 30 fc per IESNA Recommendations

Because the louver system stays perpendicular to the altitude of the sun, all of the direct sun must pass through the louvers before entering the space. Since Daysim does not have the ability to automatically rotate the shades from 0 through 90 degrees, the model has a flat plane of glass covering the opening. This means that indirect light levels entering the space are lower than what would actually happen. This means that the savings achieved will be conservative.

3.2.5 **Design Intent**

After a literature review on Daylighting of Office Buildings, it was determined that the optimal system from a daylighting perspective would be an automatic shading system. The use of a daylight simulation program would need to be used to understand the lighting impacts. Daysim, the simulation program, has recently been improved by Dr. Rick Mistrick of The Pennsylvania State University. With the information gained in the AE 565 Daylighting class, a daylighting analysis was completed.

The overall design of the façade was an important issue to all members of the design team. For this reason, many meetings were held to develop the proper system. The important parts to be considered were the architectural, thermal, and lighting impacts. Since all of the design members were of the engineering background, a discussion with an architectural consultant was had. With this information, the design team was able to find the most optimal system for energy, comfort, and architectural appeal.

To help lower the overall energy use of the building, a redesign of the facade was completed. The existing shading device is a series of ceramic rods. These rods cover less than 30% of the opening. In addition to the rods, the glazing transmits approximately 94% of the visible light. Due to the obvious issues with direct sun, a motorized shading system was incorporated on the interior of the building. The shade is great for blocking out the direct sun, but the heat will have already made it into the building.

The redesign of the façade system incorporates motorized louvers. (See Figure 283: Double Skin Facade Specification Sheet 1 on pages 380 through 383) These louvers are made from glass and have a ceramic frit applied to it. The frit is comprised of small 1/2" circles covering 50% of the louver. The glass itself has a transmittance of 70%. This exterior system allows for uni-directional tracking of the sun. The tracking nature of this

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system allows for maximum transparency within the building. When an occupant looks out of the space, there will never be a series of dark bars across their visual field. The louvers will always maintain a uniform view out of the building.

When comparing the existing system with the redesign, the new system already outperforms thermally. With the exterior layer alone, 65% of direct sun is stopped. The distinction between direct sun and light is an important one. Direct sun is what plagues an office environment exposed to glazing on all sides of the building. Even the north side of a building can sometimes receive direct sun. Because this system tracks the sun, the louver will block most of the direct sun while allowing reflected light into the space. By doing this, occupants will be able to leave the blinds open a greater percentage of the time.

When looking at the current system, the blinds close whenever the sun is on that side of the building. This results in less daylight entering the space, which in turn results in higher electric light levels. If the shading system were able to leave the blinds up for a greater portion of the day, the electric light levels would fall drastically. With proper glazing, the sun has a much higher lumen/watt rating than any source available today. This is important when considering the heat load on the building. The fewer the watts used in the lighting system, the lower the heat gain to the space. This is true as long as the glass is able to block out most of the non-visible regions of the spectrum.

The inner layer of the curtain wall must also be designed to block out some light. The transmittance of the inner curtain wall is 80%. When necessary, the inside of the curtain wall also contains motorized shades. If direct sun is an issue, the system needs to have a last line of defense for occupant comfort. With the redesign of the external system, the shades shouldn't need to be down as often.

The shading system is designed to be on the four major sides of the building. Due to the floor plan of the building, there are four cut-outs that need to be addressed. Since there is no shading device planned for these notches, something needs to be done to keep the direct sun out of the space. To keep a uniform look throughout the space, the frit was applied on the curtain wall of the notches. If the louvers are down, the entire façade will look uniform. If the louvers are up, then the corners will be more diffuse than the rest of the curtain wall. The Revit file was updated with this system and the images on the following pages are as a result of that model input.

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Figure 39: Shading System Family in Revit

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Figure 40: Shading System Render Settings

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Figure 41: Shading System Render in Revit

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Using a digitally addressable lighting system with continuous dimming is the best way to save energy. The problem with incorporating these systems is the cost. In order for the system to pay itself off, it needs to save a significant amount of energy. This is extremely difficult when designing a system that operates at a low lighting power density. In order to analyze the system for savings, Daysim simulations were run. With information learned in AE 565 a spread sheet was developed to take daylight autonomy (DA) values and turn them into kilowatt hour savings (See Figure 43: Spread Sheet Developed for Continuous Dimming Savings Based on Daylight Autonomy on page 94). This is done by finding the DA, the percentage of time that daylight meets a target illuminance, for five regions of the fluorescent dimming curve. This is done in place of continuous daylight autonomy, due to the nature of fluorescent dimming. The curve for light output versus power is not proportional. At the minimum light output, the ballast consumes a higher percentage power than when at full output. Class lectures gave the necessary information for performing the calculation and the verification that the simplification was valid.

The reason for developing this spread sheet was to run the Daysim simulation once. In a typical simulation, Daysim can have 1 zone being dimmed. With this simulation, Daysim can calculate the energy savings. Because of the large open area of the New York Times office space, a single zone would not be effective. Daysim can output the DA for the entire floor with graphical results. These graphs were used as the input for the spread sheet. The energy savings for the entire floor could then be calculated as opposed to running four full year simulations.

After multiple simulations, the control strategy that had the greatest impact was continuous dimming of the first two rows of fixtures around the entire perimeter. To obtain the cost savings from using continuous dimming, the spread sheet that was developed was used in conjunction to Daysim. By doing this, savings of \$1,125.60 per floor per year are expected based on \$.15/kWh. Over the 50 typical floors, that is a direct savings of \$56,280 per year. In addition to the direct electricity savings, the HVAC system will also have savings. This information was supplied to the mechanical student for energy modeling purposes.

With the redesign of the façade, a look into incorporating PVs was completed. Through the research completed and the Ecotect simulations, it was determined that integrating semi-transparent photovoltaics into the louvers would benefit the energy profile of the building. By incorporating these into the top third of the louvers per floor, the viewing angle would not be disrupted. In addition, peak loads during the summer months could be shaved by use of the system. More information on this redesign can be found in Figure 277: Daylight Autonomy Screen at 0 Lux Target Illuminancethrough Figure 282: Daylight Autonomy Screen at 285 Lux Target Illuminance on pages 374 through 379.

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Figure 42: Daysim Building Data Entry Screen



3.2.6 Spread Sheet Development

Figure 43: Spread Sheet Developed for Continuous Dimming Savings Based on Daylight Autonomy

3.2.7 Conclusions

Because of the daylight control strategy, these savings are extremely conservative. If the louvers were able to be simulated correctly, more indirect light would be able to enter the space. With this in mind, the combination of the electric lighting design and the daylighting control design will save a significant amount of money. With the already extremely low lighting power density, the daylighting harvesting strategies are adding to the lighting energy savings.

3.3 BIM for Performance Modeling

BIM for performance modeling has become an increasingly significant and powerful tool in industry to make the process of energy analysis more efficient and collaborative. There are, however, many barriers to successful utilization of this tool including software interoperability and best management practices for modeling, both of which were investigated in this thesis.

The Three Dimensional (3D) model of The New York Times Building was created in Autodesk Revit Architecture. Revit, along with other 3D BIM software, supports the Green Building XML (gbXML) Schema. For the purpose of this analysis, the workflow utilizing the gbXML file format to transfer information, including building geometry, wall constructions, and shading devices, into energy analysis tools was investigated.

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Specifically the transfer from Revit to Integrated Environmental Solutions (IES) <Virtual Environment> and Autodesk Ecotect Analysis software was investigated. Using IES<VE> simulations were performed to reduce the ambient load profile of the building, resulting in energy reduction and cost savings. The energy efficiency measures analyzed included building envelope improvement, shading performance, and load reduction due to decreased lighting power density in the office spaces.

3.3.1 **Objectives**

- 1) Establish workflow criteria for software interoperability
- 2) Reduce ambient building loads through parametric study

3.3.2 Building Information Modeling Workflow

3.3.2.1 Architectural Model

Figure 44 - Complete 3D BIM Model, provides the original detailed BIM model of The New York Times Building created by the design team with existing constructions and geometries.



Figure 44 - Complete 3D BIM Model

3.3.2.2 Interoperability

Utilizing the gbXML format to import for import to an energy simulation program produced errors resulting from complex geometries. For example, the shading system would not import correctly as a shading device because it was a custom family created in Revit. Shading would have to be constructed in the energy analysis software. Additionally, wall constructions would not transfer correct performance values and would therefore need to be redesigned as well. This is an obstacle in creating a complete information transfer, however, user-defined constructions can be defined in Revit for reference and assigned manually in <VE>.

The following selection describes the model parameters that needed to be addressed for a successful import.

3.3.2.2.1 Geometry Simplification

Interoperability can be a powerful tool if successful. To ensure this success, the architectural model was recreated by the mechanical designer using simplified geometry. The custom family curtain wall was modified to the default glazing curtain wall system in Revit. Interior construction types were unitized. These simplifications greatly reduced the amount of errors generated in the gbXML file. A recreation of the tower is shown in Figure 45 - Simplified Revit Tower Geometry.



Figure 45 - Simplified Revit Tower Geometry

3.3.2.2.2 Room Based Modeling

The New York Times Building was modeled in Revit using interior Room-based modeling. Proper placement of these were critical for a successful gbXML export. It was necessary to place rooms in every enclosed space, including shafts, as well as floor and ceiling plenums. If an enclosure is not defined as a room, any adjacent wall will be deemed exterior. In addition, it was important to not assign ceilings or raised floor as "Room Bounding," in Revit, as this adjacency issue would occur. This parameter is shown in Figure 46 - Room Bounding Parameter. Room bounding surfaces must have an upper limit set to the next level with a limit offset of zero to ensure that the analytical volumes created are perfectly adjacent and prevent exporting errors. Room separation lines were used to designate separate zones within the open plan space.

Parameter	Value
Constraints	
Location Line	Wall Centerline
Base Constraint	Level 3
Base Offset	0' 0"
Base is Attached	
Base Extension Distance	0' 0"
Top Constraint	Up to level: Level 4
Unconnected Height	15' 5 31/64"
Top Offset	0' 0"
Top is Attached	
Top Extension Distance	0' 0"
Room Bounding	
Related to Mass	

THE NEW YORK TIMES BUILDING

Figure 46 - Room Bounding Parameter

If utilizing Revit MEP rather than Revit Architecture for export, there is an additional step to this process. In addition to Rooms, Spaces must be placed in each enclosure, however, the file transfer used in this analysis was exported from Revit Architecture, and so only Rooms were needed. The function "Compute Room Volumes," located in the Room and Area Settings menu must be selected to ensure creation of the analytical volumes in the model. Furniture, structural columns, and other minor details that resulted in exporting errors were also removed to simplify geometry, decrease errors, and increase software interoperability.

3.3.2.2.3 Successful Export

The error report generated from the export must be analyzed carefully and requires significant to inspect the entire model to ensure all correct parameters are set. Figure 47 - Revit Analytical Volumes, shows the visualization of the analytical volumes when creating the gbXML file for export. This file was then imported successfully into IES <VE> for analysis shown in Figure 48 – Building Model in IES<VE> with zero errors.



Figure 47 - Revit Analytical Volumes



Figure 48 - Building Model in IES<VE>

3.3.2.3 Conclusions

There are several advantages and disadvantages of this workflow. Firstly, visualization is a powerful and persuasive tool. Being able to communicate with all members of the design team, including the architect and owner, could potentially help inform design decisions early on and lead to a higher performing building. Some disadvantages include the need for models to be carefully created and appropriately simplified, as well as the need to have all modeling parameters discussed and simulated correctly for interoperability to be successful. Additionally, any changes made to the model in analysis software, such as IES<VE>, cannot flow backwards into the initial BIM model. This information must be manually recreated. Overall, the interoperability of 3D BIM models to energy analysis software can be a powerful tool if care is taken by the entire design team to appropriately model the building during initial design phases with intention to use the model in this way.

3.3.3 Ambient Load Optimization

After successful import of the gbXML file format for the building analytical volumes into IES<VE>, building performance was simulated for both the original design and the buildings systems redesign. Specifically for the reduction of ambient load profiles of the redesign, the envelope constructions were studied and optimized to minimize the envelope load on the building and then results from the lighting analysis were used to determine the load reduction due to decreased lighting power density in the office spaces.

3.3.3.1 Assumptions

The information used in the energy simulation model was derived from relevant design documents, ASHRAE Standards and typical schedules found in the IES <VE> energy simulation program, as well as assumptions made by mechanical designer. The assumptions may have differed from those made by the design engineer of record resulting in differences in analysis results. Office spaces were conditioned according to outdoor and indoor design conditions designated in ASHRAE Fundamentals 2005. Retail spaces are separately metered and paid for by the tenants so for the scope of this thesis and simplification of simulation, these spaces, in addition to the lobbies and cafeteria will not be analyzed. Restrooms and mechanical spaces will not be conditioned, only exhausted with fan energy considered. In addition, the cogeneration plant was considered outside the scope of this thesis and therefore not simulated. The following design conditions were held constant for both the baseline and proposed model.

3.3.3.2 Location & Site

The analyses are based on US climatic data for New York, NY (Table B-1 ASHRAE 90.1-2007). The weather file for ASHRAE weather location New York / Laguardia Airport, New York (NewYorkTMY2.fwt) was used for analysis. Site data is adjusted accordingly:

Terrain type: City

Ground Reflectance: 0.30 (Concrete - average condition)

Site rotation angle: 28.5° from True North

Outdoor Dogion Conditions								
Outdoor Design Conditions								
Season	Dry Bul	b (°F)	Wet Bulb (^o F)					
Winter	15	i	-					
Summer	87	1	72					
Indoor Design Conditions								
Space	pace Temperature (°F)			Drift	points			
Occupancy	Summer	Winter		Cooling	Heating			
Office Spaces	75	70	50 % RH	81	64			

Table 33 - Outdoor and Indoor Design Conditions Source: ASHRAE Fundamentals (2005)



Figure 49 - Site location & Rotation Angle

3.3.3.3 Zoning



Perimeter and core zones were defined in the Revit model and simulated in IES<VE> shown in Figure 50 - Typical Office Floor Zoning.

Figure 50 - Typical Office Floor Zoning

3.3.3.4 Model Input Summary

Table 34 - Model Input Summary, describes various modeling assumptions that remained constant for all simulations.

Table 34 - Model Input Summary						
Model Input Parameter	Baseline Design Input	Proposed Design Input				
Infiltration	0.3 CFM / SF	0.3 CFM / SF				
Occupancy Loads	Sensible 250 BTU/hr/person Latent 200 BTU/hr/person	Sensible 250 BTU/hr/person Latent 200 BTU/hr/person Offices - 0.5 W/SF Copier - 400 W Refrigerator - 500 W Microwave - 450 W Telecom Equip - 400W				
Plug Loads / Equip Loads	Offices - 0.5 W/SF Copier - 400 W Refrigerator - 500 W Microwave - 450 W Telecom Equip - 400W					
Supply Air Temperature	Cooling Supply: 60-62 F Heating Supply: 83-85 F	Cooling Supply: 60-62 F Heating Supply: 83-85 F				
Humidity Control	50 % Relative Humidity	50 % Relative Humidity				
OA Ventilation Rates	5 CFM / Person 0.06 CFM / SF	5 CFM / Person 0.06 CFM / SF				

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3.3.3.4.1 Envelope Constructions

Table 35 - Envelope Constructions describes various modeling assumptions that were changed in the model to determine reductions in ambient load of the building resulting from envelope loads.

Table 35 - Envelope Constructions						
Model Input Parameter	Baseline Design Input	Proposed Design Input				
Spandrel Panel	Recessed 3/16" Aluminum Spandrel Panel: Uvalue: 0.08 Btu/ft ² -F-hr 2-1/2" Rigid Insulation behind	Recessed 3/16" Aluminum Spandrel Panel: Uvalue: 0.08 Btu/ft ² -F-hr 2-1/2" Rigid Insulation behind				
Fenestration Type	1" IGU Vision Lite - Clear w/ Low e Double Pane - Aluminum Frame	1" Coltlite Double glazed panel				
Fenestration U-value	U value for glazing: 0.625 Btu/ft ² -F-hr	U value for glazing: 0.405 Btu/ft ² -F-hr				
Fenestration Visible Light Transmittance	0.96 (96% transmittance)	0.79 (79% transmittance)				
Shading Device	1-5/8" Diameter Ceramic Tubes	Colt Shading Louvres				

3.3.3.4.2 Lighting Load Reduction

Table 36 - Lighting Load Reduction provides the lighting power density reduction determined from the lighting analysis performed by the lighting designer. These values were modeled to determine an ambient load reduction due to decreased lighting power density.

Table 36 - Lighting Load Reduction

Model Input Parameter	Baseline Design Input	Proposed Design Input
Interior Lighting Power Density	1.1 W/m ²	.46 W/m ²

3.3.3.5 Simulation Results

A study was conducted and the final reduction in peak cooling and heat loads is summarized in Table 37 - Simulation Results and Figure 51 - Simulation. Baseline Design, Proposed Envelope Design, and Proposed Lighting Design are represented by Case 1, 2, and 3 respectively in the graph.

Peak Load	Baseline Design	Proposed Design	% Reduction due to Glazing / Shading	Proposed with Reduced Lighting Power Density	% Reduction due to Reduced Lighting
Peak Cooling Load	21,554.50 (kBtu/h)	19,442.50 (kBtu/h)	9.80 %	17,090.20 (kBtu/h)	20.71 %
Peak Heating Load	22,196.00 (kBtu/h)	16,460.20 (kBtu/h)	25.84 %	16,460.20 (kBtu/h)	





Figure 51 - Simulation Peak Heating and Cooling Load per design in kBtu/h

3.3.4 Energy and Cost Analysis

The utility rates used in this simulation are summarized in Table 38 - Utility Rates Summary. This rate is a simplified rate provided by Consolidated Edison, the electric utility provider to the project site in New York City, and although the building owner has likely negotiated a complex, specific and unique rate structure, a simplified rate structure will be used for all simulations to effectively compare the results of the proposed system redesign to the original system design. Table 39 - Cost Summary - Baseline System summarizes the estimated total building energy usage and costs for the Baseline Case. Table 40 - Cost Summary - Proposed System summarizes the estimated total building energy usage and costs for the Proposed Case, including new glazing system, shading louvers, and reduced lighting power density.

Utility	Yearly \$/Unit	Reference
Natural Gas	\$1.392/Ccf	Consolidated Edison
Electric	\$0.249/kWh	Consolidated Edison
Steam	\$18.36/Mlb	Consolidated Edison
Water	\$2.31/748gals	New York City Water Board

Table 38 - Utility Rates Summary

Function	Utility	kBtu	Kwh	Cost (\$)
Heating	steam	48,132,500		\$ 740,100.28
Cooling	electricity		1,933,833.94	\$ 481,537.10
Aux. Fans/Pumps	electricity		463,253	\$ 115,350.05
Lighting	electricity		2,782,999	\$ 692,966.85
Receptacles	electricity		3,431,936	\$ 854,552.02
			Total	\$ 2,884,506.31

Table 40 - Cost Summary - Proposed System

Function	Utility	kBtu	Kwh	Cost (\$)
Heating	steam	29,721,680		\$ 457,000.27
Cooling	electricity		1,668,612	\$ 415,484.30
Aux. Fans/Pumps	electricity		463,253	\$ 115,350.05
Lighting	electricity		2,372,496	\$ 590,751.48
Receptacles	electricity		3,431,936	\$ 854,552.02
			Total	\$ 2,433,138.12

Table 41 - Table 40 - Yearly Cost Savings

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_	Yearly Cost (\$)
Baseline Design	\$ 2,884,506.31
Proposed Design	\$ 2,433,138.22
Savings	\$45,136.09

3.4 PV Analysis

3.4.1 **Objectives**

Goal of this evaluation/analysis/redesign

- 1) Make an environmental statement for the New York Times.
- 2) Analyze the energy production of a photovoltaic system incorporated into the façade.
- 3) Determine the payback period for a photovoltaic system.

3.4.2 **Process**

Design-

Find a system that would incorporate into the architectural statement of the building.

Modeling-

Import Revit model into Ecotect

Model existing buildings surrounding the Site

Simulation-

Run a solar simulation within Ecotect

Analysis-

Create an excel spread sheet to analyze the cost versus savings

3.4.3 **Design Intent**

Since the New York Times Company has attempted to show that they care about sustainability, an analysis of photovoltaics (PVs) use was completed. The New York Times Company has the ability to shape and mold the impressions of others. By incorporating PVs into their façade, they could make a substantial statement to vast quantities of people. For this reason, the financial incentive may not be the ultimate reason to incorporate PVs into the façade.
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This analysis was done in an integrated approach. The BIM model created by the CM was imported into Ecotect by the Mechanical designer. Weather data was collected from the energy.gov website. This information was used as the existing conditions. The team then modeled surrounding buildings for shading patterns. After these steps were completed, a yearly simulation could be run. The desired results were watt hours per square meter of solar radiation incident on the façade. A pseudo color of these results was obtained and used in the calculation of electricity production capability. For an image of the output from Ecotect, see the image on the following page. For more of these images see Figure 274: Incident Solar Radiation from Ecotect (NW Isometric) through Figure 276: Incident Solar Radiation Scale from Ecotect on pages 372 through 373)



Figure 52: Incident Solar Radiation from Ecotect (SW Isometric)

The use of this program for the analysis was extremely easy. The interoperability between Revit and Ecotect was, for the most part, flawless. In order to make this transition so easy, a month worth of trial and error was done. After learning exactly how the programs worked together, this will become an easier transition. In addition, modeling of the buildings around the site was completed in Ecotect. After a very short time this was an extremely easy task. Considering its graphical interface and its ability to get extremely quick results, this program was integral to this analysis. With the use of

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weather data, the actual site conditions are taken into account. With most software packages, the number of sunny hours is assumed based on general location in the world. The other programs don't even have the ability to take into account the differential shading from other buildings throughout the year. As far as BIM software goes, this was an easy tool to use.

In order to effectively calculate the benefits of the PV arrays, a spread sheet was developed. This was done due to the repetitive nature of the calculations needing to be done on each side of the building. The spread sheet took into account total square footage of possible install per level of production. This was done for each side of the building. The conversion efficiency from manufacturer data was then applied to determine the DC electricity production. From there a conversion efficiency was applied for the process of inverting the electricity from DC to AC. From these steps, the total kilowatt hours per year could be obtained.

	S	o	lar	Availab	oility			
	_			ft²	m²	wh/m²	kwh	Cost
East	t Fa	ça	de					
	5	-	17	3575	332.25	202300	10216.53	\$214,500.00
	18	-	54	10175	945.63	1446900	207971.7	\$610,500.00
Sou	th F	ag	ade					
	18	-	54	10175	945.63	2652650	381281.5	\$610,500.00
We	st F	aç	ade					
	8	-	54	12925	1201.21	2652650	484330.5	\$775,500.00
					Data			
				P	Vs	Electricity		
				\$,	/ft2	\$/kWh		
				\$60.00		\$0.15		
				Conversio	n Efficiency			
				1	6%			
				Inverting	Efficiency			
				9	5%			

Figure 53: PV Payback Spread Sheet

Using the electricity costs of ConEd in New York City and the cost/sqft of the pv installation, a simple payback period was determined. This payback took into consideration the 20% drop in efficiency over a 40 year period. See the spreadsheets on the following pages for the payback analysis.







Figure 55: South Facade PV Payback Chart







Figure 56: East Facade Bottom Floors Payback Chart

Figure 57: East Facade Top Floors Payback Chart

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As discussed in the daylighting section of the paper, these PVs would be installed in the top third of each floor. The PVs would be incorporated into the louver system of the double skin façade. As mentioned before, the PVs would take up 80-90% of the top third of each floor. By doing this, the energy savings from daylighting and energy production from the PVs are maximized.

The cost data obtained for this analysis was from actual bids for smaller installations. Due to the technical aspect of this installation, the number was augmented for the purposes of being conservative. The cost was analyzed at \$6/watt of installed PVs. PVs typically produce 1kW/100sqft. The monocrystaline cells are 16% efficient. This resulted in a cost of \$60/sqft of installed PVs for the entire installation.

3.4.4 Conclusion

3.4.4.1 Simulation Results

The simulation in Ecotect proved that the South and West facades have the highest numbers of incident solar radiation per square meter per year. The lower stories on the south façade will not be considered in the analysis since the simulation proved the significant shading due to surrounding buildings. These results will be put into the spread sheet for determining the payback period for each façade individually.

3.4.4.2 Analysis Results

After importing the simulation results into a payback spread sheet, it was determined that the West façade and the top half of the south façade shall incorporate PVs. Both of these locations were able to have a payback period just over 25 years. The east facade was unable to have a payback within the 40 year scope of this analysis. This façade could be analyzed for a longer payback due to the expected life of the building. The New York Times tenants spent 100 years in their previous building and expect to spend another 100 years in this building. The only problem with extending the payback past forty years is the expected life of the PVs. The life is a hard number to determine. They don't necessary fail, but they slowly degrade their production capabilities. This analysis was completed without any tax credit or incentives applied to the model. Some of the stipulations within the incentives say that 50% of a system load must be met in order to qualify for the incentive. This means that either 50% of the lighting energy or mechanical energy consumption must be met. Due to the size of the building and the lack of installation space, this is not able to be met. In addition, the incentives say that the system must be installed by a certified PV installer. Due to the nature of this system, this may not be able to be met. Since the system is incorporated into the louvers, the installation could be by a curtain wall contractor with assistance from an electrician for the inverters. For these reasons, the incentives could not be guaranteed.

3.5 Hybrid Ventilation

The following section discusses the investigation of hybrid ventilation as a design strategy to increase the sustainability profile of the New York Times Building.

3.5.1 Introduction

While natural ventilation has long been used to condition and ventilate buildings, most commercial buildings are now completely sealed from the environment with tight construction and rely solely on mechanical systems for indoor environmental control. However, due to the increasing concern for energy usage in buildings and the indoor environmental effects on health, such as Sick Building Syndrome, many designers are now designing high performance buildings that utilize some sort of natural ventilation.

The hybrid ventilation approach for this redesign investigation of The New York Times Building is "Mixed-Mode" which uses a combination of natural ventilation from automated operable windows and mechanical systems. The building will be naturally ventilated during periods of the year when climate conditions closely match indoor design conditions, and supplemented with mechanical cooling and ventilation when natural ventilation is not sufficient. Renzo Piano, the architect of The New York Times Building, has also employed Natural Ventilation strategies in several of his notable works, which are described in Section 4.2.3.

This design strategy must employ an integrated, multidisciplinary approach, and utilize multiple tools for analysis. Natural ventilation is driven by two forces, buoyancy (or stack effect) and wind. Whole building simulation programs, such as IES<VE> can consider the airflow across building openings to determine pressure differentials due to temperature in the building and wind pressure on an opening. The following analysis utilized a simplified Single-Zone Model approach to determine feasibility and also investigated the use of IES<VE> in conjunction with MacroFlo for mixed-mode design.

3.5.1.1 Objective

1) Investigate the feasibility and design process of implementing hybrid ventilation in the New York Times Building.

2) Determine the impact of using BIM as a modeling tool using analysis software for Mixed-Mode design

3.5.1.2 Process

Review of Literature, Case-studies, and Applicable Building Codes and Standards Identify Constraints and Design Assumptions Feasibility Assessment – Single-Zone Model with Spreadsheet Calculations Curtain Wall Product Selection Model Outputs - Energy Savings and Payback Analysis Control Strategy IES<VE> MacroFlo Investigation

3.5.1.3 Literature Review

Seppanem, O., and Fisk, W., (2001) "Association of Ventilation System Type with SBS symptoms in Office Workers" *Indoor Air 2002*

In their 2001 study, Seppanem and Fisk concluded that properly designed Mixed-Mode buildings have been shown to reduce Indoor Air Quality problems, including Sick Building Syndome (SBS). According to Carnegie Mellon's Guidelines for High Performance Buildings, their Building Investment Decision Support (BIDS) demonstrates the productivity benefits of natural ventilation and mixed-mode systems. It was found that mixed-mode conditioning achieves 0.8-1.3% health cost savings, and 3-18% productivity gain, for an average return-on-investment of at least 120%. According to an extensive study totaling over 467 buildings, relative to naturally ventilated buildings the airconditioned buildings showed 30% to 200% higher incidences of SBS symptoms.

Zhao, Y., (2007) "A Decision-Support Framework For Design of Natural Ventilation In Non-Residential Buildings"

Zhao, in this 2007 publication, provides a framework to assist with the design of natural ventilation for commercial buildings in urban environments. The paper lays a foundation for addressing the constraints of implementation and design through feasibility assessment modules and analysis algorithms. It also describes different strategies and provides various examples through building case-studies.

3.5.1.4 Building Codes and Standards

The building was designed to comply with the following codes and standards: International Building Code, International Mechanical Code, New York City Building Code, ASHRAE Standard 90.1, Standard 55 and Standard 62.1.

3.5.2 Feasibility Assessment

3.5.2.1 Constraints and Assumptions

Publications and successful case-studies have recommended a plan depth of no more than 45' or 2.5 times the height of the space. Redesigning the mechanical system of an existing building provides little flexibility to the geometry of the floor plate, however The New York Times Building provides an open floor plan giving nearly all occupants access to open windows and fresh air. The enclosed offices and conference rooms adjacent to the core of the building are too far from the windows and will be mechanically conditioned all year. Allowable natural ventilation zoning is provided in Figure 58-Natural Ventilation Zoning.



Figure 58- Natural Ventilation Zoning

Local climate conditions significantly determine the feasibility of natural ventilation. Wind direction and speed, temperature, and humidity levels control when operable windows may be utilized. For this analysis TMY-2 weather data was used because on site measurements were not available. This weather data was adjusted for local site conditions with the assumptions listed in Section 3.3.3.2

Local site conditions of an urban environment determine the quality and availability of ventilation air for a Mixed-Mode system. Airflow through urban canyons, pollution and noise determine what parts of the building are suitable for natural ventilation. A more detailed analysis of street level conditions would optimize the specific lower level floor limit where operable windows would be feasible. For the simplification of this analysis,

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it was assumed that the building would be almost completely unobstructed above Level 21, at a height of 306 feet. This height was determined from the height of the immediate surrounding buildings. In addition, requiring the lower levels to be sealed provides a solution to any potential security considerations.

3.5.2.2 Weather Data

TMY-2 hourly weather data for New York, NY was used for this analysis. Weather trends were investigated using visualization from both IES<VE> and Ecotect. Figure 59 - Annual Diurnal Temperature provides the diurnal temperature swings throughout the year. The green mild trend shows indoor comfort conditions throughout the year, while the blue oscillating values indicate the hourly outdoor temperature conditions at the site. As seen in the Figure, the overlapping conditions between the months of May through September provide comfortable temperature conditions where natural ventilation may be utilized. Therefore, these months were used for this analysis. Figure 60 - Wind Data, shows the predominate wind coming from the southern direction with infrequent gusts coming from the northwest, northeast and southwest directions.



Figure 59 - Annual Diurnal Temperature





Figure 60 - Wind Data

3.5.2.3 Curtain Wall Selection

There were many design considerations when selecting a curtain wall with operable windows for the façade. It was important to specify a system that worked in conjunction with the shading system. Colt was chosen as the manufacturer for the glazing for more efficient coordination with the entire envelope construction. They also were the manufacturer for the chosen shading system providing a similar manufacturer and point of contact to address any issues during the design and construction process. The load analysis determined the optimal thermal characteristics for the desired architectural requirements of fully transparent glass. The natural ventilation analysis will determine how many glazing panels with operable windows will be needed. The specified operable glazing system can be seen in Figure 61 - Coltlite Operable Glazing System.



Figure 61 - Coltlite Operable Glazing System

Colt Coltlite LWI Ventilator, type LWI

Extruded aluminum outer frame with framed controllable double glazed louvers with thermal breaks to both outer and internal sections.

1" overall glass thickness. Glazing seals contain double weather strips with a nylon lip between, the horizontal glass edges of the louvers are enclosed with aluminum sections which have two overlapping weather seals for air-tightness.

Fixing

Fixing to curtain walling using thermally broken glazing frame adaptor. Fixing to structural opening either through frame of strap fixings.

Control Options

Integrated, hidden electric controls. Frame mounted motor positioned at top or bottom on either side frame, with 24V DCLAH61 motor. Typical operation time is 15 to 30 seconds. Motors fitted with in-built finger trapping sensor.

Performance

Heat transfer coefficient: U-value = $0.405 \text{ BTU/h-ft}^{2-\circ}\text{F}$

The Product Specifications for the selected curtain wall can be seen in Section 7.4.

Additionally, the specified curtain wall was modeled in the Revit 3D BIM model to architecturally visualize the proposed dynamic façade shading and curtain wall system. This is shown in Figure 62 - Revit Model of Proposed Facade System.



Figure 62 - Revit Model of Proposed Facade System

3.5.2.4 ASHRAE Adaptive Comfort Model

Figure 63 - Acceptable Operative Temperature Ranges for Naturally Conditioned Spaces provides allowable operative temperature limits for use in a naturally conditioned space. This criterion was used to evaluate potential time when windows could be opened and maintain a comfortable temperature for occupants.



Figure 63 - Acceptable Operative Temperature Ranges for Naturally Conditioned Spaces

3.5.3 Sizing Openings and Air Flow Estimation

Several design methods were explored after researching hybrid-ventilation for high-rise commercial buildings. Preliminary analysis was performed utilizing TMY-2 hourly weather data with supplemental spreadsheet calculations. The following section describes the Single Zone Model used for preliminary feasibility and sizing of operable window openings. Section 3.5.4 investigates the effectiveness of using whole building simulation software, such as IES<VE>, to simulation natural ventilation using the original BIM model created in Revit.

3.5.3.1 Single Zone Model

3.5.3.1.1 Assumptions

Natural ventilation will only be utilized during the cooling months of May-September analyzed

Effective opening area, A of 1.6 feet (opening on top and bottom - 3.2 feet total for each operable window glazing panel)

Setpoint Temperature = 75 $^{\circ}F$

Six operable glazing panels on East and West Façade

Three operable glazing panels on North and South Façade

Total of 18 operable glazing panels per floor

A single perimeter zone was evaluated with hourly cooling load determined from the IES<VE> energy model.

3.5.3.1.2 Calculations

Note: Data was converted to SI Units for to be analyzed with the following equations to determine flow rates due to buoyancy (stack effect) and wind.

 $V_{\text{stack}} = 0.6 \text{AV}(\text{gh}\Delta T/(\text{Tout}+273))$ (m³/s)

where $g = 9.8 \text{ m/s}^2$ and h is the height of the window opening, and ΔT is the difference between the outside and average inside temperature

 $V_{wind} = 0.025 AU_{local}$ (m³/s)

where U_{local} is the local wind speed determined from the equation

 $U_{local,z} = KUmetz^{a}cos\Theta$,

where the meterological wind speed is adjusted for site conditions of an urban terrain where K=0.35 and a=0.25. The wind direction is adjusted to obtain wind speeds in the perpendicular direction where Θ is the degrees between the wind direction and the angle perpendicular to the façade being analyzed.

Wind and Stack are combined using the equation

$$V_{\text{total}} = \sqrt{((V_{\text{stack}})^2 + (V_{\text{wind}})^2)}$$

This equation provides the total flow rate provided by the operable windows in the zone.

The required flow rate to meet the cooling load in the space was determine using the hourly cooling data from IES<VE> and the equation

 $Q = q_i / (C_p * \rho * (Tin-Tout) \text{ with } C_p = 1 \text{ kJ/kgK} \text{ and } \rho = 1.3 \text{ kg/m}^3$

Where the required cooling load was met with the flow rate provided through the window openings, the natural ventilation system was deemed feasible.

3.5.3.1.3 Results

Outdoor air conditions allow for 3067 hours where natural ventilation may be utilized to adequately condition and ventilate the space out of a total of 8760 hours in a year. This is approximately 35% of the total hours in a year, however many of these hours with suitable conditions occur out of the typical work day. The results have been adjusted to reflect utilizable cooling hours during the work day when the system would be able to take advantage of natural ventilation for conditioning the open office space of The New York Times Building. This resulted in an annual energy cost savings of \$145,419.

3.5.4 Whole Building Simulation

While the Single Zone Model evaluates natural ventilation feasibility within a single zone, IES<VE> also has a simulation tool called MacroFlo which enables multiple zones to be simulated simultaneously, providing more accurate relative pressure and temperature differentials. An investigation was performed to utilize IES<VE> MacrFlo for analyzing Mixed-Mode natural ventilation conditions on The New York Times Building. Due to the complexity of the more detailed inputs required for MacroFlo, this analysis was only successful at obtaining the pressure coefficients as predicted by the Zonal AirFlow Model.

3.5.4.1 BIM Workflow

The existing gbXML file used for load analysis was also used for this MacroFlo simulation. The geometry of the tower was originally built in Autodesk Revit Architecture and the gbXML file was imported to IES <VE> for further analysis.

3.5.4.2 Airflow Network Model

Airflow Network Models calculate the airflow movement through the building. Coupled with thermal dynamic simulation models, IES <VE> uses MacroFlo to investigate performance of the building over a typical year. Within MacroFlo, opening types are selected and adjusted according to their heights on the building. Then the dynamic simulation feature is run in conjunction with MacroFlo to obtain hourly data.

3.5.4.3 Wind Pressure

Wind pressures on the building exterior are calculated utilizing data from the weather file, including wind speed and directional data, combined with opening orientations and wind exposures. The pressure is estimated using wind pressure coefficients, derived from wind tunnel experimentation which are supplied to the user in the IES <VE> software. Wind pressure on the building surface is derived using the relationship

 $P_{w} = C_{p} \frac{1}{2} \rho v^{2}$ Where $P_{w} \qquad \text{is wind pressure}$ $C_{p} \qquad \text{wind pressure coefficient}$ $\rho \qquad \text{air density}$ $v^{2} \qquad \text{reference wind speed}$

The reference wind speed is estimated from the meteorological wind speed and adjusted for height and terrain type using the expression

 $v = uKh^{a}$ where u meteorological wind speed h height above the ground

and *a* and *K* are coefficients set when originally setting location data. For this simulation the Terrain Type was set to *City* with an Exponent *a* of 0.33 and a *K* value of 0.2097.

For this simulation, 'High-rise' exposure types were used. The elevation is expressed using h/H, where h is the height of the opening and H is the height of the building. Table 42 - Opening Types by Zone, including Wind Pressure Coefficients shows the building's floors zoned by exposure type.

Table 42 - Opening Types by Zone, including Wind Pressure Coefficients

Wind Pressure Coefficients, Cp, as Predicted by Zonal Airflow Model (IES)							
			IES Cp Derivations	Degree of Opening			
Building Z	oneFloor	Height	Exposure Type	(Modulating Profile)			
Zone0	1-10	155'	High-rise sheltered wall h/H=0.2	OFF: off continuously			
Zone1	11-21	306'	High-rise semi-exposed wall h/H=0.4	OFF: off continuously			
Zone2	22-27	443'	High-rise exposed wall h/H=0.6	ON: on continuously			
Zone3	28	416'	High-rise exposed wall h/H=.8	OFF: off continuously			
Zone4	29-41	594'	High-rise exposed wall h/H=.8	ON: on continuously			
Zone5	42-50	719'	High-rise exposed wall h/H=1.0	ON: on continuously			
Zone6	51	746'	High-rise exposed wall h/H=1 0	OFF: off continuously			

Building	Angle of Attack															
Zone	0.0°	22.5°	45.0°	67.5°	90.0°	112.5°	135.0°	157.5°	180.0°	202.5°	225.0°	247.5°	270.0°	292.5°	315.0°	337.5°
Zone0	0.106	0.084	0.042	-0.043	-0.145	-0.172	-0.148	-0.114	-0.084	-0.114	-0.148	-0.172	-0.145	-0.043	0.042	0.084
Zone1	0.249	0.202	0.1	-0.11	-0.362	-0.348	-0.275	-0.22	-0.175	-0.22	-0.275	-0.348	-0.362	-0.11	0.1	0.202
Zone2	0.55	0.45	0.24	-0.18	-0.615	-0.538	-0.41	-0.333	-0.29	-0.333	-0.41	-0.538	-0.615	-0.18	0.24	0.45
Zone3	0.65	0.558	0.315	-0.155	-0.645	-0.525	-0.39	-0.325	-0.28	-0.325	-0.39	-0.525	-0.645	-0.155	0.315	0.558
Zone4	0.65	0.558	0.315	-0.155	-0.645	-0.525	-0.39	-0.325	-0.28	-0.325	-0.39	-0.525	-0.645	-0.155	0.315	0.558
Zone5	0.4	0.315	0.15	-0.213	-0.65	-0.533	-0.38	-0.303	-0.255	-0.303	-0.38	-0.533	-0.65	-0.213	0.15	0.315
Zone6	0.4	0.315	0.15	-0.213	-0.65	-0.533	-0.38	-0.303	-0.255	-0.303	-0.38	-0.533	-0.65	-0.213	0.15	0.315

3.5.4.4 Buoyancy Pressure

The variation of pressure with height is known as the stack effect. Air pressure in room is a linear function of height:

$P_n(h)=p_n(0)-h\rho_n g$

Where

- $P_n(h)$ pressure in room *n* at height *h* above ground level
- *h* height above ground level
- ρ_n air density in room
- *g* acceleration due to gravity

3.5.4.5 Flow Characteristics

As defined in Table 42 - Opening Types by Zone, including Wind Pressure Coefficients, the Degree of opening for Zone 0 and Zone 1 are set to a modulating profile of OFF CONTINUOUSLY, because they are designated to be below the desirable height to limitnoise, air pollution, and unmeasured airflow through the surrounding urban canyon. Zone 3 and Zone 6 refer to the two mechanical floors and are also set to OFF CONTINUOUSLY. ON CONTINUOUSLY, the area of the opening will be varied by modulating the openable area with the degree of opening percentage profile dictated by the profiles determined in the energy model.

3.5.4.6 Conclusions

This simulation, utilizing MacroFlo, was unable to provide realistic energy comsumption results. This may be due to the significantly detailed and time-consuming inputs required to accurately simulate the Mixed-Mode natural ventilation scheme. Simplified calculations and assumptions, with limited information on system components, such as accuracy of window operational controls, variable modulating profile of the window openable area, detailed internal heat gain sources and locations, more specific geometries of the operable windows, simply provide results with order of magnitude percent errors that are not accurate enough to present in this report. With more detailed information and time, MacroFlo has the potential to provide extremely informative results. It is important, however, to document the workflow and trial of another software design tool utilizing the BIM model. Further investigation of this application could provide accurate and informative results, aiding the application of natural ventilation design for complex high performance buildings.

3.5.5 Control Strategies

Mixed-Mode buildings can generally be placed in three categories including CONCURRENT, CHANGE-OVER, and ZONED. A CONCURRENT strategy has mechanical cooling and natural ventilation in the same space at the same time. CHANGE-OVER has the building switch between mechanical cooling and natural

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ventilation depending on seasonal or daily characteristics. ZONED refers to the mechanical cooling and natural ventilation operating in different areas of the building (Brager, et. al, 2007). Due to the open perimeter plan suitable for natural ventilation and the interior enclosed office and conference spaces, a ZONED strategy was selected for the New York Times Building. This is complimented with CHANGE-OVER occurring in the spaces zoned for natural ventilation responding to interior and exterior conditions.

3.5.5.1 Input Signals

The input signal will consist of temperature and CO_2 sensors that are distributed throughout the zone and generate a ventilation demand when the space deviates from its required set point.

3.5.5.2 Modifiers

The ventilation demand signal will be modified to take into account outside conditions including outside air temperature, wind speed and direction, rain and humidity levels. If the outside air is above the desired set point temperature, the actuators will close the windows and the system will change-over to mechanical cooling and ventilation. A similar function will be performed if any of the outside levels are out of the acceptable range.

3.5.5.3 Controller

The computer Building Management System (BMS) would monitor the input signals and modifiers and direct the control actions.

3.5.5.4 Control Actions

The window fully opened or fully closed and the degree of opening of the window is a control action in response to the input signals or modifiers.

3.5.5.5 Control Functions

The criteria used to drive the control sequence for operable windows include ventilation control, thermal comfort control, and space cooling. Ventilation control refers to the exchange of outside air with stale inside air, diluting indoor air pollutants including CO₂, dust and other particulates. Thermal comfort control is set by the ASHRAE 55 Adaptive Comfort Zone, which allows for a wider range of floating temperatures than a typical mechanically conditioned space. This can encompass space cooling with the adaptive range and allow for the mechanical cooling to switch on to meet peak demands (Brager, et. al, 2007).

3.5.5.6 Control Algorithm

The flowchart shown in Figure 64 - Control Algorithm represents the sequence of the input and modifier signals that would be used to regulate the building in response to the control functions of ventilation, comfort control and cooling.



Figure 64 - Control Algorithm

3.6 Façade Lighting

The following section discusses the exterior lighting design for the facade.

3.6.1 **Objective**

Goal of this evaluation/analysis/redesign

1) Design an exterior environment that responds to the two main views of the building. Both the pedestrian scale and distant views were considered.

2) Design the lighting to respond to the goals of the architect.

3) Design an energy efficient lighting design to lower the yearly energy bills.

3.6.2 Process

Model inputs-

Building geometry - Use the existing Revit model for geometry

Photometry - Download .ies files from manufacturer websites

Model outputs-

Illuminance levels on the façade

Illuminance levels at the entrance

Lighting Power Densities

Renderings

Architectural impact

3.6.3 Calculations for Analysis

AGI was used as the tool for the lighting calculations. Radiance was used to complete the renderings for the façade due to the large number of surfaces. The knowledge of Radiance was gained in the AE 565 Daylighting course. This program has the ability to render more complex scenes than AGI. The reason it is not used often is because of the interface or lack there of. The program must be run from the command prompt, and this concept is unfamiliar to many students of this era.

3.6.4 Assumptions

The reflectances are unknown, so they were assumed.

Facade

St	eel	.65				
G	lazing	.20				
Lo	ouver	.65				
Entrance						
Si	dewalk	.18				
А	sphalt	.05				
Light Loss Factors						
Te	otal	.7				

Design Considerations 3.6.5

Psychological Impression

For the pedestrian scale, an impression of visual clarity is needed.

Appearance of Space and Luminaires (Very Important)

The lighting design should highlight the architecture of the building and promote the unique design. The architecture expresses transparency. To assist in the architectural theme, the lighting must express transparency. The luminances at the entrance must be balanced between the interior and exterior. By doing this, pedestrians along the sidewalk will be able to see into the space, and the occupants inside will be able to see outside.

Color Appearance (Important)

Another design concept implemented by the architect was the idea of a constantly changing building appearance. The building should reflect the concept of lightness as the facade reacts to the changing daylight and night conditions. The lighting design should create a glowing structure that seems to disappear into the night sky. The entrance must have high CRI lamps, while the façade can have slightly lower CRI lamps.

Direct Glare (Important)

All luminaires shall have no direct glare to create a safe environment in the streets surrounding the perimeter. Fixture accessories should be used to completely remove glaring effects. This is important when considering the traffic on 8th avenue.

Light Distribution on Surfaces (Very Important)

The lighting design should highlight the entire building to promote the architect's concepts. The facade should be washed horizontally with uniform light gradually fading vertically as the building progresses into the sky. The horizontal louvers will promote a sense of 3-dimensions. If the façade consisted solely of glass, the building would lose all dimension.

Light Pollution/Trespass (Very Important)

Avoid light pollution into the night sky by utilizing cutoff fixtures. This will reduce interference with air traffic and keep the light directly on the building. Spill light should not hit the surfaces surrounding buildings. Fixtures should be kept close to building with medium to narrow distribution.

Point(s) of Interest (Important)

The text across the front of the facade should be emphasized. To emphasize the height of the structure, the entire facade should be illuminated. The spire at the top of the building should also receive illuminance, creating the effect of a structure disappearing into the sky. To promote direction, the main lobby should be clearly visible from the street with luminaires accenting the entry.

Shadows (Important)

Shadows should be present across the building facade to create a visually interesting structure. The building should have dark and light areas to create depth and detail and promote the unique design.

Source/Task/Eye Geometry (Important)

The expansive curtain wall requires that luminaires are not placed too close or aimed directly at the glass. This can prevent irritation to individuals inside the building. Persons walking along the sidewalk or in vehicles should also be taken into consideration. Luminaires should not provide any disturbances to these individuals.

Sparkle/Desirable Reflected Highlights (Somewhat Important)

The interior spaces can provide sparkle and highlight. The different colors of the interior should be visible from the street. The floodlighting across the facade can also cause reflections from parts of the building structure and create a changing visual display.

Surface Characteristics (Important)

The louvers will create a highly reflective surface. The steel structure of the building will reflect less light and create an interesting contrast. The interior spaces should also provide additional detail to the exterior view.

Maintenance

Luminaires should not be easily accessed by individuals in the street or along the sidewalk. The lamp selection is crucial for this. By selecting LED fixtures, the lamp life can be well over 50,000 hours. This would significantly decrease maintenance time.. The fixtures should also be rated to withstand the varying weather conditions in New York, NY. Fixtures should also have easy relamping capabilities.

3.6.6 Design Criteria

Illuminance (IESNA Lighting Handbook Ninth Edition)

7)

3.6.7 **Design Intent**

In one of the interviews of Renzo Piano's, he expressed his interest in having the building disappear into the sky. This was a major consideration for the redesign of the façade lighting. Another consideration was the division between human scale and skyline views. The human scale was from ground level to approximately the eighth floor. This is amount of the building that would be mainly viewed from pedestrian level. Anything above the eighth floor would be visible from across the Hudson. All of these ideas played a role in the redesign of the exterior lighting.

The first consideration was the building entrance. This is where pedestrian scale would play its biggest part. Renzo had mentioned how important the structure was in the building. To bring the building down to size and highlight the structure, uplighting the columns was the first decision. By doing this, there would be a gradient of light traveling up the column for the first floor. This was done to keep the occupants focus on the lower part of the building. Because of the building being located in Times Square, higher light levels were needed. Area lights were used to illuminate the sidewalk in front of the building. The illuminance was targeted to be 6fc. The signage of the building was also illuminated to 6fc. By doing this, equal weight was placed on the building name and the pedestrians.

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As for the upper stories, the design was more complicated. Many designs were looked into before ending up with the final one. Due to the height of the building, fixtures either needed to be mounted to the building every few stories or placed far out from the building. The reason for this is the inverse square cosine law, but more specifically the cosine part. As the light traveled further and further up the building, the cosine term would go to 0. To combat part of this problem, the new façade system was used to increase the cosine term.

The new façade system incorporates motorized louvers. At night the sun would not play a role inside the space, so the louvers could be adjusted to any desired position. When the exterior lights come on, the louver position could be re-oriented to horizontal. By doing this, the cosine term would go to 1 towards the top of the building. This allows the building to reach higher illuminance values with less light output.

3.6.8 Conclusion

3.6.8.1 Fixture selection

The luminaire schedule can be found on pages Table 79: Luminaire Schedule and Table 80: Luminaire Schedule Continued. The specification sheets for the exterior lighting can be found on pages 321 through 334.

3.6.8.2 Lighting Power Density

The redesign uses 42 fixtures to illuminate the upper part of the building. The approximate square footage of the west façade is 91,920sqft. The allowable wattage would be 18,384Watts. The redesign uses 42 fixtures at 51 watts per fixture for a total of 2142Watts. This results in a lighting power density of .0233w/sqft.

3.6.8.3 Pseudo Colors and Renderings



Figure 65: Exterior Facade Illuminance Pseudo Color (fc)



Figure 66: Exterior Entrance Illuminance Pseudo Color (fc)



Figure 67: Front Entrance Rendering



Figure 68: Front Entrance Rendering



Figure 69: Front Entrance Rendering



Figure 70: Front Entrance Rendering



Figure 71: Front Entrance Overhang Rendering



Figure 72: Front Facade Perspective



Figure 73: Front Facade Rendering

3.6.8.4 Illuminance Levels (Façade)

Average top .1 fc

Average bottom 6 fc

3.6.8.5 Illuminance Levels (Entrance)

Average 6 fc

3.6.8.6 Control

The lighting for these two areas will be controlled by a controllable lighting panel. Each of these panels can be set by time clock. There is also capability to include photosensors as input for each of these panels. The fixtures atop the Port Authority building will be connected to their own panel, and the fixtures at the entrance will be connected to their own panel as well. The specification sheet for this panel can be found in Figure 270: Exterior Lighting Control Panelboard Specification Sheet and Figure 271: Exterior Lighting Control Panelboard Specification Sheet Continued on pages 368 and 369.

3.6.8.7 Panelboard changes

The existing panelboards that would be effected by this change could not be located. For this reason, new panelboards were created. The effected panelboards can be found in Figure 261: Panelboard P-LE-1 (New) through Figure 264: Panelboard PA-PP-1 (New) on pages 359 through 362. The feeder worksheet can be found in Figure 265: Feeder Sizing Worksheet on page 363.

3.6.8.8 Plans

The lighting plans can be found in Figure 211: Exterior Lighting Plan through Figure 214: Exterior Lighting Elevation E-302 on pages 309 through 312.

3.7 Construction Implications

The changes to the curtain wall will have a large affect on the cost of the system, along with the payback period of the changes to the upfront cost. The first analysis when determining the feasibility of the new curtain wall system was determining the cost of the original system. Then the corner changes to the facade to the more standardized mullion spacing and enclosed structure as discussed in sections 3.1 and 4.2 were modeled and the a cost was developed with the original ceramic rod shading system. The next step included the modeling of the new louver shading system with 50% circular frit on the louvers with fully transparent glass behind the shades, and the same 50% circular frit on the glazing panels where no shading system is present, as discussed in section 3.2. This analysis also included the addition of photovoltaics to the shading system at strategic locations on the facade, which was determined in section 3.3. The payback period analysis for the photovoltaic addition is also covered in section 3.3. The final analysis was the inclusion of some glazing panels being replaced by an operable glazing system, allowing for hybrid ventilation discussed in section 3.5.

3.7.1 **Objective**

The goal of this analysis is to provide material take-offs and cost breakdowns for each of the proposed changes to the curtain wall system, which will provide input toward the feasibility of each of the changes.

3.7.2 Process

Model Inputs-

Update existing Revit model families

Worked together to create curtain wall family changes in Revit

Research-

Possible zoning challenges

Cost of original curtain wall system

Cost of curtain wall system changes

Analysis-

Electronic material schedules generated from the BIM

Apply cost to original system and through changes to the curtain wall system

3.7.3 **Zoning**

When looking at the façade, placing louvers that extend away from the building further than the existing shading system may face building setback problems with the building code. By investigating the New York City building code, the site is found to be classified in both the Market District (M1-6) and the Construction District (C-7, C-6.5) as shown in Figure 74.



Figure 74 - New York City Zoning Map

The designation of M1-6 and C6-7 gives the setback criteria for buildings, shown in Figure 75 and Figure 76 respectively. The code states that there has to be an initial setback of 15 feet because the front of the building is on a wide street. The setback also states that after the first 85 feet (or 6 stories, whichever is less) a slope of 5.6 to 1.0 (vertical over horizontal) must be applied as setbacks.
MAXIMUM HEIGHT OF FRONT WALL AND REQUIRED FRONT SETBACKS

#Sky Exposure Plane#

	Mavimum	Mourimum		Slope ov expresse distand	ver #Zoni ed as a r ce to hor di	ng Lot# catio of cizontal .stance)
#Initial Setback Distance# (in feet)	Height of a Front Wall, or other • Portion of a	Height	#Narrow S	On Street#	#Wide	On Street#
On On #Narrow #Wide Street# Street#	#Building# within the #Initial Setback Distance#	above #Street Line# (in feet)	Verti- cal Dis- tance	Hori- zon- tal Dis- tance	Verti- cal Dis- tance	Hori- zon- tal Dis- tance
District: M1-1						
20 15	30 feet or 2 #stories#, whichever is less	30	1 to	1	1 to	1
Districts: M1-2 M	11-4 M2-1 M2-	-3 M3				
20 15	60 feet or 4 #stories#, whichever is less	60	2.7 to	1	5.6 to	1
Districts: M1-3 N	41-5 M1-6 M2-	-2 M2-4				
20 15	85 feet or 6 #stories#, whichever is less	85	2.7 to	1	5.6 to	

Figure 75 - Market District Setback Criteria

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		Maximum Height of a Front Wall or · other portion of a		Slope ove a F	#1 er #Zoning Ratio of Ve Ho	Sky Exposu Lot# (Exp ertical Di prizontal	re Plane# ressed as stance to Distance)
#Initial Distance (in feet	Setback #)	#Building# within the #Initial Setback	Height above the	0	n #Narrow Street#		On #Wide Street#
On #Narrow Street#	On #Wide Street#	Distance#	#Street Line# (in feet)	Vertical Distance	Hori- zontal Distance	Vertical Distance	Hori- zontal Distance
Distric	ts: C3	C4-1 C8-1					
20	15	30 feet or two #stories#, whichever is less	30	1	to l	1	to 1
Distric	ts: Cl-	6 C2-6 C4-2	2 C4-3 C	C4-4 C4-5	5 C7 C8-2	C8-3	
20	15	60 feet or four #stories#, whichever is less	60	2.7	to 1	5.6	to l
Distric	ts: Cl-	7 C1-8 C1-	9 C2-7 C	C2-8 C4-2	2F C4-6 C	4-7 C5 C	6 C8-4
20 🤇	15	85 feet or six #stories#, whichever is less	85	2.7	to 1	5.6	to 1

Figure 76 - Commercial District Setback Criteria

When applying the criteria to the current building, it is found that the existing building does not meet these criteria for the setbacks, shown in Figure 77. This is found when applying the initial setback and slope criteria to the south elevation of the building. By not meeting the criteria, there must be unknown information as to why this building was not restricted to these codes, or the city granted certain ordinances for the New York Times Building. This would make it possible for having the shading system extend slightly further than the existing building.



Figure 77 - Existing Building Setback Limits

3.7.4 Curtain Wall Material Take-offs

The original curtain wall was modeled using Autodesk Revit Architecture, showing the glazing and spandrel panels, the mullions, structure for the ceramic tube shading system, and the ceramic rods. By applying the different families to the facade of the building, a curtain wall take-off was developed using the Revit software. The original curtain wall was a unitized system, and when the manufacturer was contacted, an average price of \$145 per ft² was supplied. The manufacturer also supplied a cost of \$10 per 5' length of ceramic, plus \$10 per 5' length of structure within each ceramic rod, achieving a total of \$20 per 5' length of ceramic rod with the rod structure. When applying the costs to the curtain wall takeoff, the cost for the original facade totals \$83,532,860.00. The original corner of the building is shown in Figure 78, with the 3 non-standard panels highlighted. The summary of the original curtain wall take-off is shown below in Table 43. Detailed take-offs of all of the following changes are located in Appendix 7.5 on page 403.

TOTALS						
Curtain Wall	555236	Sq. Ft.	п			\$ 80,509,220.00
Ceramic Rods	755910	L.F.	=	151182	5' Lengths =	\$ 3,023,640.00
					Total	\$ 83,532,860.00

Table 43 - Original Curtain Wall System Take-off



Figure 78: Original Corner of The New York Times Building

When expanding the corners to standardize the curtain wall and enclose the structure of the tower, a material take-off of the facade changes increases with slightly more facade area, and more ceramic rods across the facade. The changes are shown in Figure 79, with the non-standard panel highlighted. The summary of the corner change curtain wall take-off is shown below in Table 44.

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Figure 79: Proposed Corner Change to The New York Times Building

	TO	TALS					
Curtain Wall	555530	Sq. Ft.	П			\$	80,551,850.00
Ceramic Rods	792200	L.F.	=	158440	5' Lengths :	= \$	3,168,800.00
					Tota	I \$	83,720,650.00

Table 44: Corner Change Curtain Wall System Take-off

Take-offs were then completed for the new louvered shading system replacing the existing ceramic rods. Manufacturers data supplied an average cost of \$40 per square foot of a louver panel. The sizing of each panel was determined to comply with the specifications of the manufacturer, and placed 7 shading louvers on each facade panel. The pricing breakdown of each louver is shown in Table 45. The summary of the corner change and shading system change to the curtain wall system is shown below in Table 45.



Table 45: Louver Panel Pricing Breakdown

	ΤΟΤΑ	LS				
Curtain Wall	568000	Sq. Ft.	=			\$ 82,360,000.00
Louvers	165190	L.F.	=	33038	5' Lengths	\$ 11,563,300.00
					Total	\$ 93,923,300.00

Table 46: Corner Change Louver Curtain Wall System

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This take-off also allowed for the incorporation of photovoltaics on specific louvers of the building. The placement was determined by the analysis of section 3.3, along with the payback period of the photovoltaics. As discussed in section 3.3, to retain the architecture and interior views, only the top 2 louvers on each curtain wall panel would be replaced to have photovoltaics instead of frit. The louvers with photovoltaics would only be contain about 50% coverage from the photovoltaics. As determined in section 3.3, the south facade would have photovoltaics on floors 18 through 51, and the west facade would have photovoltaics on floors 8 through 51. The pricing breakdown for each louver with photovoltaics is shown in Table 47. The summary of the corner change and shading system change with strategic photovoltaics placed on the facade is shown below in Table 48.

P.V. Louver Area	8.75	S.F. per 5' length
P.V. Louver Cost	\$612.50	per 5' length; 50% P.V. Coverage

TOTALS						
Curtain Wall	568000	Sq. Ft. =			\$	82,360,000.00
Louvers	145290	L.F. =	29058	5' Lengths	\$	10,170,300.00
P.V. Louvers	19900	L.F. =	3980	5' Lengths	\$	2,437,750.00
				Total	\$	94,968,050.00

Table 47: Photovoltaic Louver Panel Pricing Breakdown

Table 48: Corner Change P.V. Louver Curtain Wall System

Finally, an operable glazing system take-off was created to show the implications of added cost due to material and installation of the system. As discussed in section 3.5, due to safety and other restrictions, operable windows were not included on the first 20 stories of the building, along with both the 28th and 51st stories which are double-height mechanical spaces and would not benefit from the operable windows. This gave 29 total stories with operable windows. The entire face of the building would not be replaced with operable windows, but the east and west tower walls would have 6 panels replaced each for a total of 18 panels replaced per floor. With a standard panel size of 5'-0" x 13'-9" and 18 panels replaced per floor, a total of 1,237.50 ft² replaced per floor. The additional cost was estimated from industry data at \$70/ft² added to the initial cost of \$145/ft². The cost of the curtain wall panel change was found to add \$3,870.00 per floor. The pricing breakdown for each operable window curtain wall system change is shown below in Table 50.

Operable Window Louver	5	S.F. per 5' length
Number of Operable Window Louvers	10	Louvers per glazing panel
Operable Window Louver Cost	\$215.00	per S.F. of glazing panel

Table 49: Operable Window Pricing Breakdown

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TOTALS					
Curtain Wall	532112.5 Sq. Ft. =	\$ 77,156,312.50			
Operable Curtian Wall	35887.5 Sq. Ft. =	\$ 7,715,812.50			
		Total \$ 84,872,125.00			

Table 50: Operable Window Curtain Wall System

3.7.5 **Cost Implications**

Based on the original cost for the curtain wall system priced at a total of \$83,532,860.00, expanding the corners of the building to enclose the structure would add an additional cost of \$187,790.00, bringing the total to \$83,720,650.00. This was due to more ceramic rods. The cost of replacing the existing ceramic rod shading system with a total cost of \$3,168,800.00 to a louvered shading system with a total cost of \$11,563,300.00 would add a cost of \$8,394,500.00 to the curtain wall system, making the entire system total cost equal to \$93,923,300.00. This is an increase of approximately 10% to the cost of the system, but is less than 1% of the total building cost. The cost of the addition of photovoltaics on the top two louvers of each panel to the west and south facades of the building on floors 8 through 51 and 18 through 51 respectively, generated an additional cost of \$1,044,750.00, bringing the total curtain wall system cost to \$94, 968,050.00. Finally, the inclusion of operable curtain wall panels on floors 21 through 27 and floors 29 through 50 generated an additional \$2,512,125.00 to the curtain wall. A total for the proposed curtain wall system change is shown below in Table 51.

TOTALS							
Curtain Wall	532112.5	Sq. Ft.	=			\$	77,156,312.50
Operable Curtian Wall	35887.5	Sq. Ft.	=			\$	7,715,812.50
Louvers	145290	L.F.	=	29058	5' Lengths	\$	10,170,300.00
P.V. Louvers	19900	L.F.	=	3980	5' Lengths	\$	2,437,750.00
					Total	\$	97,480,175.00
					Original	\$	83,532,860.00
					Difference	\$	13,947,315.00

Table 51: Total Proposed Curtain Wall System Change Breakdown

This shows a total additional cost of \$13,947,315.00 for all changes to the facade, with a total cost of \$97,480,175.00. The additional cost would be approximately 16.5% more when compared to the original curtain wall system.

3.7.6 Payback

The data from energy modeling for the original building envelope without the ceramic rod shading system shows energy costs at \$1,365,048.80 per year for the cooling loads for the entire building. While the information for the exact ceramic rod cooling load savings, looking at the differences between savings of 1%, 10% and 20%, there would be savings of \$13,650.49, \$136,504.88, and \$273,009.76 respectively. The result is a payback period of over 220 years, 23 years, or 12 years for the ceramic rods when compared to the initial cost for the ceramic rods at \$3,023,640.00. Data for the proposed louvered shading system shows a savings of \$873,828.43 per year for the entire building.

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When applied to the cost of the proposed louver system at \$11,563,300.00 the payback period for the cost of the louver system is approximately 13.25 years. With the integration of the photovoltaic panels, the savings are the same for the cooling loads. The payback for the photovoltaic integration is discussed in section 3.4. Finally, the additional cost of \$2,512,125.00 for the operable curtain wall panels is offset in approximately 15 years by an additional savings of \$171,927.13 in the cooling load.

3.7.7 Conclusions

When all of the systems are put together, a total cooling load savings of \$1,045,755.56 per year is obtained. This results in a lower operating cost of the building every year. When the savings are applied to the additional upfront cost of \$13,947,315.00, the new system has a payback period of approximately 13.5 years. While the original savings are only a range, it is believed that the savings range would be between 1-5%, or over 50 years. Compared to the payback and energy cost reduction, of the existing system, the proposed system would be a viable option. Even with commissioning and maintenance pricing added to the long term cost of the façade system, the overall payback period would remain under that of the existing system. The environmental significance is also important, as the reduction in cooling load, inclusion of natural ventilation and the improvement of daylighting within the office spaces are all key factors when determining the added social benefit of the system.

4 TENANT SPACES REDESIGN

4.1 Tenant Spaces Changes

The exposed structure was enclosed to eliminate thermal differential between the structural members that penetrated the building envelope. These changes resulted in significant cost savings in the structural system and generated additional revenue for the owner by increasing the rentable area. Due to the increased rentable floor area, the lighting system needed to be redesigned. The proposed change switched the design from an all general lighting system to a lower general lighting level with supplemental task lighting. Additionally, the existing Under Floor Air Distribution (UFAD) system was changed to a ducted sidewall displacement system to improve upon the indoor environmental quality. This required space coordination with the architectural and structural changes. The BIM model was utilized to calculate the changes to rentable floor area, space coordination, and quantity take-off of structural framing members and columns.

4.2 Architectural Layouts

The following section highlights the changes to the layouts of spaces within the core and tenant areas as a result of the structural and facade changes. The architectural layouts for typical floors had to be changed in accordance with the proposed structural and facade changes. The original model was updated to replace the structural steel core with the new concrete core. The facade changes to enclose the exposed steel columns in the corner of the building were also included in the model. Meetings were held between all members of the integrated team and the architectural advisor to discuss the layout changes, and their proper arrangement. The team also worked together to review and change the layouts to make sure the original criteria were met. These spaces were all organized in Autodesk Revit Architecture, along with the color coded layout plans shown below. Area schedules were also developed using Autodesk Revit Architecture.

4.2.1 **Objective**

The objective of this analysis is to develop architectural changes within a typical floor to meet the criteria of the original architecture, and function properly with the structural and facade changes. The analysis will also focus on the effects to the owners of the New York Times Building due to the changes.

4.2.2 Process

Collaboration-

Meetings to discuss design changes

Review and alter changes as a team

Research

Architectural justification for enclosing the exposed structure

Building codes

Existing criteria

Model Input-

Original model documentation

Model design changes

Analysis-

Develop area schedules to show maintained area of spaces, as well as possibility of gaining rentable space

Apply available rent/lease pricing for NYC high rise to changes

4.2.3 Architectural Justification

Various changes led to architectural impacts on the building envelope and exposed structure. The exposed structure was enclosed to eliminate thermal differential between the structural members that penetrated the building envelope. Additionally a dynamic curtain wall system with louvered shades and operable windows was introduced. The design team researched the architect's previous work to verify that similar designs were utilized in precedent notable work. These building's include the Debis Headquarters Building in Berlin, Germany and Aurora Place in Sydney, Australia shown in Figure 80 and Figure 81.

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Figure 80: Debis Headquarters Building in Berlin, Germany

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Figure 81: Aurora Place in Sydney, Australia

4.2.4 Layout Changes

The primary change to the architecture of the core was due to the openings between the walls of the concrete core. The openings for each of the elevator shafts were maintained to avoid problems with the elevators. The clear space for access from the elevator lobbies to the office space was also maintained between the shear walls as discussed in section 2.3. Bathroom spaces were also maintained and unchanged in their respective areas of the core. The main problem was encountered when laying out the access to support areas for the core utility spaces along with the access and orientation of the emergency stairs. As a team, we decided to keep the mechanical space and primary duct risers centralized within the core. The emergency stairs were moved away from the center of the core toward the shear walls where the electrical rooms were, and the

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electrical rooms were moved to each side of the mechanical room. After discussion between the Lighting/Electrical team member and the Construction Management Team member about the use of bus ducts instead of conduit discussed in section 2.3.2, the riser space for bus ducts for the New York Times' floors along with the Forest City Ratner Company's floors was combined and located behind the electrical rooms. All spaces were given proper access from support spaces on each side of the core, and access to the mechanical room was maintained from the service elevator space and the support spaces serving the office floor. These changes are shown between Figure 82 and Figure 83.



Figure 82: Original Core Layout



Figure 83: Proposed New Core Layout

4.2.5 Area Changes

Area schedules were developed to show the comparison between the existing layout of spaces and the proposed changes to the layout. This allowed the team to compare the sizes of spaces to the original to maintain at least the same size of each space. These were developed for four levels throughout the tower of the building where elevators drop out and for core shear wall thicknesses changes. The four areas are floors 5 through 17, 18 through 27, 29 through 38, and 39 through 50. Mechanical floors were omitted from this analysis. A summary of each area schedule for the original spaces are shown below in Figure 84, Figure 85, Figure 86, and Figure 87. A summary of each area schedule for

the core and corner change spaces are shown below in Figure 88, Figure 89, Figure 90, and Figure 91. The visual layouts of the spaces along with the detailed area schedules are located Appendix 7.5 on page 421.

Name	Area (S.F.)
Dead Space	629
Elevator Lobby	776
Elevator Shaft	2177
Office	18872
Restroom	581
Stairway	435
Support	413
Utility Space	1366
Total	25249
Rentable Area	19285
Not Rentable Area	5964
Total	25249

Figure 84: Original Area Schedule; Floors 5-17

Name	Area (S.F.)
Dead Space	679
Elevator Lobby	795
Elevator Shaft	1688
Office	18693
Restroom	475
Stairway	397
Support	985
Utility Space	1397
Total	25109
Rentable Area	19678
Not Rentable Area	5431
Total	25109

Figure 85: Original Area Schedule; Floors 18-27

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Name	Area (S.F.)
Dead Space	350
Elevator Lobby	466
Elevator Shaft	1298
Office	19084
Restroom	552
Stairway	405
Support	1642
Utility Space	1339
Total	25136
Rentable Area	20726
Not Rentable Area	4410
Total	25136

Figure 86: Original Area Schedule; Floors 29-38

Name	Area (S.F.)
Dead Space	283
Elevator Lobby	449
Elevator Shaft	586
Office	20516
Restroom	526
Stairway	420
Support	1000
Utility Space	1356
Total	25136
Rentable Area	21516
Not Rentable Area	3620
Total	25136

Figure 87: Original Area Schedule; Floors 39-50

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Name	Area (S.F.)
Added Corner Area	1732
Dead Space	730
Elevator Lobby	714
Elevator Shaft	2137
Office	19048
Restroom	578
Stairway	333
Support	509
Utility Space	1334
Total	27115
Rentable Area	21289
Not Rentable Area	5826
Total	27115

Figure 88: Core/Corner Change Area Schedule Floors 5-17

Name	Area (S.F.)
Added Corner Area	1732
Dead Space	727
Elevator Lobby	774
Elevator Shaft	1645
Office	19046
Restroom	489
Stairway	341
Support	1056
Utility Space	1304
Total	27115
Rentable Area	21835
Not Rentable Area	5280
Total	27115

Figure 89: Core/Corner Change Area Schedule Floors 18-27

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Name	Area (S.F.)
Added Corner Area	1752
Dead Space	458
Elevator Lobby	469
Elevator Shaft	1255
Office	19294
Restroom	482
Stairway	340
Support	1929
Utility Space	1261
Total	27240
Rentable Area	22975
Not Rentable Area	4265
Total	27240

Figure 90: Core/Corner Change Area Schedule Floors 29-38

Name	Area (S.F.)
Added Corner Area	1752
Dead Space	398
Elevator Lobby	434
Elevator Shaft	642
Office	20648
Restroom	472
Stairway	340
Support	1158
Utility Space	1318
Total	27162
Rentable Area	23558
Not Rentable Area	3604
Total	27162

Figure 91: Core/Corner Change Area Schedule Floors 39-50

4.2.6 **Rent Changes**

The amount of rentable area has a significant effect on the profitability of the building to the owner. The amount of rentable space is a major concern to an owner involved in developing leasing the space to other clients. While additional space in the New York Times spaces would be utilized, it is only necessary to analyze the Forest City Ratner Company's floors. By increasing the rentable area of each floor plan, there is an increase in the potential revenue to the owner. The article, Manhattan Office Vacancy Rate Falls for 2nd Consecutive Month by Cushman & Wakefield, dated January 12, 2010 supplies data for class A office space rental prices in Manhattan. The years of 2007, 2008, and 2009 were listed within the article, giving average pricing per square foot of office space per year at \$53.24, \$72.97, and \$55.52 respectively. An average of these prices comes to \$60.58. Input from a member of the industry confirmed this by supplying an estimate of currently \$50.00. Cost comparison summaries for the two layouts of the original FCRC spaces is shown in Figure 92, and Figure 93, along with the cost comparison summaries for the two layouts of the core and corner changes for the FCRC spaces, shown in Figure 94, and Figure 95.

	Totals									
Name	Area (S.F.)	Area Type								
Dead Space	350	Not Rentable								
Elevator Lobby	466	Not Rentable								
Elevator Shaft	1298	Not Rentable								
Office	19084	Rentable								
Restroom	552	Not Rentable								
Stairway	405	Not Rentable								
Support	1642	Rentable								
Utility Space	1339	Not Rentable								
Total	25136	SF								
			ļ	Average	Rental	Price	(\$ per \$	6.F. per	Year)
Rentable Area	20726	SF		2007		2008		2009		AVG.
Not Rentable Area	4410	SF	\$	53.24	\$	72.97	\$	55.52	\$	60.58
Total	25136	SF	\$1,103	3,452.24	\$1,512,	376.22	\$1,150,	707.52	\$1,255	,511.99

Figure 92: Original Rentable Space Pricing Floors 29-38

	Totals									
Name	Area (S.F.)	Area Type								
Dead Space	283	Not Rentable								
Elevator Lobby	449	Not Rentable								
Elevator Shaft	586	Not Rentable								
Office	20516	Rentable								
Restroom	526	Not Rentable								
Stairway	420	Not Rentable								
Support	1000	Rentable								
Utility Space	1356	Not Rentable								
Total	25136	SF								
			4	Average	Rental	Price	(\$ per :	S.F. per	Year)
Rentable Area	21516	SF		2007		2008		2009		AVG.
Not Rentable Area	3620	SF	\$	53.24	\$	72.97	\$	55.52	\$	60.58
Total	25136	SF	\$1,145	5,511.84	\$1,570,	022.52	\$1,194	,568.32	\$1,303	,367.56

Figure 93: Original Rentable Space Pricing Floors 39-50

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1	otals									
Name	Area (S.F.)	Area Type								
Added Corner Area	1752	Rentable								
Dead Space	458	Not Rentable								
Elevator Lobby	469	Not Rentable								
Elevator Shaft	1255	Not Rentable								
Office	19294	Rentable								
Restroom	482	Not Rentable								
Stairway	340	Not Rentable								
Support	1929	Rentable								
Utility Space	1261	Not Rentable								
Total	27240	SF								
				Average	Renta	Price	(\$ per	S.F. pei	·Year)
Rentable Area	22975	SF		2007		2008		2009		AVG
Not Rentable Area	4265	SF	\$	53.24	\$	72.97	\$	55.52	\$	60.58
Total	27240	SF	\$1,22	3,189.00	\$1,676,	485.75	\$1,27	5,572.00	\$1,391	,748.92

Figure 94: Core/Corner Change Rentable Space Pricing Floors 29-38

т	otals									
Name	Area (S.F.)	Area Type								
Added Corner Area	1752	Rentable								
Dead Space	398	Not Rentable								
Elevator Lobby	434	Not Rentable								
Elevator Shaft	642	Not Rentable								
Office	20648	Rentable								
Restroom	472	Not Rentable								
Stairway	340	Not Rentable								
Support	1158	Rentable								
Utility Space	1318	Not Rentable								
Total	27162	SF								
				Average	Renta	l Price	(\$ pe	r S.F. pei	Year)
Rentable Area	23558	SF		2007		2008		2009		AVG.
Not Rentable Area	3604	SF	\$	53.24	\$	72.97	\$	55.52	\$	60.58
Total	27162	SF	\$1,25	54,227.92	\$1,719	,027.26	\$1,30	7,940.16	\$1,427	,065.11

Figure 95: Core/Corner Change Rentable Space Pricing Floors 39-50

4.2.7 **Conclusions**

Through this analysis, it was found that using an integrative design team, the redesign of the architectural layout of core spaces in response to structural core and facade changes could impact the profitability of the building. The current design was found to have rentable areas each totaling 19,285 ft² on the 5th-17th floors, 19,678 ft² on the 18th-27th floors, 20,726 ft² on the 29th-38th floors and 21,516 ft² on the 39th-50th floors. When applied to the floors owned by Forest City Ratner Companies (floors 29-50), this amounts to an average revenue of \$1,255,511.99 per floor per year for floors 29-38, and \$1,303,367.56 per floor per year for floors 39-50, and a total of \$28,195,530.98 per year.

The design of the proposed core and corner changes, along with the proposed architectural layouts of the core and tenant spaces was found to have rentable areas each totaling 21,289 ft² on the 5th-17th floors, 21,835 ft² on the 18th-27th floors, 22,975 ft² on the 19th-38th floors, and 23,558 ft² on the 39-50th floors. This is approximately 2,000 ft² of additional rentable space per floor. When applied to the floors owned by Forest City Ratner Companies (floors 29-50), this amounts to an average revenue of \$1,391,748.92

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per floor per year for floors 19-38, and \$1,427,065.11 per floor per year for floors 39-50, and a grand total of \$31,042,267.52 per year. Compared to the original, the proposed changes would amount to \$2,846,736.54 in additional revenue to Forest City Ratner Companies. The result would be shorter payback period to Forest City Ratner Companies.

4.3 Gravity System

The following section pertains to a redesign of the gravity system of The New York Times Building tower. Within this section as per the structural designer's MAE requirements a computer model was created in RAM Structural Systems for the various gravity system analyzed. In addition to the RAM model, the structural designer utilized basic dynamic principles learned in CE 548: Structural Design for Dynamic Loads and AISC Design Guide 11: Floor Vibration Due to Human Activity to analyze the potential solution for walking excitation. With the added design challenge of framing steel beams into the concrete lateral system, connection design techniques learned in AE 534: Analysis and Design of Steel Connections were used to design and analysis adequate connections.

4.3.1 **Objective**

1) Design an alternative floor system that reduces the number of structural members while providing cost savings and decreasing structural erection time.

2) Design the structural gravity system to respond to the goals of the architect.

- 3) Design various structural connections for the gravity system.
- 4) Create a model of the gravity system in Revit to aid in structural takeoffs.

4.3.2 Process

Design-

Determine an appropriate gravity system that maintains strength and serviceability requirements

Coordination-

Work with the design team and the architectural advisor to determine an optimal solution for the gravity system

Modeling-

Import RAM model into Revit

Model potential gravity system designs in RAM

Analysis-

Design and analyze the potential gravity systems for strength and deflection requirements

Analyze the potential gravity system for walking excitation

Design and analyze gravity columns

Design and detail connections

4.3.3 Codes, References, and Criteria

4.3.3.1 Original Design Codes and Deflection Criteria

National Model Code:

1968 Building Code of the City of New York with latest supplements

Structural Standards:

ASCE 7-98, Minimum Design Loads for Buildings and other Structures

Structural Design Codes:

AISC – LRFD, Steel Construction Manual 2nd edition, American Institute of Steel Construction

National Building Code of Canada, 1995

Uniform Building Code, 1997

4.3.3.2 Thesis Design Codes and Deflection Criteria

National Model Code:

2006 International Building Code

Structural Standards:

ASCE 7-05, Minimum Design Loads for Buildings and other Structures

Structural Design Codes:

AISC – LRFD, Steel Construction Manual 13th edition, American Institute of Steel Construction

Gravity Deflections Criteria:

Live load deflections for floor members are limited to L/360

Total load deflections for floor members are limited to L/240

4.3.4 Gravity System Material Strength

Structural Steel:

Rolled Shapes and Channels:

ASTM A572 or A992, Minimum yield strength of 50 ksi

Miscellaneous Angles

ASTM A36, Minimum yield strength of 36 ksi

"UAP" Channels

European Code EC3, Grade S-235JRG2, Minimum yield strength of 46 ksi

Tubes

ASTM A500, Grade B, Minimum yield strength of 42 ksi

Pipes

ASTM A500, Grade B, Minimum yield strength of 46 ksi

Plate Material used for Built-Up Members

ASTM A572, Minimum yield strength of 50 ksi

Connections & Base Plate

ASTM A36 (36 ksi), A529 (42 ksi), A572 & A588 (50 ksi)

Metal Decking:

3" Composite Deck

ASTM A653 SQ, Grade 40, Minimum yield strength of 40 ksi

Headed Shear Studs ³/₄"

ASTM A108, Type B

Connections:

Bolts

ASTM A325 or A490

Nuts

.ASTM A563

Washers

ASTM A-F436

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Anchor Bolts/ Rods

ASTM F-1554, Grade 55

Welding Electrodes E70XX

Tensile strength of 70 ksi

4.3.5 Iterative deck and beam design

The proposed floor system redesign investigated two different framing layouts shown in Figure 96 on page 167 and Figure 97 on page 168. For each framing option Wide flange shapes versus SMARTBEAMS (CMC Steel Products castellated beams), normal weight versus lightweight concrete, and long span deck versus typical span deck were investigated as a potential design. The following matrix was constructed to look at all the possible combinations for each framing layout.

LS/WF/NW	TS/WF/NW					
LS/SB/NW	TS/SB/NW					
LS/WF/LW	TS/WF/LW					
LS/SB/LW TS/SB/LW						
Table 52: Framing Matrix						

Where:

LS = long span deck & TS = typical span deck

WF = wide flange shape & SB = SMARTBEAM

NW = normal weight concrete & LW = Lightweight concrete



Figure 96: Gravity system framing option 1



Figure 97: Gravity system framing option 2

4.3.5.1 Initial Gravity Design Calculations

After initially consulting with the construction manager about fireproofing the gravity system, it was decided to investigate an unprotected deck. For which a 2 hour restrained assembly rating, yielded 3 1/4" and 4 1/2" thickness of concrete above the flutes of the metal deck for lightweight and normal weight concrete respectively. In addition, the mechanical designer was initially consulted about structural implications due to changing the under floor air distribution or UFAD system. As a result, the 20 psf allotted for the UFAD and MEP in the ceiling was reduced by 10 psf to obtain a total superimposed dead load of 15 psf. It should be noted that the floor live load was not changed. The vendors of the metal decks investigated include Metal Dek Group, Epic Metals, United Steel Deck, and Nucor Vulcraft Group. It was determined that 30 potential metal decks met fireproofing and load capacity requirements in addition to a minimum of double unshored span length. These 30 metal decks were then reduced down to 7 potential metal decks by selecting the least weight and least gage for each metal deck application of each possibility for the two framing options. This can be seen in the attached potential gravity system design matrix in Structural Figure 178 on page 275. Please note that in framing option lonly long span deck with normal weight concrete did not met load requirements. RAM was utilized for the 14 different designs, however it should be noted that the interoperability between RAM and Revit does not exist for 64 bit computers therefore interoperability was not used. Out of the eight possibilities for each framing option the following four possibilities were investigated further:



Table 53: Reduced Framing Matrix

After consulting with Stephen Redman of CMC Steel Products, Glen Smith of Epic Metals Corporation, and Chris Cerino of Desimone Consulting Engineers in New York City the following costs were determined:

EPICORE 450	\$6.10/SF
EPICORE 3.5	\$4.60/SF
SMARTBEAMs	\$100-\$200/ton in addition to steel cost
Lightweight concrete on metal deck	\$11/SF
Normal weight concrete on metal deck	\$10/SF
Structural steel	\$3,500-\$4,500/ton

Table 54: Framing costs

Mr. Redman also advised that for SMARTBEAMs to be cost effective longer spans than 40'-0" are needed. In addition to consulting with Mr. Redman, the mechanical designer was consulted about the location of ductwork relative to structural framing. As a result of this meeting, it was determined that the ductwork would either run out from the core parallel to the framing in option 1 or on top of the structural slab. Due to these meetings, SMARTBEAMs and framing option 2 were eliminated due to cost and minimizing mechanical penetration through the structural framing. Normal weight concrete was eliminated after consulting with the construction manager. It was determined that the added weight of normal concrete needed to obtain the 2 hour fire rating would affect the loads of the framing system increasing beam, columns, and foundation sizes. The added weight would also influence the mass of the building, therefore potentially increasing the period of vibration and potentially increasing the lateral stiffness to counteract the increased mass of the building. This left only the framing option 1 with lightweight concrete on long span composite deck on wide flange shapes. Please refer to Structural Figure 179 on page 275 for the reduced framing matrix with relative costs.

When originally consulting with Mr. Smith at Epic Metals Corporation, the design team only knew of the EPICORE 450 metal deck which is a 4 $\frac{1}{2}$ " deck with 4.5" of lightweight concrete topping which resulted with a total slab thickness of 8 $\frac{1}{2}$ inches. Mr. Smith advised the structural designer to consider the EPICORE 3.5 composite floor deck which was \$1.50/SF cheaper and was able to obtain the 2 hour fire rating with a total slab thickness of 5 $\frac{1}{2}$ ". Please note that this is different from the conventional unprotected deck fire rating due to a no-spray-applied fireproofing that is applied at the factory. For more information see U.L. Design Number D942.

4.3.6 Floor Vibration Analysis

Closing in on the final floor framing solution, only framing option 1 with lightweight concrete on long span metal deck on wide flange beams remained. Both EPICORE 3.5 and EPICORE 450 allow this floor framing option to meet strength and deflection criteria. However to be able to eliminate, aside from cost, and compare one deck over the other a higher level of analysis should be carried out. As stated previously the structural

designer utilized basic dynamic principles to analyze these two potential solution for walking excitation or floor vibration.

AISC Design Guide 11: Floor Vibration Due to Human Activity, DG11, was developed due to criteria based on the dynamic response of floor systems to human excitation under walking loads. A floor system is deemed acceptable if the peak acceleration determined from

$$\frac{a_{\text{peak}}}{g} = \frac{P_o e^{-0.35 f_n}}{\beta W}$$

Equation 6

does not exceed the acceleration limit. Design Guide 11 provides the following table for recommended P_0 and β value in addition to acceleration limit.

Recom Eq	Table 4.1 mended Values of uation (4.1) and <i>a</i> o	Parameters in <i>/ g</i> Limits	
	Constant Force Po	Damping Ratio β	Acceleration Limit $a_o/g \times 100\%$
Offices, Residences, Churches	0.29 kN (65 lb)	0.02-0.05*	0.5%
Shopping Malls	0.29 kN (65 lb)	0.02	1.5%
Footbridges—Indoor	0.41 kN (92 lb)	0.01	1.5%
Footbridges—Outdoor	0.41 kN (92 lb)	0.01	5.0%
* 0.02 for floors with few non-structural c work areas and churches, 0.03 for floors with non-structural comp typical of many modular office areas, 0.05 for full height partitions between floors.	omponents (ceilings, duct onents and furnishings, b ors.	s, partitions, etc.) as can ut with only small demou	occur in open

Figure 98: AISC DG11 Recommended Values of Parameters and ao/g limits

Because long span decks are prone to more vibration issue then typical deck, an additional mode was analyzed and checked for the deck. Since DG11 provide no approach for a slab panel mode, Dr. Hanagan was consulted in the approach of this mode's analysis. The slab panel mode follows the same concepts and ideas utilized in the beam panel mode and girder panel mode. However, the combined mode calculations in DG11 were modified to include the slab panel mode. Please refer to Structural Figure 180 through Figure 185 for in-depth calculations on composite beam design and vibration analysis. After analyzing the two different decks it was determined that in both cases larger structural wide flanges were required in order to meet acceleration limits of 0.5%g for a damping ratio of 0.03 which is for open floor offices. If the open floor office plan was changed to have full-height partition offices smaller member could be used due to the increase of the damping ratio from 0.03 to 0.05. The following table summarizes the vibration calculations for the two types of long span deck. It should be noted that the sizes of the beams are driven by the vibration analysis.

Summary of Vibration Analysis Results			
	EPICORE 3.5	EPICORE 450	
Slab thickness (in.)	5.5	8.5	
Beam Size	W30X108	W21X44	
Girder Size	W24X84	W18X40	
Framing weight (psf)	62.45	59.43	
Slab frequency (Hz)	5.88	12.23	
Beam frequency (Hz)	8.70	5.75	
Girder frequency (Hz)	7.28	5.31	
Combined weight (lbs)	107093	119710	
Combined frequency (Hz)	4.05	3.72	
a_p/g with $\beta = 0.03$	0.005	0.005	
a_p/g with $\beta = 0.05$	0.003	0.003	
Avg. relative cost (\$/SF)	34.84	28.66	

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Table 55: Summary of Vibration Analysis Results

Due to the high costs, deep wide flanges, and thicker slab both long span decks were eliminated and the existing design was reevaluated. After a design team consulting session, the decision was made to keep the existing framing system and replace the normal weight concrete in the deck to light weight concrete. Mark Cook at Vulcraft's New York office was contacted for Vulcraft deck costs. It was determined that Vulcraft's deck was the cheapest at 1.80\$/SF. Therefore the final gravity system floor framing is summarized in Table 56 on page 171 with the existing floor framing system. Refer to Structural Figure 186 through Figure 191 on page 282 through 287 for in-depth calculation on the final gravity system floor framing and the existing floor framing comparisons. Please note that all the acceleration values include the slab panel mode and therefore the existing and redesigned acceleration values are conservative.

	Existing System	Redesigned System
Slab depth (in)	5.5	6.25
Girder depth (in)	17.9	17.9
Beam Depth (in)	17.7	17.7
Total Structural Depth (in)	23.4	24.15
Beam size	W18X35	W18X35
Girder Size	W18X40	W18X40
Deck Span (ft)	10'-0"	10'-0"
Beam Weights (psf)	4.50	4.50
Deck Weight (psf)	53	46
Structural Weight (psf)	57.50	50.50
Avg. relative cost (\$/SF)	22.88	24.38
a_p/g with $\beta = 0.03$	0.005	0.005
a_p/g with $\beta = 0.05$	0.003	0.003

Table 56: Comparison Summary of Existing to Redesign

4.3.7 Column Design

Due to the weight of the floor system decreasing and disengaging all of the columns from the lateral system, column sizes were reduced and built-up column sections were minimized to the cantilever bays. Figure 99 shows the columns that are not built-up sections all the way up the building.



Figure 99: Non-built-up Section Columns

The sizes of the columns of the top floor range from W14X61 to W14X99 and increase in size down to base where the lightest column is a W14X342 and the heavier columns are the built-up sections. The columns were designed using RAM Structural System. Please refer to Structural Figure 192 through Figure 194 on page 288 through 290 for columns loads and RAM output. Due to the 5'-0" cantilevers on West and East sides of the building the columns were oriented to allow for the cantilever beam to be moment connected to the flange of the column. The same is true for the column in the cantilever bays. In order to keep with the architectural vision of the building floating above the storefront and eliminating the single rods in the cantilever bays, two additional Vierendeel frames were added to each cantilever bay and the back span beams were moment connected to reduce the unbalanced moment going into the columns. With the added moments going into the columns no rolled W14 shape could handle the loads thus built up columns were needed. Figure 100 and Figure 101 shows the built-up columns locations for the cantilever bays.





Figure 100: Built-Up column Location and Vierendeel Frames



Figure 101: 3D view of Built-Up column Location and Vierendeel Frames

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Table 57 shows a summary of the section properties of the two built-up columns that were used. The flanges and webs of the built-up columns were checked for slenderness and were found to be ok. Hand calculations were developed to check the flexural and torsional buckling stresses as well as the flexural yielding of the sections. To verify these results, the RAM column code was changed to include built-up sections and their properties for axial gravity loads and the moments due to the Vierendeel frame. It was determined from the RAM output that the built-up sections met the necessary strength requirements. Refer to Structural Figure 195 through Figure 197 on page 291 through 292 for in-depth built-up column properties, stress checks, and RAM output.

	BU24X987	BU24X817
d (in)	24	24
$b_{f}(in)$	22	22
t _f (in)	5	4
t _w (in)	5	4
w (plf)	987	817

Table 57: Built-up Column Section Properties

4.3.8 Connection Design

The typical structural connections of the building consist of simple shear tab connections and flange plate moment connections. However a challenge occurred when the gravity steel beams were framed into lateral concrete shear walls. On numerous occasions the structural designer consulted with the design team's construction manager, Dr. Hanagan, and Mike McGowan of Gannett Fleming. The main concern of the structural designer and the construction manager was the issue of constructability. It was determined early on in the design of the steel to concrete connection that construction flexibility was needed. As a result steel angles were used instead of a shear tab to allow for ease of welding the angle to the embedded plate. In addition, slotted holes were used in the angle for more construction flexibility of the connection. The resulting connection, shown in Figure 102, follows criteria set by AISC and PCI with a connection capacity of 48 kips.



Figure 102: Concrete to Steel Connection

For beam to girder and girder to column flange connections shear tab were used. In the case of girder to column web an extended shear tab was designed. For the moment connections flexibility for construction, was considered. In the case where the W12X19s cantilever 5'-0" every floor the decision was made to use a bolted flange plate moment connection instead of an extended end plate moment connection. The extended end plate connection is ideal for relatively small moments, however due to the construction flexibility the bolted flange plate moment connection was used. See Figure 103 though Figure 107 on page 175 though 176 for the detailed shear tab and moment connections. For in-depth calculations please refer to Structural Figure 198 through Figure 207 on page 293 through 302.



Figure 103: Beam to Girder Shear Tab Connection



Figure 104: Girder to Column Flange Shear Tab Connection

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Figure 105: Girder to Column Web Shear Tab Connection



Figure 106: Girder to Column Flange Moment Connection



Figure 107: Girder to Column Flange Moment Connection

4.3.9 Foundation Impacts

As stated in section 2.2.7: Foundation Impacts on page 64, with disengaging all of the columns in the lateral design, their foundations will most likely be smaller due to the removal of moments due to wind acting on the columns. The foundations under the

Vierendeel frames will change however not as dramatically as the other column foundations due to the built-up columns and larger cantilevers. Due to the foundation not being part of the design team's scope, in-depth calculations were not performed.

4.3.10 **Cost Implications**

The Building Information Models were utilized again to obtain accurate schedules for the steel columns and steel framing members of the building. Cost data was applied to the schedules to provide accurate take-offs for comparison. The exterior "knuckle" connections and X-bracing were not included in the original take-off and pricing. A summary of the cost for framing for the original building as well as the proposed core and corner change is shown below in Table 58, Table 59 respectively. Detailed take-offs are available in Appendix 7.5.

Total	52256.4	C.F.
	25605636	Lbs
	12802.818	Tons
	\$ 2,205.88	per Ton of Steel
	Total Framing Cost	\$ 57,367,161.04

Total	30972.96	C.F.
	15176750.4	Lbs
	7588.3752	Tons
	\$ 2,658.34	per Ton of Steel
	Total Framing Cost	\$ 20,172,478.64

Table 58: Original Framing Cost Summary

Table 59: Core/Corner Change Framing Cost Summary

Additionally, the cost summary for columns for the original building as well as the core and proposed core and corner change is shown below in Table 60, and Table 61 respectively. Detailed take-offs are available in Appendix 7.5.

Total	28600	L.F.
	26788300	Lbs
	13394.15	Tons
	\$ 3,932.80	per Ton of Steel
	Total Column Cost	\$ 52,676,511.62

Table 60: Original Column Cost Summary

Total 21724 L.F. 5547770.2 Lbs 2773.8851 Tons \$ 5,206.74 per Ton of Steel Total Column Cost \$ 14,442,894.08

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Table 61: Core/Corner Change Column Cost Summary

4.3.11 Schedule Implications

The schedule changes for the building evaluated in accordance for the reduction in the number of members, their sizes and integrating their construction along with the concrete core. The original schedule allowed for a total lead time of 7 months from the beginning of fabrication of the steel for the tower to the start of on-site steel erection. The original schedule required 2 weeks for erection of 2 floors of structural steel. This included an average of 9 working days for the erection of 2 floors, and allowed for one day of float every two weeks to still keep on schedule. The original lead time was retained for the new steel, but with the reduction to the number of members and their sizes, the erection of the steel members would eventually overtake the concrete core. To avoid this, the duration of erection was left to the same timeframe of 2 stories per 2 weeks, but allowed for 2 days of float instead of 1. The new framing would begin on 3/18/05 and would be completed on 5/24/06, which are the same dates as the original steel construction. This is shown in the detailed construction schedule available in Appendix 7.5 on page 389.

Using a BIM model in conjunction with a construction schedule into a 4D is very useful to check for possible problems with trade coordination. Prior to construction, the use of a 4D model can help to properly portray the sequencing of trades electronically, helping to eliminate on-site problems before they are created. This was utilized to check that the proposed core, façade and tenant space changes were properly integrated into the construction schedule. By linking the foundations, steel, concrete core, and façade to the schedule in Navisworks, a 4D model was created, accurately showing the construction process. A breakdown of the 4D model is shown in the screen shots below in Figure 108 through Figure 114. The dates associated with each picture depict the date of construction the screen shot was taken at. This analysis showed the durations and sequencing worked together properly, and the coordination between trades could be maintained.

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Figure 108: 4D Model; 1/27/05



Figure 109: 4D Model; 4/29/05


Figure 110: 4D Model; 8/7/05



Figure 111: 4D Model; 11/25/05



Figure 112: 4D Model; 3/5/06



Figure 113: 4D Model; 5/27/2006



Figure 114: 4D Model; 10/2/06

4.3.12 Conclusions

The goal of reducing structural members per bay was not met due to vibrations. It was determined that the redesigned floor system resulted in a total structural depth increase of ³/₄" and an increase of cost of \$1.58/SF. In addition, the redesigned floor system met acceleration limits when subjected to walking excitation loads. The floor framing system was decreased by 7.5 psf and all columns were disengaged from the lateral system which decreased column sizes. To keep with the architect's vision of no columns at the storefront in the cantilever bays, built-up sections are necessary. However, the redesigned built-up sections are not as large as the existing due to decreased weight and exclusion from the lateral system as listed above. Adequate connections were designed due to being driven by constructability.

There are also several impacts on the cost of the framing and columns of the building. A major impact to the overall weight of steel and the cost of columns and framing occurred with large built up columns being replaced by the concrete core. Additionally, the outrigger system was eliminated from the building, reducing the cost dramatically. The framing throughout the building was also reduced in size and weight due to the use of the concrete core, and some of the more specialty framing members were eliminated or replaced by more common steel members, resulting in a cost reduction. Comparing the columns and framing of the original building and displacing the savings of the members of the core discussed in section 2.4, a reduction in cost to the proposed system is approximately \$55 million. This is a fairly conservative savings as well due to the expensive "knuckle" connections and X-bracing on the exterior of the building being eliminated by the structural change.

4.4 Interior Lighting

The following section discusses the interior lighting design for the open office.

4.4.1 **Objective**

Goal of this evaluation/analysis/redesign

- 1) Investigate the energy savings resulting from a lower general lighting level with additional task lighting.
- 2) Pass lighting power densities on to the mechanical designer for energy modeling and possible sizing changes of mechanical systems from previous design.

4.4.2 Process

Model inputs-

Building geometry – Use the existing Revit model for geometry and recreate model in AutoCAD for use in AGI

Photometry - Download .ies files from manufacturer websites

Model outputs-

Illuminance levels within the space

Lighting Power Densities

Renderings

Architectural impact

Psychological perception of the space

4.4.3 Calculations for Analysis

AGI was used as the tool for the lighting calculations. AGI was also used for the raytraced images .

4.4.4 Assumptions

The assumptions for this part of the project include interior finishes, consistent furniture layout, and consistent controls.

Room

Desk

- Ceiling .80 Walls .50 Floor .20 Counter .7 Partition .5
- Cabinet .3

Light Loss Factors

Ballast Factor	1.0			
LDD Category 1	.92			
RSDD	.925			
Total	.85			

4.4.5 **Design Considerations**

Psychological Impression

The space should have the impression of visual clarity. To obtain this, the space should be uniformly lit across the office area with some peripheral emphasis. Having a luminous glazing surface will help with peripheral emphasis around the exterior. To add peripheral emphasis along the interior, wall washers around the circulation space were used where solid wall is available.

Appearance of Space and Luminaires (Important)

The architecture aids in the appearance of space. The layout is open and all areas have views of the exterior. The luminaires are designed to be flush with the ceiling. This allows a continuous plane across the entire ceiling. Designing the lighting to have peripheral emphasis also adds to the appearance of space.

Color Appearance (Important)

Because of the work completed in the space, the luminaires must use high CRI lamps. The occupants will be working with graphics and type, so it is crucial to have good color rendering. All lamps within the space shall be of 80 CRI or higher. The color temperature of the lamping is 3500K and must be consistent throughout the entire space. To maintain a uniform design throughout the space, all lumianires must be relamped with the same color temperature lamp.

Daylight integration and Control (Important)

Daylight is a major component of the office design. Dimming controls are used to properly harvest the benefits of daylight. Luminaires will individually respond to the changing exterior environment and provide appropriate lighting levels. In addition to controlling the lumianires, the daylight also needs to be controlled. Solar shades are used across each of the facades.

Direct Glare (Very Important)

Direct glare is a crucial part of occupant comfort. To help maintain a glare free environment, both daylight and electric light must be designed accordingly. Electric light fixtures must be chosen that maintain a glare free environment. To control the dynamic nature of daylight, automatic blinds and louvers are incorporated into the façade.

Flicker (Important)

The tasks of computer use and reading or writing require that light sources do not flicker. Any luminaires that caused this occurrence would create an uncomfortable situation and reduce productivity. The combination of lamping and ballasts are designed to minimize this occurrence.

Light Distribution on Surfaces (Important)

All surfaces should receive uniform, area lighting. This will provide appropriate illuminance for individuals working in the space. This uniform design should be present throughout the floor with little to no deviations.

Light Distribution on Task Plane (Important)

The task plane should receive a uniform distribution to create a comfortable work setting. Individuals working at their desks will want to be able to easily focus on tasks without being distracted with varying lighting levels. To help the occupants with this, task lighting is installed at each workstation.

Luminance of Room Surfaces (Very Important)

Room surfaces should appear bright to promote an active atmosphere. The ceiling and walls should have a uniform luminance. This will help in creating a completely uniform environment to work in.

Modeling of Faces or Objects (Important)

Social interaction is important in this workspace. Facial expressions and hand or body motions should be easily seen. The use of area lighting should illuminate the entire space so that these factors will be of no issue. To properly model faces, there must be some contribution of vertical illuminance.

Reflected Glare (Very Important)

Reflected glare should be complete removed from the space. Glare can effect an individual's ability to work and feel comfortable. The reflectance of interior materials is a major consideration for reflected glare. Since the reflectances cannot be changed, it is luminaire placement that must be adapted if reflected glare is a problem.

Shadows (Important)

No shadows should be present in this space. Fluorescent sources should be used to create a diffuse lighting solution. Shadows can create uncomfortable working conditions and reduce productivity. Shadows from daylight were previously an issue. With the redesign of the façade system, shadows are no longer an issue.

Source/Task/Eye Geometry (Very Important)

Furniture should be spaced out so that luminaires are not directly in front of or behind individuals. Veiling reflections can occur on computer screens or glossy papers if luminaires are located in inappropriate spots. With proper selection of flat screen computer monitors, this shouldn't be a problem.

Maintenance

Luminaires should have lamps with long life to reduce the time between replacement. Proper color temperatures should always be provided to keep the lighting design consistent and uniform. The average height ceiling provides easy access to the fixtures. Luminaires should be able to be relamped or replaced easily to reduce office distractions.

4.4.6 **Design Criteria**

Illuminance

General Lighting 30fc

Task 50fc

Lighting Power Density

Open Office 1.1W/sqft

Corridor .5W/sqft

4.4.7 **Design Intent**

The office lighting was redesigned to not only optimize the electrical energy consumption, but to decrease heating loads. The building is 1.6 million square feet in total. With most of the square footage being taken up by open office at 1.1 watts/sqft, there is a significant heat gain from lighting alone. By reducing this interior lighting load, the overall energy consumption of the lighting and mechanical loads should decrease.

To maintain part of the original ideas of the architect, a linear system was used. Strips of glowing lines would be seen from outside of the building as the sun is going down. This look will maintain the rectilinear look of the building. To serve as contrast to the open office, yet compliment the shape of the fixtures, a square downlight was used to mark the circulation space around the core of the building. The combination of downlights and wall washers, where applicable, were used. This look around the core was carried into the elevator lobby. This design allows for a consistent look through all office floors. Due to the nature of the elevators in the lobby, though not the same six per floor. To highlight the area where the elevators are on each floor, the downlights are placed in front of the doors. Where there are no elevators, wall washers are used to accent the walls.

To save energy, the general lighting within the space was designed to 30fc. This is the IESNA recommendation for reading. For some of the tasks, it would be better if the occupant had 50fc. When an occupant is not at their desk, there is no need for 50fc. At the same time, it would be a negative impact if a downlight were turned off above the

empty desk. To aid the occupants, a task light was installed at each desk to bring the light levels up to 50fc. This allows for maximum energy savings for the building.

The original system incorporated digitally addressable ballasts. These ballasts took input from photosensors and occupancy sensors. Since the lighting system was designed to operate at 50fc, the photosensors were set to maintain 50fc. The proposed redesign also incorporates photosensors with the digitally addressable ballasts. Because the general system is only trying to maintain 30fc, the lighting will be able to dim at lower daylight levels. It will be important for the photosensors to be installed in such locations where the sensor cannot see a desk. With the incorporation of task lights, the photosensor could be fooled by higher than actual light levels.

In addition to energy savings, the proposed redesign will also save in maintenance fees. With drastic cuts in the number of fixtures, maintenance workers will spend less time relamping fixtures. This could be a huge financial burden lifted from the New York Times annual expenses. Since the original design incorporated over 18,000 fixtures in the open office, this will also save a large part of construction costs due to the reduced number of fixtures.

4.4.8 **Conclusions**

4.4.8.1 Fixture Selection

The fixtures chosen for this space can be found on pages 314 through 320.

4.4.8.2 Lighting Power Density

The redesign uses 142 R1 fixtures and a combination of 86 R2 and R3 fixtures. The square footage of the floor plan totals 17,558 square feet. The total wattage in the redesigned layout is 8,241.2Watts. This results in an average lighting power density of .469 Watts per Square Foot. Within ASHRAE Standard 90.1, there is a lighting exception for task lights controlled by occupancy. With this exception, the task lighting was not included in the lighting power density. The resulting energy savings would be approximately \$462,200.00 per year.

4.4.8.3 Pseudo Colors and Rendered Images



Figure 115: Open Office General Lighting Render



Figure 116: Open Office General Lighting Pseudo Color



Figure 117: Open Office with Task Lighting Render



Figure 118: Open Office with Task Lighting Pseudo Color



Figure 119: Elevator Lobby Render



Figure 120: Elevator Lobby Pseudo Color



Figure 121: Circulation Space Render



Figure 122: Circulation Space Pseudo Color

4.4.8.4 Illuminance Levels (General Lighting Only)

Average	31 fc
Max/Min	3.39

4.4.8.5 Illuminance Levels (With Task Light)

Average 55 fc

4.4.8.6 Control

The lighting controls for The New York Times Building are extremely complicated. The design was done by Susan Brady Lighting Design, Lutron, and assisted by Lawrence Berkley Laboratory. For this reason, a redesign of the entire control scheme was not completed. The daylighting was analyzed in the Daylighting section of this report starting on page 83. The current system uses all digitally controlled ballasts by Lutron. Each of the ballasts is controlled by a system of photosensors and occupancy sensors. All pieces of the system tie back to the Quantum controls. The system also incorporates the shade control sensors. These are open loop sensors around the exterior of the building. The mast on top of the building also contains a sensor for dealing with the passing of cloud cover. Due to the complexity of these systems, the control system was not redesigned.

4.4.8.7 Panelboard Changes

The panelboard changes for the interior lighting redesign can be found in Figure 245: Panelboard EHV-8 (Existing) through Figure 259: Panelboard P-8-2 (New) on pages 343 through 358. The cut sheets for these panels can be found on pages 364 through 367.

4.4.8.8 Plans

Though a representative section of the entire reflected ceiling plan can be found on page 306 and the task lighting layout on page 307, the full size plans have been folded into the back of this report.

4.5 Air Distribution Redesign

The following section discusses the investigation of the existing air distribution system and its impact on indoor environmental quality. A side-wall displacement ventilation system was selected to replace the existing unducted Underfloor Air Distribution (UFAD) system to improve the indoor environment for the building occupants by minimizing distribution of dust and contaminants that may collect in the open plenum space.

4.5.1 **Process**

Calculate cooling loads and required ventilation rates for the spaces within a typical office floor of The New York Times Building

Select and size Side-Wall Diffusers

Locate diffusers within the space

Size ductwork for within the floor plenum space

4.5.2 Existing Underfloor Air Distribution (UFAD) System

In the New York Times Building, heating, cooling and ventilation is achieved through an air distribution system. The floors occupied by The New York Times utilize an under floor air distribution (UFAD) system. A traditional overhead ducted system was implemented on the Forest City Ratner floors. Fresh air is brought in through outdoor air units in the two mechanical penthouses on the 28th and 51st floors, and then distributed throughout the building. Outdoor air is centrally dehumidified so the floor by floor air handlers can operate with dry coils. This minimizes both maintenance costs and long-term microbial growth on the coils.

The underfloor plenum for each floor is served by a base building air handling unit which has multiple zones of control and an overall capacity of 29, 500 CFM. The outdoor ventilation air is supplied through a variable air volume box terminal unit, which is fed from the main outdoor air handling units on the 28th and 51st floors. The typical VAV box terminal unit has a capacity of a 4000 CFM.

Static pressure sensors in the plan East and plan West air highways ensure that the base building air handling unit maintains a constant static pressure of 0.1" WG. In each control zone there are multiple control dampers in the air highway discharging supply air to the under floor plenums. These dampers are controlled in unison to maintain an under floor static pressure of 0.05" WG in each zone. A temperature sensor in each zone will override the pressure control loop to maintain an appropriate temperature in the space.

A temperature sensor located in the fan coil discharge modulates the chilled water cooling coil control valve in order to maintain a constant discharge temperature of 60° F to the space during cooling mode. In heating mode, if the space temperature drops below

the occupied set point of 70° F the perimeter fan powered boxes with heating coils will start and supply 84° F air to the space.

A carbon dioxide sensor located in the return air stream monitors CO_2 levels. If the CO_2 level increases to 1000 PPM, the minimum outside air dampers will be opened to 100%. If the CO_2 levels continue to rise, the mixed air control loop will be overridden and the maximum outdoor air damper will be modulated open.

Swirl diffusers were installed to provide occupant control, while in high occupancy spaces air flows through perforated floor tiles.

The under floor air distribution system used in The New York Times Building provides certain advantages and disadvantages. A thorough literature review helped identify some of these and also dictate a potential alternative design. Also, the design intent and objectives of the owner were taken into account during this evaluation.

4.5.3 **Design Objectives**

In the original design, several objectives and requirements were major driving factors in the selection of a UFAD system for the New York Times Building.

- 1) High-profile sustainability The potential for energy savings and improved IAQ with less mixing than an overhead system.
- 2) Cost-effectiveness Choosing an un-ducted system provides a lower first cost by eliminating significant amount of ductwork.
- 3) Raised floor Desire to accommodate telecommunication cables as well as provide flexibility in the space with the ability to rearrange diffusers as the need of the occupants changes.

These design objectives were given consideration in the evaluation of the existing system and proposed displacement ventilation system.

4.5.4 Literature Review

4.5.4.1 Comparison of UFAD and DV systems

The existing UFAD system leaves room for two significant areas of improvement. Firstly, while utilizing less mixing than a typical overhead system, a displacement ventilation system will supply air at a lower velocity and take advantage of the natural thermal plumes creating by internal heat gains within the space to draw cool supply air upwards and stratify. The open office plan is partitioned causing some mixing. The partitions can block the flow of the floor diffusers from evenly distributing across the floor plate and stratifying. The proposed ducted Displacement Ventilation (DV) system resolves this issue.

The second issue with the original UFAD design using an unducted plenum to supply air. This can instigate several problems. One potential problem is the possibility of air

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leakage resulting in system efficiency losses and increased utility costs. Additionally, over time, the air quality can degrade due to neglected cleaning and maintenance.

Figure 123 - Side-wall Diffuser Airflow Path Source (Halton shows a typical air flow path for a DV diffuser. Figure 124 - Temperature Profile Comparison shows the improved stratification with DV. This stratification minimizes mixing of fresh supply air with stale room air. This leads to cleaner air supplied to each occupant, and ultimately an improved indoor environment.



Figure 123 - Side-wall Diffuser Airflow Path Source (Halton)



Figure 124 - Temperature Profile Comparison Source: Halton.com

4.5.5 **Design of Displacement Ventilation System**

4.5.5.1 Assumptions

Space cooling is coupled with supply ventilation air and therefore, the ducted displacement ventilation system is sized to meet the minimum ventilation requirements and the space cooling loads calculated using the design procedure outlined in Section 4.5.5.3, where supplemental spreadsheet calculations are additionally used to apply load factors associated with the proposed displacement ventilation system. Table 63-Displacement Diffuser Schedule for Typical Office Floor provides specification data for the proposed system.

The space heating system was not drastically modified and is provided by perimeter recirculation fan power boxes. Steam heating coils in the perimeter units as well as floor air handling units are supplied with purchased steam. The mechanical system modifications will not significantly impact the size, layout or operation of the heating system.

4.5.5.2 Diffuser Location

In the proposed design, side-wall displacement ventilation diffusers are located adjacent to the columns in the open floor plan to integrate seamlessly with the interior structure and architecture. An individual diffuser is located in each enclosed office and conference room. Duct sizes and diffuser locations are provided in Figure 126- Duct Sizing and Diffuser Layout.

4.5.5.3 Design Procedure

Results from the IES<VE> simulation provided individual cooling loads for each zone in the typical office plan. The loads, organized by type, and load factors for displacement ventilation, as determined by ASHRAE, are listed in Table 62 - Cooling Load Categories and DV Load Factors. These load factors are applied to their specified load type.

Table 62 - Cooling Load Categories and DV Load Factors

		Load Factors,	Load Type
Q _{oe}	(Btu/h)	0.295	Occupants, desk lamps & equipment
Q	(Btu/h)	0.132	overhead lighting
Q _{ex}	(Btu/h)	0.185	heat conduction through the room envelope and transmitted solar radiation
Q _{total}	(Btu/h)		Total Cooling Load

Required air flow rate for cooling is determined by the equation

$$V_{h} = (0.295Q_{oe} + 0.132Q_{l} + 0.185 Q_{ex}) / (\Delta T_{hf}^{*} \rho^{*} C_{p})$$

Required air flow rate for fresh air using ASHRAE defined values for ventilation effectiveness by the equation

$$V_{oz} = V_r = V_{bz}/E = (R_p P_z + R_A A_z)/E_z$$

The greater of the two ventilation rates are chosen for required airflow

 $V = max \{V_f, V_h\}$

The airflow requirements are divided by the number of diffusers in the space

4.5.5.4 Diffuser Selection

A Price-HVAC Floor Mounted Three-Way Diffuser was selected for its performance characteristics to meet the required loads of the space. Table 63- Displacement Diffuser Schedule for Typical Office Floor summarizes the selected diffusers for a typical office floor.

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Figure 125 - Three Way Side-Wall Displacement Diffuser - DF-3 Series (Price HVAC)

Table 63- Displacement Diffuser Schedule for Typical Office Floor														
	Unit Type	# of	Unit Size	Inlet Size	Face	Airflow CFM	Total	Static	Noise	Adjacent Zone				
Space (add tag)		Diffusers	[Face Area,		Velocity		Pressure	Pressure	Criteria	ΔT = 5°F		ΔT = 10°F		
		per Zone	ft²] WxHx		FPM		in.w.g.	in.w.g.	NC	Length ft.	Width ft.	Length ft.	Width ft.	
Zone 1 - NW Perimeter Open Office	DF-3 Series	1	24 x 48 x 13	16 x 8	30	475	0.06	0.02		10	20	14	28	
Zone 2 - W Perimeter Open Office	DF-3 Series	4	24 x 48 x 13	16 x 8	40	633	0.1	0.03	23	11	20	14	28	
Zone 3 - N Perimeter Open Office	DF-3 Series	4	24 x 48 x 13	16 x 8	40	633	0.1	0.03	23	11	20	14	28	
Zone 4 - E Perimeter Open Office	DF-3 Series	4	24 x 48 x 13	16 x 8	40	633	0.1	0.03	23	11	20	14	28	
Zone 5 - S Perimeter Open Office	DF-3 Series	4	24 x 48 x 13	16 x 8	40	633	0.1	0.03	23	11	20	14	28	
Zone 5 - SE Perimeter Open Office	DF-3 Series	1	24 x 48 x 13	16 x 8	30	475	0.06	0.02		10	20	14	28	
Zone 6 -SWPerimeter Open Office	DF-3 Series	1	24 x 48 x 13	16 x 8	30	475	0.06	0.02		10	20	14	28	
Zone 7 - NE Perimeter Open Office	DF-3 Series	1	24 x 48 x 13	16 x 8	30	475	0.06	0.02		10	20	14	28	
Zone 8 - Enclosed Offices	DF-3 Series	18	24 x 24 x 13	10	20	155				7	14	10	22	
Zone 9 - Conference	DF-3 Series	3	24 x 24 x 13	10	20	155				7	14	10	22	

4.5.5.5 Duct Design

The required ductwork was sized and laid out in Revit MEP to check for clash detection. The Equal Friction Method, along with required space supply air, was used to size the ductwork with a pressure of 0.2 inWater. Figure 126- Duct Sizing and Diffuser Layout provides the new layout and ductwork sizes.



Figure 126- Duct Sizing and Diffuser Layout

5 CONCLUSIONS

5.1 Core

The lateral system was changed from a braced frame system to concrete shear walls with coupling beams. This was changed in order to eliminate the out riggers, thermal trusses, and x-bracing to increase transparency of the building. From this analysis, it was determined that the base shears were 3,968 kips and 3,278 kips in the west-east and north-south directions respectively. The periods of vibrations were determined to be 6.46 seconds and 6.64 seconds in the west-east and north-south directions respectively. It was also determined that the total building drift is H/690 and the acceleration is 14.6 milli-g's. From these results, the system was deemed acceptable.

Due to the necessary structural space within the core, the mechanical and electrical systems were affected. In order to make room for this added structure, the electrical feeders were switched from conduit to bus duct. These feeders were also relocated from a chase along the elevator core into the electrical rooms. This reduced the access space, but increased the cost by approximately \$500,000.00 for aluminum bus duct. By switching to bus duct, future capacity is allotted for. Mechanical duct work was also rerouted due to the increased structural space requirements. Due to 3-D modeling of these systems, early detection of possible problems were found. This has the potential to decrease the coordination problems within the field.

In response to the structural changes, the architectural layouts of the spaces within the core also needed to be changed. The main room changes were within the electrical and emergency stairwell areas. In addition to moving The New York Times distribution, the bus duct for the Forest City Ratner Companies was also changed. The analysis of these spaces showed that proper access to the areas could be maintained or improved even with the additional space requirements of the structural system. Even with the increased structural requirements, transparency through the building was maintained by protecting the circulation space within the core.

Comparing the original steel core to the proposed concrete core resulted in a cost savings of approximately \$20,000,000.00 for only the immediately affected steel members replaced by the proposed structural core redesign. These savings were achieved by using the original model and proposed systems within the Building Information Model for material take-offs. This information was applied to cost data obtained from R.S. Means Construction Data 2009. The schedule and general conditions implications resulted in the addition of approximately \$3,060,000.00. This cost increase was the result of temporary heating requirements as well as requiring the cranes on site two months earlier than the original construction schedule. The overall cost savings from this analysis resulted in approximately \$16,500,000.00.

After completing the analysis of the proposed core changes, the redesign would be a valid change because it would maintain structural and architectural integrity while decreasing cost. Overall the use of IPD/BIM strategies was successful in completing this analysis.

5.2 Envelope

The existing curtain wall system was changed from a single façade layer with a ceramic rod shading system to a dynamic curtain wall system incorporating motorized louvered shades and operable windows. The new design was modeled in AutoDesk Revit using nested families and parametric parameters to accurately depict the way in which the facade would work. The proposed redesign allows for improved occupant comfort with respect to daylight and improved upon the architectural desire for transparency. All direct sun will be reflected while allowing maximum indirect light into the space. This allows for increased lighting energy savings, because the shades will not have to close as often as the existing system. The daylighting study resulted in a 72% reduction in lighting energy use within the first two rows of lighting around the entire floor plan. This proposed redesign created a cost savings of \$56,280 per year for the entire building. A redesign of the exterior lighting design was also completed. This redesign incorporated LED fixtures, which saved approximately 10,000 watts per side of the building. These savings resulted in a cost savings of \$17,520 per year from the original design, assuming 8 hours of use per night.

The BIM model was utilized to investigate interoperability with energy analysis software. IES<VE> successfully imported geometries from Revit and was used to analysis the performance of the existing and proposed glazing, proposed shading and reduced lighting power densities within the office. An energy analysis resulted in a reduction of building ambient loads translating to an estimated annual cost savings of \$45,136.09.

Hybrid Ventilation was investigated as a possible design solution for the New York Times Building to reduced energy usage and costs, as well as increase the sustainability profile of the building. Two analysis methods were utilized including a single-zone model to estimate feasibility, and IES<VE> Macroflo. Additionally, a control sequence was developed to allow the operation of the windows to respond to environmental and space conditions. The analysis concluded the addition of 18 operable window curtain wall panels on office floors 22-50, excluding floor 28. Natural ventilation would cut energy usage by 35% resulting in an annual energy savings of \$145,419.

Using the data generated from the original and new Revit envelope models, an additional cost of applying louvers was found to be approximately \$8,400,000.00. When applied to the cooling load savings generated by the louvers, a payback period of 14 years was achieved. A study into incorporating photovoltaics into the facade was completed simultaneously. The study was completed in Ecotect and analyzed in Excel. The analysis showed that incorporating a photovoltaic system into parts of the west and south facades would add approximately \$2,500,000 to the cost of the facade. This addition showed a payback of approximately 25 years. Finally, the incorporation of operable windows cost an additional \$2,500,000.00. A payback period of 15 years was found when analyzed for additional cooling load savings on top of the savings due to the louvers.

After completing the analysis of the proposed envelope changes, the redesign would be a valid change because it would maximize energy savings and maintain the architectural integrity but the cost will increase. This increase was deemed to be allowable when the

payback periods were analyzed to be shorter than the original design. Overall the use of IPD/BIM strategies was successful in completing this analysis.

5.3 Tenant

Using Integrated Project Delivery and Building Information Modeling, the layout of tenant spaces changed. This change is a result of enclosing the exposed steel within the interior of the building. This resulted in an increase of rentable area averaging approximately 2,000 square feet per floor. When the increased area was applied to New York City leasing costs for Class A offices, an average revenue increase of approximately \$1,275,000.00 per floor per year was achieved or a total of \$28,200,000.00 per year for the Forest City Ratner Companies' spaces.

It was determined that the redesigned floor system resulted in a total structural depth increase of 3/4" and an increase cost of \$1.58 per square foot. In addition, the goal of reduction of structural members per bay was not met due to vibrations. This new system met acceleration limits when subjected to walking excitation loads. The floor framing system was decreased by 7.5 psf and all columns were disengaged from the lateral system. This change decreased column sizes. Built-up columns were required in the cantilever bays in order to keep with the Architect's vision of no columns at the storefront, however they are not as large as the existing columns. Structural connection designs were driven by constructability.

A redesign of the interior lighting was done because of the architectural floor plan change. The proposed design changed incorporated task lighting into the design. The existing system uses 1.1 Watts per square foot. The proposed redesign would use .469 Watts per square foot. If these savings were applied to the entire building at 12 hours of use per day, the resulting energy savings would be approximately \$462,200.00 per year.

A ducted side-wall displacement ventilation system was selected to replace the existing unducted Underfloor Air Distribution (UFAD) system to improve the indoor environment for the building occupants by minimizing distribution of dust and contaminants that may collect in the open plenum space. The system was sized utilizing load factors determined by ASHRAE, and a 3D model was created in Revit MEP to ensure space requirements were met with the raised floor system.

After completing the analysis of the proposed tenant changes, the redesign would be a valid change because it would maximize energy savings, maintain the architectural integrity, and decrease cost. Overall the use of IPD/BIM strategies was successful in completing this analysis.

5.4 IPD/BIM Lessons Learned

The Integrated Project Delivery and Building Information Modeling approach allowed for accurate visualization of a 3D model. It allowed the design team to identify any potential system clashes. In addition, the Revit model aided in structural takeoffs for the building weight, seismic loading, and cost data. Interoperability between software allowed for improved information flow. The workflow between the BIM model and the energy analysis software also allowed for optimized system performance.

At times, interoperability between software was time consuming and did not result in improved information flow. The structural analysis software RAM did not have the proper plug-in with Revit on a 64 bit computer and the ETABs model was not deemed complex enough to best utilize the plug-in with Revit. While the gbXML file format for energy performance modeling was successful, it required more time consuming and detailed model creation. In addition BIM requires intensive computing capabilities which can cause multiple software failure due to lack of computing capacity.

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7 APPENDIX

7.1.1 Architectural Existing Conditions



Figure 127:Exterior X-bracing



Figure 128: Exterior view of NY Times HQ

7.1.2 Structural Existing Conditions





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Figure 129: Typical Floor Plan



Figure 130: Typical Core N/S Core Bracing Elevation



Figure 131: Typical Core E/W Core Bracing Elevation



Figure 132: Typical E/W Outrigger Section (28th Floor)



Figure 133: Typical N/S Outrigger Section (28th Floor)



Figure 134: Outrigger bracing on mechanical floor, courtesy of Thornton Tomasetti



Figure 135: Core bracing during construction, courtesy of Thornton Tomasetti







Figure 136: 1st-27th Floor Mechanical Floor Framing Plan





Figure 137:29th-51st Floor Mechanical Floor Framing Plan


7.1.3 Construction Management Existing Conditions

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Figure 138: Detailed Project Schedule

	- 1.000 (COA) (COA)	- Contra	Thildre		LOOL							
Owner Acquisition	657 days?	Mon 7/2/01	Tue 1/6/04	Q3 Q4	Q1	Q2	Q3 Q	4 Q1 Q2	Q3 Q4	Q1	Q2 Q	3 Q4
Documents Available	609 days?	Mon 7/2/01	Thu 10/30/03		1					T .		
Bid and Award	223 days?	Tue 8/19/03	Thu 6/24/04		1					_		
Site Mobilization/Abatement and Demo	140 days?	Mon 12/1/03	Fri 6/11/04							1		
Site Fence	10 days	Mon 12/1/03	Fri 12/12/03							1		
Pedestrian Walkway	10 days	Mon 12/15/03	Fri 12/26/03									
Overhead Protection	20 days	Mon 12/29/03	Fri 1/23/04									
Foundations	330 days?	Mon 12/22/03	Fri 3/25/05						c.	Ē		
Award Excavations/Foundations	6 days?	Mon 12/22/03	Mon 12/29/03							0		
Start Construction	0 days	Mon 4/19/04	Mon 4/19/04							1		
Excavation/Foundations - East	84 days?	Mon 5/24/04	Thu 9/16/04									
Excavation/Foundations - West	140 days?	Thu 8/12/04	Wed 2/23/05									_
Slab On Grade	44 days	Tue 1/25/05	Fri 3/25/05									
Superstructure	1060 days?	Mon 3/3/03	Wed 3/21/07							-		
Steel and Metal Deck	700 days?	Fri 9/19/03	Wed 5/24/06						$\overline{\nabla}$	-		
Award Steel Package	22 days?	Fri 9/19/03	Mon 10/20/03									
Shop Drawings	295 days?	Tue 10/21/03	Mon 12/6/04							1		
Mill Orders	159 days?	Thu 11/20/03	Tue 6/29/04									
Material Deliveries	179 days?	Tue 1/27/04	Fri 10/1/04									
Fabrication - Podium	90 days?	Mon 6/21/04	Fri 10/22/04									
Fabrication - Tower	248 days?	Fri 7/16/04	Tue 6/28/05									
Erect Steel	331 days?	Wed 11/17/04	Tue 2/21/06									9
Erect Steel - Podium: 2nd thru 5th Floor	59 days?	Wed 11/17/04	Mon 2/7/05									
Erect Steel - Floors 1-6	24 days?	Fri 3/18/05	Wed 4/20/05									
Erect Steel - Floors 7-12	27 days?	Thu 4/21/05	Fri 5/27/05									
Erect Steel - Floors 13-18	31 days?	Tue 5/31/05	Mon 7/11/05									
Erect Steel - Floors 19-24	27 days?	Tue 7/12/05	Wed 8/17/05									
Erect Steel - Floors 25-30	34 days?	Thu 8/18/05	Tue 10/4/05									
Erect Steel - Floors 31-36	27 days?	Wed 10/5/05	Thu 11/10/05									
Erect Steel - Floors 37-42	26 days?	Fri 11/11/05	Fri 12/16/05									
Erect Steel - Floors 43-48	26 days?	Mon 12/19/05	Mon 1/23/06									
Erect Steel - Floors 49-52	21 days?	Tue 1/24/06	Tue 2/21/06									
Root Screen Support/Topout/MEP Equipment	44 days?	Wed 2/22/06	Mon 4/24/06									
Demobilize	22 days?	Tue 4/25/06	Vved 5/24/06									
Concrete	591 days?	Fri 2/6/04	Thu 5/11/06									
Award Bour Constants	22 days?	Tue 4/26/04	Tue 4/44/06							_		
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Pour Concrete - Floors 13-18	30 days?	Thu 7/21/05	Wed 8/31/05									
Pour Concrete - Floors 19-74	28 days?	Thu 9/1/05	Mon 10/10/05									
Pour Concrete - Floors 25-30	32 days?	Tue 10/11/05	Wed 11/23/05									
Pour Concrete - Floors 31-36	30 days?	Thu 11/24/05	Wed 1/4/06									
Pour Concrete - Floors 37-42	24 days?	Thu 1/5/06	Tue 2/7/06									
Pour Concrete - Floors 43-48	24 days?	Wed 2/8/06	Mon 3/13/06									
Pour Concrete - Floors 49-52	21 days?	Tue 3/14/06	Tue 4/11/06									
Concrete Fills/Topout	22 days?	Wed 4/12/06	Thu 5/11/06									
Conc - N/S Cantilever	237 days?	Fri 5/20/05	Fri 4/14/06									
Conc - N/S Cantilever - Floors 2-6	20 days?	Fri 5/20/05	Thu 6/16/05									
Conc - N/S Cantilever - Floors 7-12	23 days?	Fri 6/24/05	Mon 7/25/05									
Conc - N/S Cantilever - Floors 13-18	24 days?	Thu 8/4/05	Tue 9/6/05									
Conc - N/S Cantilever - Floors 19-24	21 days?	Thu 9/15/05	Thu 10/13/05									
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Conc - N/S Cantilever - Floors 31-36	23 days?	Thu 12/8/05	Mon 1/9/06									
Conc - N/S Cantilever - Floors 37-42	19 days?	Tue 1/17/06	Fri 2/10/06									
Conc - N/S Cantilever - Floors 43-48	19 days?	Mon 2/20/06	Thu 3/16/06									
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57 58															00
58	Conc - N/S Cantiley	er - Floors 49-52	16 days?	Fri 3/24/06	Fri 4/14/06	Q3 Q4	Q1	Q2	Q3 Q4	Q1	Q2	Q3 Q4	Q1	Q2	Q3 C
	Intumescent Paint Fireproo	fing	289 days?	Thu 4/28/05	Mon 6/5/06										
59	Intumescent FR - Podiur	n Mobilization	5 days?	Thu 4/28/05	Wed 5/4/05										
50	Intumescent FR - Podiur	n	23 days?	Thu 5/5/05	Mon 6/6/05										
1	Intumescent FR - Tower	Mobilization	5 days?	Wed 7/13/05	Tue 7/19/05										
2	Intumescent FR - Tower		229 days?	Wed 7/20/05	Mon 6/5/06										
3	Spray Fireproofing		292 days?	Wed 3/23/05	Wed 5/3/06										
54	Mobilize SOFP - Podium		6 days?	Wed 3/23/05	Wed 3/30/05										
55	Spray Fireproof - Podiun	1	20 days?	Thu 3/31/05	Wed 4/27/05										
36	Spray Fireproof Mobiliza	tion - Tower	7 days?	Mon 5/16/05	Tue 5/24/05										
67	Spray Fireproof - Tower		246 days?	Thu 5/26/05	Wed 5/3/06										
58	Curtain Wall		1060 days?	Mon 3/3/03	Wed 3/21/07					V			-		
69	Award		22 days?	Mon 3/3/03	Tue 4/1/03										
0	Shop Drawings		249 days?	Wed 4/2/03	Mon 3/15/04									9	
71	Mock Ups		244 days?	Wed 4/2/03	Mon 3/8/04								-		
72	Material Procurement an	d Delivery	559 days?	Tue 7/8/03	Thu 8/25/05							0	1		
73	Fabrication Drawings		317 days?	Mon 9/15/03	Tue 11/30/04							<u></u>	3		
74	Shop Assembly/Shipping	g - Utilized Frames	368 days?	Wed 7/21/04	Thu 12/15/05								1		
75	Set Inserts/Clips		183 days?	Wed 4/27/05	Thu 1/5/06										
76	Curtain Wall Podium		42 days?	Thu 4/28/05	Fri 6/24/05										
77	Curtain Wall Tower		299 days?	Mon 8/8/05	Wed 9/27/06										
78	Curtain Wall Tower	- Floors 2-7	28 days?	Mon 8/8/05	Wed 9/14/05										
79	Curtain Wall Tower	- Floors 8-13	27 days?	Thu 9/15/05	Fri 10/21/05										
30	Curtain Wall Tower	- Floors 14-19	31 days?	Mon 10/24/05	Mon 12/5/05										
31	Curtain Wall Tower	- Floors 20-25	29 days?	Tue 12/6/05	Fri 1/13/06										
32	Curtain Wall Tower	- Floors 26-28	23 days?	Mon 1/16/06	Wed 2/15/06										
83	Curtain Wall Tower	- Floors 29-50	89 days?	Thu 2/16/06	Tue 6/20/06										
84	Curtain Wall Towe	r North/South Wings	107 days?	Wed 3/1/06	Wed 7/26/06										
85	Curtain Wall To	ower - Floors 31-40	45 days?	Wed 3/1/06	Tue 5/2/06										
86	Curtain Wall To	ower - Floors 41-51	61 days?	Thu 5/4/06	Wed 7/26/06										
87	Roof Top Work - Sc	reen Walls	45 days?	Thu 7/27/06	Wed 9/27/06										
38	Curtain Wall Infill		22 days?	Tue 2/20/07	Wed 3/21/07										
39	Roofing		355 days?	Tue 6/7/05	Fri 10/13/06										
90	Port Authority Lighting A	ssembly	68 days?	Tue 6/7/05	Wed 9/7/05										
91	Podium Skylights		91 days?	Tue 6/14/05	Mon 10/17/05										
92	Roofing at 5th Floor Pod	ium	70 days?	Tue 10/18/05	Mon 1/23/06										
93	Temp. Watertight Roof A	bove 15th Floor	0 days	Fri 11/4/05	Fri 11/4/05										
94	5th Floor Roof Pavers		33 days?	Tue 1/24/06	Thu 3/9/06										
95	Weathertight Podium Ro	of	0 days	Tue 1/24/06	Tue 1/24/06										
96	Temp. Watertight Roof A	bove 28th Floor	0 days	Mon 2/20/06	Mon 2/20/06										
97	Temp. Watertight Roof A	bove 36th Floor	0 days	Fri 3/24/06	Fri 3/24/06										
98	Temp. Watertight Roof A	bove 44th Floor	0 days	Mon 4/24/06	Mon 4/24/06										
99	Roofing at Tower		45 days?	Fri 8/11/06	Thu 10/12/06										
00	Watertight Tower Roof		0 days	Fri 10/13/06	Fri 10/13/06										
01	NY Times Tenant Floors	- Weather Tight	0 days	Mon 2/20/06	Mon 2/20/06										
02 E	levators		469 days?	Wed 3/23/05	Thu 1/4/07										
03	Podium Elevators		270 days?	Wed 3/23/05	Mon 4/3/06										
04	Low Rise: P1 - P6		217 days?	Tue 6/14/05	Tue 4/11/06										
05	Mid-Low Rise: P7 - P12		304 days?	Tue 6/14/05	Wed 8/9/06										
06	Mid-High Rise: P13 - P18		344 days?	Tue 6/14/05	Wed 10/4/06										
07	High Rise: P19 - P26		398 days?	Tue 6/14/05	Tue 12/19/06										
08	Service Elevators: S27 & S28		410 days?	Tue 6/14/05	Thu 1/4/07										
09 B	Building Systems		829 days?	Wed 2/11/04	Thu 4/12/07								-		
10	Utilities		242 days?	Fri 10/15/04	Fri 9/16/05										
11	MEP Coordination		214 days?	Wed 2/11/04	Mon 12/6/04								Ψ		
12	MEP Coordination - Sho	p Standards	33 days?	Wed 2/11/04	Fri 3/26/04										
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ate: The	u 11/5/09	Progress	Summarv			Rolled Up Mil	lestone	0		Split				Project Sur	nmarv



ID I	Fask Name	Duration	Start	Finish
3	MEP - Underground Coordination	11 days?	Wed 2/11/04	Wed 2/25/04
4	MEP Coordination - Risers	45 days?	Mon 3/29/04	Fri 5/28/04
5	MEP Coordination - Cellar Floor	33 days?	Mon 3/29/04	Wed 5/12/04
6	MEP Coordination - Ground Floor	34 days?	Thu 5/13/04	Tue 6/29/04
7	MEP Coordination - Mechanical RMS & Typical Floors	136 days?	Mon 5/31/04	Mon 12/6/04
	B.A.T.C	471 days?	Mon 6/27/05	Thu 4/12/07
9	BATC - Low Rise Backbone & Panels: C - 27	139 days?	Mon 6/27/05	Wed 1/4/06
20	BATC - High Rise Backbone & Panels: 28 - Roof	135 days?	Fri 12/16/05	Thu 6/22/06
-	BATC - Install Head End Equipment	88 days?	Thu 1/5/06	Mon 5/8/06
22	BATC - Programming	90 days?	Wed 3/8/06	Tue 7/11/06
3	BATC - Commissioning	250 days?	Mon 5/1/06	Thu 4/12/07
4	HVAC	619 days?	Thu 9/2/04	Fri 1/12/07
5	Cellar Level - Chiller Plant and Switchgear Room	363 days?	Thu 9/2/04	Fri 1/20/06
26	Ground Floor - 4th Floor	127 days?	Tue 7/12/05	Wed 1/4/06
7	Co-Gen Plant	313 days?	Tue 12/21/04	Wed 3/1/06
8	Co-Gen: Rig Equipment	6 days?	Tue 12/21/04	Tue 12/28/04
Э	Co-Gen Plant - Structure & Enclosure	113 days?	Tue 2/8/05	Wed 7/13/05
,	Co-Gen: HVAC Piping (Heat Exchangers, Radiators)	45 days?	Thu 7/14/05	Wed 9/14/05
	Co-Gen: Switchgear, Gererators, Co-Gen Equipment	67 days?	Thu 7/14/05	Fri 10/14/05
	Co-Gen: HVAC Plenumsm Dampers, etc	44 days?	Thu 9/15/05	Tue 11/15/05
	Co-Gen: Electrical Wiring/Terminations	22 days?	Mon 10/17/05	Tue 11/15/05
4	Co-Gen Instrumentation And Controls	48 days?	Wed 11/16/05	Fri 1/20/06
5	Co-Gen: Testing	22 days?	Tue 1/31/06	Wed 3/1/06
36	Gas - Blue Card Required	0 dave	Tue 1/31/06	Tue 1/31/06
87	5th Floor MER - Podium Roof	305 days	Fri 6/24/05	Tue 8/22/06
38		287 days?	Thu 43/9/05	Thu 4/44/07
30	Rig AHLIs: 6th thru 27th Floors	90 days?	Thu 12/0/05	Wed 4/12/06
40	Rig AHOS, our unit 27th Floors	90 days?	Fri 1/12/0/05	Fri 12/00
40	All Ductured: 20th thru 50th Floor	237 days?	Fri 1/13/08	Fil 12/8/08
41	AHO Ductwork: 29th thru 50th Floor	237 days?	Fri 1/13/06	FI 12/8/06
42	Pipe/Duct - Floor Run Outs: 29th thru 50th Floor	228 days?	Vved 3/1/06	Thu 1/11/0/
43	28th Floor - Mechanical Room	165 days?	Thu 11/24/05	Wed //12/06
44	Rig All Mech Equipment: 28th Floor	6 days?	Thu 11/24/05	Thu 12/1/05
45	Steam Station - PRV	137 days?	Tue 1/3/06	Wed 7/12/06
46	Piping Equipment	134 days?	Tue 1/3/06	Fri 7/7/06
47	AHU Ductwork	134 days?	Tue 1/3/06	Fri 7/7/06
48	Low Zone Chilled Water Return Loop	22 days?	Tue 1/3/06	Wed 2/1/06
49	LR - Hot Water Return Loop	33 days?	Tue 1/3/06	Thu 2/16/06
50	Testing - Low Zone Chilled Water Loop	11 days?	Thu 2/2/06	Thu 2/16/06
51	LR - Hot Water System - Testing/Comm.	15 days?	Fri 2/17/06	Thu 3/9/06
2	Low Zone Chilled Water Available for NYT	0 days	Fri 3/10/06	Fri 3/10/06
53	LR - Hot Water Sys Available for NYT	0 days	Fri 3/10/06	Fri 3/10/06
54	High Rise	287 days?	Thu 12/8/05	Thu 1/11/07
55	51st Floor - Mechanical Room	188 days?	Wed 4/19/06	Thu 1/4/07
56	Roof	117 days?	Wed 2/22/06	Wed 8/2/06
57	Risers	425 days?	Wed 6/1/05	Fri 1/12/07
58	Plumbing	595 days?	Wed 9/1/04	Fri 12/8/06
59	Underground	77 days?	Wed 9/1/04	Thu 12/16/04
60	Low Rise	271 days?	Mon 6/6/05	Fri 6/16/06
61	High Rise	210 days?	Tue 2/21/06	Fri 12/8/06
162	Gas Risers	155 days?	Mon 6/27/05	Thu 1/26/06
63	Fire Protection	374 days?	Wed 6/15/05	Thu 11/16/06
64	Low Rise	271 days?	Wed 6/15/05	Tue 6/27/06
165	High Rise	241 days?	Fri 12/16/05	Thu 11/16/06
66	Electrical	589 days?	Thu 11/18/04	Eri 2/16/07
167	Cellar Level - Chiller Plant and Swithnear Room	321 days?	Thu 11/18/04	Wed 2/8/06
169		250 days?	Mon 6/27/05	Thu 6/0/06
00		230 days ?	1001 0/2//00	
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Th	nu 11/5/09			
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,	askiname	Duration	Start	Finish		2002			2003		2004	
·	20th Elean Machanical Beem	124 days2	Thu 1/5/06	Tue 7/11/06	Q3 Q4	Q1	Q2 Q3	Q4	Q1 Q	2 Q3 Q4	Q1 Q	2 Q3
	Lich Pice	134 days?	Thu 1/5/06	Mod 1/2/07								
	51st Eloor - Mechanical Room	201 days?	Mon 4/10/06	Fri 2/16/07								
	Life Safety	467 days?	Thu 11/18/04	Wed 8/30/06								
-	Fire Alarm	404 days?	Wed 6/29/05	Thu 1/11/07								
In	terior Finishes	427 days?	Mon 6/20/05	Mon 2/5/07								
-	Core Program	427 days?	Mon 6/20/05	Thu 1/18/07								
-	Core Program - Floors 1-6	153 days?	Mon 6/20/05	Tue 1/17/06								
	Core Program - Floors 7-12	112 days?	Mon 9/26/05	Tue 2/28/06								
-	Core Program - Floors 13-18	112 days?	Mon 11/7/05	Tue 4/11/06								
-	Core Program - Floors 19-24	110 days?	Wed 12/21/05	Tue 5/23/06								
	Core Program - Floors 25-30	110 days?	Fri 2/3/06	Thu 7/6/06								
-	Core Program - Floors 31-36	116 days?	Fri 3/17/06	Thu 8/24/06								
	Core Program - Floors 37-42	122 days?	Fri 5/12/06	Fri 10/27/06								
	Core Program - Floors 43-48	112 days?	Tue 7/18/06	Tue 12/19/06								
	Core Program - Floors 49-52	103 days?	Tue 8/29/06	Thu 1/18/07								
-	Perimeter Program	304 days?	Fri 7/22/05	Tue 9/19/06								
	NYT - Interior Program - Floor Handover	128 days?	Tue 12/27/05	Thu 6/22/06								
-	NYT - Floors 3-6 Handover	17 days	Tue 12/27/05	Wed 1/18/06								
1	NYT - Floors 7-12 Handover	21 days	Wed 2/1/06	Wed 3/1/06								
	NYT - Floors 13-18 Handover	21 days	Wed 3/15/06	Wed 4/12/06								
	NYT - Cellar Level Handover	0 days	Tue 3/28/06	Tue 3/28/06								
1	NYT - 1st Floor Area - Handover	0 days	Tue 3/28/06	Tue 3/28/06								
1	NYT - Floors 19-24 Handover	21 days?	Wed 4/26/06	Wed 5/24/06								
	NYT - Floors 25-28 Handover	11 days?	Thu 6/8/06	Thu 6/22/06								
	NYT - 2nd Floor Handover	0 days	Thu 6/22/06	Thu 6/22/06								
1	FCRC - Turnovers	85 days	Mon 10/9/06	Mon 2/5/07								
	FCRC Tenant Turnover A (29-34)	0 days	Mon 10/9/06	Mon 10/9/06								
t	FCRC Tenant Turnover B (35-40)	0 days	Mon 10/9/06	Mon 10/9/06								
	FCRC Tenant Turnover C (41-46)	0 days	Mon 2/5/07	Mon 2/5/07								
	FCRC Tenant Turnover D (47-50)	0 days	Mon 2/5/07	Mon 2/5/07								
Fi	nish and Closeout	446 days?	Tue 8/23/05	Tue 5/8/07								
	Tower Lobby - Interior and Entrances	316 days?	Tue 8/23/05	Mon 11/6/06								
	NYT - Times Center - 1st Floor Handover	0 days	Thu 3/9/06	Thu 3/9/06								
	NYT - Times Center - Cellar Floor Handover	0 days	Tue 3/28/06	Tue 3/28/06								
	Low Rise TCO	0 days	Wed 3/29/06	Wed 3/29/06								
	Project Punchlist/Closeout/Demobilization	68 days?	Mon 12/18/06	Wed 3/21/07								
1	High Rise TCO	0 days	Mon 2/5/07	Mon 2/5/07								
	Internal Garden/Lobby Restoration and Landscaping	44 days?	Wed 3/7/07	Mon 5/7/07								
	Lobby Completion	0 days	Tue 5/8/07	Tue 5/8/07								
T	Project Close Out	O dava	Tue 5/9/07	T								

Technical Assignment 2

Hedrick | Miller | Wiacek



Figure 139: Cost Estimation

Sunday, October 4, 2009

Statement of Probable Cost

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	N	IYT - Aug 2004 - NY - N.Y	(.C.	
	Prepared By:		Prepared For:	
	Fax: Building Sq. Size: 150000 Bid Date: No. of floors: 6 No. of buildings: Project Height: 1st Floor Height: 1st Floor Size:		Fax: Site Sq. Size: F2218 Building use: Foundation: Exterior Walls: Interior Walls: Roof Type: Floor Type: Project Type:	
Division		Percent	Sq. Cost	Amount
00	Bidding Requirements	2.65	7.64	11.464.738
	Bidding Requirements	2.65	7.64	11,464,738
01	General Requirements	7.58	21.88	32,820,265
	General Requirements	7.58	21.88	32,820,265
02	Site Work	0.62	1.80	2,696,973
	Site Work	0.62	1.80	2,696,973
03	Concrete	10.13	29.25	43,874,651
	Concrete	10.13	29.25	43,874,651
04	Masonry	2.77	7.99	11,989,406
	Masonry	2.77	7.99	11,989,406
05	Metals	7.80	22.52	33,782,993
	Metals	7.80	22.52	33,782,993
05	Wood & Plastics Wood & Plastics	0.32	0.94	1,404,110 1,404,110
07	Thermal & Moisture Protection	1.25	3.61	5,421,114
	Thermal & Moisture Protection	1.25	3.61	5,421,114
80	Doors & Windows	9.96	28.75	43,127,477
	Doors & Windows	9.96	28.75	43,127,477
09	Finishes	3.64	10.50	15,743,545
	Finishes	3.64	10.50	15,743,545
10	Specialties	2.28	6.57	9,852,009
	Specialties	2.28	6.57	9,852,009
11	Equipment Equipment	0.59	1.70 1.70	2,554,579 2,554,579
12	Furnishings	1.29	3.73	5,596,079
	Furnishings	1.29	3.73	5,596,079
14	Conveying Systems	2.33	6.71	10,069,183
	Conveying Systems	2.33	6.71	10,069,183
15	Mechanical	3.15	9.11	13,658,570
	Mechanical	3.15	9.11	13,658,570
16	Electrical	1.36	3.93	5,891,949
	Electrical	1.36	3.93	5,891,949
21	Fire Suppression	3.31	9.55	14,319,069
	Fire Suppression	3.31	9.55	14,319,069
Z2	Plumbing Plumbing	1.82	5.24	7,862,137 7,862,137

Total Proj	ect Costs		-	432,957,936
Total Non	-Building Costs	100.00	0.00	0
Total Buil	ding Costs	100.00	288.64	432,957,936
55	Utilities	1.51	4.36	6,535,147
33	Ittilities	1.51	4.36	6 535 147
32	Exterior Improvements Exterior Improvements	3.10 3.10	8.95 8.95	13,426,292 13,426,292
31	Earthwork Earthwork	1.41 1.41	4.07 4.07	6,104,975 6,104,975
28	Electronic Safety and Security Electronic Safety and Security	2.90	8.37 8.37	12,559,593 12,559,593
27	Communications Communications	6.16 6.16	17.79 17.79	26,681,147 26,681,147
26	Electrical Electrical	9.55 9.55	27.56 27.56	41,335,182 41,335,182
25	Integrated Automation Integrated Automation	0.36 0.36	1.04 1.04	1,564,597 1,564,597
23	HVAC	12.15 12.15	35.08 35.08	52,622,158 52,622,158



148,45

5.85

152.75

6.95

157.90

8.35

R/Conc. Frame

Per 100 LF.

			0.00	0.40	2.30	2.15	1.95	1,40	1.20	101.0
Story Hat, Adj., Add or Deduct	Per 1 Pt	3.30	2.95	2.00	2.00					
	For 8	asement, add \$3	iá. 40 per sig	ware foot of be	osement creo					
he above costs were calculated using the ba usigit alternatives and owner's requirements.	sic specifications shown on Reported campleted projec	the facing page. t costs, for this typ	These costs is se of stucture	hould be only 1, range from	sled where n \$93.60 to \$	ecessory for 228.35 per 5	LE			
Common additives									Unit	\$ Coni
	Unit	\$ Cost		Description						
Description				Escalators, N	Vetal	a la			Each	143,00
Clock System	Each	16,000			32" wide, 11	U story neight			Each	172,00
20 room	Each	39,100			20 stor	y negra			Each	152,00
50 room					48" wide, 11	U story nega			Each	180,50
Directory Boonts, Mostic, glass covernor	Epch	595			20, 200	A sedan				
30° × 20°	Each	1450		Glass	and the second	the second stable			Epdy	137,0
20 × 40	Each	600			32' wi00, 1	U sory neight			Each	165,0
Aluminum, 24° x 16°	Each	675			20 stor	ry neight			Each	48,30
35' x 24	Each	980			45" vide, 1	U SOLA beilds			Each	175,0
48' x 32'	Epch	2025			20 10	iy neigh.				
48" X.OV				Smoke Dete	dors				Each	187
Elevatori, Electric passenger, 10 sepa	Each	430,500)	Ceiling	type				Each	480
3000# capacity	Each	433,000	2	Ducting	pe					
-> 4000# capacity	Each	437,000	0	Sound Syste	100				Each	235
SUDU# capacity	Epd	1 3,600		Ampili	er, 250 wars				Each	191
Additional stop, and hetery coefficient	ed .			Specke	IC, ceeing or v	YOR			Each	365
Emergency ugrang, 25 wear, oner a operation	Ead	282			Inverper	m 12 culat			Oufet	31:
Lacci DDRery	Ead	h 905		TV Antenno	, wester syst	sti, 12 0048			Outlet	200
PROMY COSTINUES				100 or	utlat				Outlet	194

180

Precast Concrete Panel

With Exposed Aggregate

Perimater Adj., Add or Deduct

Important: See the Reference Sect

129.60

1,70

1.20

1.30

0.95

133.15

2.50

1,40

139.55

3.85

1.95

141.75

4.40

2,15

144.60

-

5.00

2.30

of f	loor area		Unit	Unit Cost	Cost Per S.E.
Δ.	SUBSTRUCTURE				
1010 1020 1030 2010	Standard Foundations Special Foundations Stab on Grade Basement Excavation	CP concrete pile caps Steel Hpiles, concrete grade beams 4* evidenced concrete with vapor barrier and grane/ar base Site preparation for table, take and grade beams	S.F. Ground S.F. Ground S.F. Stab S.F. Ground	0.92 62 4.74 .25	.62 3.86 .30 .02
2020	Basement Walls	4' foundation wall	LE Wall	78	.38
В.	SHELL		ELECTRONY	C.C. Coller	
1010	B10 Superstructure	I Country to a world dock house	S & Elser	1 90 BT	29.03
1020	Roof Construction	Metal deck, open web steel joists, beams, columns	S.F. Roof	9.76	.61
	820 Exterior Enclosure				
2010	Exterior Wolls	N/A		-	-
2020	Exterior Windows	Double glazed heat obsorbing, finted plate glass wall panels 100% of wall	Bach	41.40	13.52
1944	B30 Roofing		20221000		1
3010	Roof Coverings	Single ply membrane, fully adhered; perite/EPS composite insulation	S.F. Roof	5.60	.35
3020	Roof Openings	N/A	-	-	-
C. 1	INTERIORS		A DESCRIPTION OF	1.12	
1010	Portitions	Gypsum board on metal studa 20 S.F. Floor/L.F. Partition	S.F. Partition	10.20	2.72
1020	Elitinga	ange tear hotow metal 400 S.C. Plaas/Door Tailet caritions	S.E. Floor	.42	42
2010	Stair Construction	Concrete tilled metal pan	Flight	18,950	2.55
3010	Wall Finishes	60% vinyl wall covering, 40% paint	S.J. Serface	1.33	
3030	Celling Finishes	Wineral fiber tile on concealed zee bars	5.F. Ceiling	6.38	6.38
D. 1	SERVICES				S. Sala
	D10 Conveying				
1010	Bevators & Lifs	Four geared passanger elevators	Each	479,050	7,37
1020	Escalators & Moving Walks	N/A	-	and the second	-
2010	D20 Plumbing	Talat and service federers service and devices 1 Federer/1345 5 F Floor	Each	4072	7.00
2020 2040	Domestic Water Distribution Rain Water Drainage	Coll Brod worker heater Roal droites	S.F. Floor S.F. Noof	.25 2.08	.25
3010	Energy Supply	N/A	-	-	-
3020	Heat Generating Systems	Bailer, heat exchanger and fans	Epch	388,485	2.04
3030	Cooling Generating Systems	Chilled woter, fan coil units N/A	S.P. Hoor	13.59	13.59
3090	Other HWC Sys. & Equipment	N/A	-	-	-
	D40 Fire Protection			1999	1000
4010	Sprinklers Stradpices	Sprinkler system, light hazard Standaises and hase systems	S.F. Floor	2.25	2.23
	050 Electrical	3			
5010	Sectrical Service/Distribution	2400 ampere service, panel board and feeders	S.F. Floor	1.10	1.10
5020	Communications & Security	High efficiency truorescent lixtures, receptodes, switches, A.C. and misc, power Addressable alone systems, internet and phone wiring, emergency lighting	S.F. Ploor S.F. Ploor	5.81	5.81
5090	Other Electrical Systems	Emergency generator, 200 kW, uninterruptible power supply	S.F. Floor	.51	.51
E. 8	QUIPMENT & FURNISHIP	ICS	19.19	S16.15	
1010	Commercial Equipment	N/A	-	-	-
1020	Institutional Equipment	N/A	-	-	-
1090	Other Equipment	N/A		-	_
5.5	PECIAL CONSTRUCTION			9	100 E.C.
1020	Integrated Construction	N/A	-	and the state of the	-
1040	Special Facilities	N/A	-	-	-
G. 1	BUILDING SITEWORK	N/A	STREETS.		
			Sub	-Totai	115.61
	CONTRACTOR FEES (General	Requirements: 10%, Overhead: 5%, Profit 10%		25%	28.92
	ARCHITECT FEES	and a second second second second second		6%	B.67



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Figure 142: Google Maps Images















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Figure 144: Detailed Structural Estimate

Quantity	LineNumber	Description	Crew	Daily	labor	Unit	Material	labor	Fauinment	Figu Total	Fet Mat	Fxt Labor	Ext Equip	Fate	Mat. O&P	l abor O&P	Fauin O&P	Total O&P Fx	t Mat O&P	Ext. Labor O&P	Ext Equip O&P	Ext Total O&P	l abor Type
quantity	Enervaniser	Description	ore w	Output	Hours	onne	Material	Lubol	Equipment	Total	Ext. Mut.	Ext. Eubor	Ext. Equip.			Labor Odi	Equip. Our		a mat. Our	Ext. Eubor our	Ext. Equip. Our		Labor Type
0	051223750010	STRUCTURAL STEEL MEMBERS					\$ -	\$-	\$ -	\$ -	\$-	\$ -	\$ -	\$-	\$ -	\$ -	\$-	\$ - \$	-	\$ -	\$-	\$-	STD
		project, 1 to 2 story building, W10x26,																					
		A992 steel, shop fabricated, incl shop																					
41.33	051223750720	primer, bolted connections Structural steel member 100-top	E2	600	0.093	L.F.	\$ 44.51	\$ 5.75	\$ 3.20	\$ 53.46	\$ 1,839.60	\$ 237.65	\$ 132.26	\$ 2,209.50	\$ 48.65	\$ 9.84	\$ 3.52	\$ 62.01 \$	2,010.70	\$ 406.69	\$ 145.48	\$ 2,562.87	STD
		project. 1 to 2 story building. W12x26.																					
		A992 steel, shop fabricated, incl shop																					
18.29	051223751500	primer, bolted connections	E2	880	0.064	L.F.	\$ 44.51	\$ 3.92	\$ 2.18	\$ 50.61	\$ 814.09	\$ 71.70	\$ 39.87	\$ 925.66	\$ 48.65	\$ 6.71	\$ 2.40	\$ 57.76 \$	889.81	\$ 122.73	\$ 43.90	\$ 1,056.43	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop																					
37.72	051223752100	primer, bolted connections	E2	900	0.062	L.F.	\$ 51.23	\$ 3.84	\$ 2.13	\$ 57.20	\$ 1,932.40	\$ 144.84	\$ 80.34	\$ 2,157.58	\$ 56.41	\$ 6.56	\$ 2.35	\$ 65.32 \$	2,127.79	\$ 247.44	\$ 88.64	\$ 2,463.87	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop																					
57	051223752320	primer, bolted connections	E2	810	0.069	L.F.	\$ 73.49	\$ 4.26	\$ 2.37	\$ 80.12	\$ 4,188.93	\$ 242.82	\$ 135.09	\$ 4,566.84	\$ 80.73	\$ 7.29	\$ 2.60	\$ 90.62 \$	4,601.61	\$ 415.53	\$ 148.20	\$ 5,165.34	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop																					
179.26	051223752380	primer, bolted connections	E2	740	0.076	L.F.	\$ 154.22	\$ 4.67	\$ 2.59	\$ 161.48	\$ 27,645.48	\$ 837.14	\$ 464.28	\$ 28,946.90	\$ 168.71	\$ 8.00	\$ 2.85	\$ 179.56 \$	30,242.95	\$ 1,434.08	\$ 510.89	\$ 32,187.93	STD
		Structurel steel member 100 ten																					
		project, 1 to 2 story building, W14x120																					
		A992 steel, shop fabricated, incl shop	,																				
151.18	051223752500	primer, bolted connections	E2	720	0.078	L.F.	\$ 204.93	\$ 4.80	\$ 2.67	\$ 212.40	\$ 30,981.32	\$ 725.66	\$ 403.65	\$ 32,110.63	\$ 225.63	\$ 8.21	\$ 2.93	\$ 236.77 \$	34,110.74	\$ 1,241.19	\$ 442.96	\$ 35,794.89	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop																					
398.86	051223752700	primer, bolted connections	E2	1000	0.056	L.F.	\$ 44.51	\$ 3.46	\$ 1.92	\$ 49.89	\$ 17,753.26	\$ 1,380.06	\$ 765.81	\$ 19,899.13	\$ 48.65	\$ 5.90	\$ 2.12	\$ 56.67 \$	19,404.54	\$ 2,353.27	\$ 845.58	\$ 22,603.40	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop																					
114.96	051223752900	primer, bolted connections	E2	900	0.062	L.F.	\$ 52.79	\$ 3.84	\$ 2.13	\$ 58.76	\$ 6,068.74	\$ 441.45	\$ 244.86	\$ 6,755.05	\$ 58.48	\$ 6.56	\$ 2.35	\$ 67.39 \$	6,722.86	\$ 754.14	\$ 270.16	\$ 7,747.15	STD
		Structural steel member, 100-ton																					
		project, 1 to 2 story building, W18x35,																					
2310.15	051223753300	primer, bolted connections	E5	960	0.083	L.F.	\$ 60.03	\$ 5.20	\$ 2.15	\$ 67.38	\$ 138,678.30	\$ 12,012.78	\$ 4,966.82	\$ 155,657.91	\$ 65.72	\$ 8.99	\$ 2.37	\$ 77.08 \$	151,823.06	\$ 20,768.25	\$ 5,475.06	\$ 178,066.36	STD
		Structural steel member, 100-ton																					
		project, 1 to 2 story building, W18x40,																					
364.18	051223753500	primer, bolted connections	E5	960	0.083	L.F.	\$ 68.31	\$ 5.20	\$ 2.15	\$ 75.66	\$ 24,877.14	\$ 1,893.74	\$ 782.99	\$ 27,553.86	\$ 75.04	\$ 8.99	\$ 2.37	\$ 86.40 \$	27,328.07	\$ 3,273.98	\$ 863.11	\$ 31,465.15	STD
		Structural steel member, 100-ton																	·				
		project, 1 to 2 story building, W18x50,																					
280	051223753700	primer, bolted connections	E5	912	0.088	L.F.	\$ 85.39	\$ 5.48	\$ 2.27	\$ 93.14	\$ 23,909,20	\$ 1.534.40	\$ 635.60	\$ 26.079.20	\$ 94.19	\$ 9.49	\$ 2.49	\$ 106.17 \$	26.373.20	\$ 2.657.20	\$ 697.20	\$ 29.727.60	STD
		Structural steel member, 100-ton													1								
		project, 1 to 2 story building, W18x65,																					
120	051223753920	A992 steel, shop fabricated, incl shop	E5	900	0 089	LE	\$ 110.75	\$ 5.55	\$ 2.29	\$ 118.59	\$ 13,290,00	\$ 666.00	\$ 274.80	\$ 14 230 80	\$ 122.13	\$ 963	\$ 2.52	\$ 134.28 \$	14 655 60	\$ 1 155 60	\$ 302.40	\$ 16 113 60	STD
120	031223733320	Structural steel member, 100-ton	LJ	300	0.003	<u> </u>	φ 110.75	ψ 0.00	ψ 2.23	ψ 110.03	φ 13,230.00	\$ 000.00	ψ 2/4.00	φ 14,230.00	φ 122.13	φ 3.05	ψ 2.02	φ 134.20 φ	14,000.00	\$ 1,133.00	ψ 302.40	\$ 10,113.00	510
		project, 1 to 2 story building, W18x76,																					
160	051222752040	A992 steel, shop fabricated, incl shop	55	000	0.000		¢ 120.20	¢	¢ 2.20	¢ 127.22	¢ 20,700,80	¢ 999.00	¢ 266.40	¢ 21.055.20	¢ 142.02	¢ 0.62	¢ 2.52	¢ 154.00 ¢	22 052 00	¢ 1 540 90	¢ 402.20	¢ 24.706.90	STD
100	031223733340	primer, bolted connections	LJ	300	0.003	L.I .	ψ 123.30	φ 0.00	ψ 2.23	ψ 101.22	φ 20,700.00	\$ 000.00	ψ 300.40	ψ 21,855.20	φ 142.03	φ 3.03	ψ 2.02	φ 134.30 φ	22,002.00	\$ 1,340.00	φ 403.20	\$ 24,730.00	310
		Structural steel member, 100-ton																					
		project, 1 to 2 story building, W18x106	,																				
174.12	051223753980	primer, bolted connections	E5	900	0.089	L.F.	\$ 181.13	\$ 5.55	\$ 2.29	\$ 188.97	\$ 31.538.36	\$ 966.37	\$ 398.73	\$ 32,903,46	\$ 198.72	\$ 9.63	\$ 2.52	\$ 210.87 \$	34.601.13	\$ 1.676.78	\$ 438.78	\$ 36.716.68	STD
		Structural steel member, 100-ton											• • • • •										
		project, 1 to 2 story building, W21x50,																					
260	051223754300	A992 steel, shop fabricated, incl shop	E5	1064	1 0.075	LE	\$ 85.39	\$ 470	\$ 194	\$ 92.03	\$ 22 201 40	\$ 1 222 00	\$ 504.40	\$ 23 927 80	\$ 94.19	\$ 814	\$ 214	\$ 104.47 \$	24 489 40	\$ 2 116 40	\$ 556.40	\$ 27 162 20	STD
					1		+	+	÷	• •=•••	·	+ .,===	• •••••	•		•			,		• ••••		
		Structural steel member, 100-ton																					
		A992 steel shop fabricated incl shop	,																				
60	051223754760	primer, bolted connections	E5	1000	0.08	L.F.	\$ 172.85	\$ 5.00	\$ 2.07	\$ 179.92	\$ 10,371.00	\$ 300.00	\$ 124.20	\$ 10,795.20	\$ 189.41	\$ 8.64	\$ 2.27	\$ 200.32 \$	11,364.60	\$ 518.40	\$ 136.20	\$ 12,019.20	STD
		Structural steel member, 100-ton																					
		project, 1 to 2 story building, W24x76,																					
225	051223755500	primer, bolted connections	E5	1110	0.072	L.F.	\$ 129.38	\$ 4.50	\$ 1.86	\$ 135.74	\$ 29,110.50	\$ 1,012.50	\$ 418.50	\$ 30,541.50	\$ 142.83	\$ 7.79	\$ 2.05	\$ 152.67 \$	32,136.75	\$ 1,752.75	\$ 461.25	\$ 34,350.75	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop	,																				
60	051223756900	primer, bolted connections	E5	1134	4 0.071	L.F.	\$ 222.53	\$ 4.40	\$ 1.82	\$ 228.75	\$ 13,351.80	\$ 264.00	\$ 109.20	\$ 13,725.00	\$ 244.26	\$ 7.65	\$ 2.01	\$ 253.92 \$	14,655.60	\$ 459.00	\$ 120.60	\$ 15,235.20	STD
		Structural steel member, 100-ton																					
		A992 steel, shop fabricated, incl shop	,													1						1	
60	051223757100	primer, bolted connections	E5	1134	4 0.071	L.F.	\$ 241.16	\$ 4.40	\$ 1.82	\$ 247.38	\$ 14,469.60	\$ 264.00	\$ 109.20	\$ 14,842.80	\$ 264.96	\$ 7.65	\$ 2.01	\$ 274.62 \$	15,897.60	\$ 459.00	\$ 120.60	\$ 16,477.20	STD
		Structural steel member, 100-ton														1						1	
		A992 steel, shop fabricated, incl shop														1						1	
673.67	051223750120	primer, bolted connections	E2	600	0.093	L.F.	\$ 25.88	\$ 5.75	\$ 3.20	\$ 34.83	\$ 17,434.58	\$ 3,873.60	\$ 2,155.74	\$ 23,463.93	\$ 27.95	\$ 9.84	\$ 3.52	\$ 41.31 \$	18,829.08	\$ 6,628.91	\$ 2,371.32	\$ 27,829.31	STD
		Structural steel member, 100-ton			1																		
		Project, 1 to 2 story building, W12x19, A992 steel, shop fabricated incl shop														1						1	
887.43	051223751300	primer, bolted connections	E2	880	0.064	L.F.	\$ <u>37.7</u> 8	\$ 3.92	<u>\$ 2.18</u>	\$ 43.88	\$ 33,527.11	\$ 3,478.73	<u>\$ 1,934.60</u>	\$ 38,940.43	\$ 41.40	\$ 6.71	\$ 2.40	\$ 50.51 \$	36,739.60	\$ 5,954.66	\$ 2,129.83	\$ 44,824.09	STD
			-		-				_						-	-							

	1	In	1	1	1		1	1	r	1		1		T	1	1	1		-		
		Structural steel member, 100-ton																			
		Agg2 steel shop fabricated incl shop																			
951 23	051223751900	primer bolted connections	F2	990	0.057	I F	\$ 44.51 \$ 3.48	\$ 1.94	\$ 49.93	\$ 42,339,25	\$ 3,310,28	\$ 1 845 39	\$ 47 494 91	\$ 48.65	\$ 5.96	\$ 2.13	\$ 56.74	\$ 46 277 34	\$ 5,669,33	\$ 2 026 12 \$ 53 972 79 ST	ГD
001120	001220101000	Structural steel member, 100-ton		000	0.001	<u> </u>	¢ 11.01 ¢ 0.10	\$ 1.61	¢ 10.00	¢ 12,000.20	φ 0,010.20	¢ 1,010.00	φ in, io i.o i	¢ 10.00	φ 0.00	φ 2.10	φ σο	¢ 10,277.01	\$ 0,000.00	¢ 2,020.12 ¢ 00,012.10 01	
		project, 1 to 2 story building, W14x48,																			
		A992 steel, shop fabricated, incl shop																			
30	051223752340	primer, bolted connections	E2	800	0.07	L.F.	\$ 90.56 \$ 4.32	\$ 2.40	\$ 97.28	\$ 2,716.80	\$ 129.60	\$ 72.00	\$ 2,918.40	\$ 99.36	\$ 7.36	\$ 2.63	\$ 109.35	\$ 2,980.80	\$ 220.80	\$ 78.90 \$ 3,280.50 ST	ГD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W14x82,																			
		A992 steel, shop fabricated, incl shop																			
70.47	051223752380	primer, bolted connections	E2	740	0.076	6 L.F.	\$ 154.22 \$ 4.67	\$ 2.59	\$ 161.48	\$ 10,867.88	\$ 329.09	\$ 182.52	\$ 11,379.50	\$ 168.71	\$ 8.00	\$ 2.85	\$ 179.56	\$ 11,888.99	\$ 563.76	\$ 200.84 \$ 12,653.59 ST	ГD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W14x109	,																		
134 38	051223752500	primer, bolted connections	F2	720	0.078	I F	\$ 204.93 \$ 4.80	\$ 2.67	\$ 212.40	\$ 27 538 49	\$ 645.02	\$ 358.79	\$ 28 542 31	\$ 225.63	\$ 8.21	\$ 2.93	\$ 236.77	\$ 30 320 16	\$ 1 103 26	\$ 303 73 \$ 31 817 15 ST	TD
104.00	001220102000	Structural steel member, 100-ton		120	0.070	,	φ 204.30 φ 4.00	φ 2.07	φ 212.40	φ 21,000.45	φ 040.02	φ 000.75	φ 20,042.01	φ 220.00	φ 0.21	φ 2.55	φ 200.11	φ 00,020.10	φ 1,100.20	¢ 000.70 ¢ 01,017.10 01	
		project, 1 to 2 story building, W16x36,																			
		A992 steel, shop fabricated, incl shop																			
260	051223753100	primer, bolted connections	E2	800	0.07	L.F.	\$ 68.31 \$ 4.32	\$ 2.40	\$ 75.03	\$ 17,760.60	\$ 1,123.20	\$ 624.00	\$ 19,507.80	\$ 75.04	\$ 7.36	\$ 2.63	\$ 85.03	\$ 19,510.40	\$ 1,913.60	\$ 683.80 \$ 22,107.80 ST	TD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W18x60,																			
100		A992 steel, shop fabricated, incl shop								• • • • • • • • •	• • • • • • •										-
120	051223753920	primer, bolted connections	E5	900	0.089) L.F.	\$ 110.75 \$ 5.55	\$ 2.29	\$ 118.59	\$ 13,290.00	\$ 666.00	\$ 274.80	\$ 14,230.80	\$ 122.13	\$ 9.63	\$ 2.52	\$ 134.28	\$ 14,655.60	\$ 1,155.60	\$ 302.40 \$ 16,113.60 ST	ID
		project 1 to 2 story building W18x71																			
		A992 steel, shop fabricated, incl shop		1	1	1								1			1		1		
72.49	051223753940	primer, bolted connections	E5	900	0.089	L.F.	\$ 129.38 \$ 5.55	\$ 2.29	\$ 137.22	\$ 9.378.76	\$ 402.32	\$ 166.00	\$ 9.947.08	\$ 142.83	\$ 9.63	\$ 2.52	\$ 154.98	\$ 10.353.75	\$ 698.08	\$ 182.67 \$ 11.234.50 ST	ГD
-		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W21x57,																			
		A992 steel, shop fabricated, incl shop																			
122.12	051223754500	primer, bolted connections	E5	1036	6 0.077	7 L.F.	\$ 105.57 \$ 4.83	\$ 1.99	\$ 112.39	\$ 12,892.21	\$ 589.84	\$ 243.02	\$ 13,725.07	\$ 116.96	\$ 8.35	\$ 2.19	\$ 127.50	\$ 14,283.16	\$ 1,019.70	\$ 267.44 \$ 15,570.30 ST	ſD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W21x132	,																		
78	051223754780	primer, bolted connections	E5	1000	0.08	I F	\$ 208.04 \$ 5.00	\$ 2.07	\$ 215.11	\$ 16 227 12	\$ 390.00	\$ 161.46	\$ 16 778 58	\$ 228.74	\$ 8.64	\$ 2.27	\$ 239.65	\$ 17 841 72	\$ 673.92	\$ 177.06 \$ 18.692.70 ST	TD
10	001220104100	printer, bolted connections	20	1000	0.00	,	φ 200.04 φ 0.00	φ 2.07	φ 210.11	φ 10,227.12	φ 000.00	φ 101.40	φ 10,770.00	φ 220.74	φ 0.04	ψ 2.27	φ 200.00	φ 17,041.72	φ 010.02	¢ 111.00 ¢ 10,002.10 01	
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W33x221																			
		A992 steel, shop fabricated, incl shop																			
120	051223757900	primer, bolted connections	E5	1125	0.071	L.F.	\$ 393.30 \$ 4.45	\$ 1.84	\$ 399.59	\$ 47,196.00	\$ 534.00	\$ 220.80	\$ 47,950.80	\$ 434.70	\$ 7.72	\$ 2.02	\$ 444.44	\$ 52,164.00	\$ 926.40	\$ 242.40 \$ 53,332.80 ST	ГD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, TT14x99,																			
		A992 steel, shop fabricated, incl shop					• ····				• • • • • •		• • • • • • •	• • • • • • • •			• • • • • • •	• • • • • • • • •			-
53.7	051223756100	primer, bolted connections	E5	1200	0.067	′ L.F.	\$ 168.71 \$ 4.16	\$ 1.72	\$ 174.59	\$ 9,059.73	\$ 223.39	\$ 92.36	\$ 9,375.48	\$ 186.30	\$ 7.22	\$ 1.90	\$ 195.42	\$ 10,004.31	\$ 387.71	\$ 102.03 \$ 10,494.05 ST	ſD
		Structural start member, 100 ten																			
		project 1 to 2 story building W14x132																			
		A992 steel, shop fabricated, incl shop	,																		
123.34	051223756900	primer, bolted connections	E5	1134	4 0.071	L.F.	\$ 222.53 \$ 4.40	\$ 1.82	\$ 228.75	\$ 27,446.85	\$ 542.70	\$ 224.48	\$ 28,214.03	\$ 244.26	\$ 7.65	\$ 2.01	\$ 253.92	\$ 30,127.03	\$ 943.55	\$ 247.91 \$ 31,318.49 ST	TD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building, W14x257	,																		
		A992 steel, shop fabricated, incl shop					· ····														
22.74	051223757920	primer, bolted connections	E5	1035	0.077	'L.F.	\$ 445.05 \$ 4.83	\$ 1.99	\$ 451.87	\$ 10,120.44	\$ 109.83	\$ 45.25	\$ 10,275.52	\$ 491.63	\$ 8.35	\$ 2.19	\$ 502.17	\$ 11,179.67	\$ 189.88	\$ 49.80 \$ 11,419.35 ST	ſD
		Structural start member, 100 ten																			
		project 1 to 2 story building W14v283		1	1	1								1			1		1		
		A992 steel, shop fabricated, incl shop	,																		
101.25	051223758100	primer, bolted connections	E5	1035	0.077	L.F.	\$ 517.50 \$ 4.83	\$ 1.99	\$ 524.32	\$ 52,396.88	\$ 489.04	\$ 201.49	\$ 53,087.40	\$ 569.25	\$ 8.35	\$ 2.19	\$ 579.79	\$ 57,636.56	\$ 845.44	\$ 221.74 \$ 58,703.74 ST	ГD
		Structural steel member, 100-ton																			
		project, 1 to 2 story building,		1	1	1								1			1		1		
		HSS6x4x3/8, A992 steel, shop																			
		fabricated, incl shop primer, bolted	_																		
398.55	051223750360	connections	E2	550	0.102	2 L.F.	\$ 40.88 \$ 6.27	\$ 3.49	\$ 50.64		\$ 2,498.91	\$ 1,390.94	\$ 20,182.57	\$ 45.02	\$ 10.76	\$ 3.83	\$ 59.61	\$ 17,942.72	\$ 4,288.40	b 1,526.45 \$ 23,757.57 ST b	טו
		Structural steel member 100-top		1	1	1								1	1						
		project. 1 to 2 story building W18v130		1	1	1								1			1		1		
		A992 steel, shop fabricated, incl shop	'	1	1	1								1			1		1		
56.5	051223756900	primer, bolted connections	E5	1134	1 0.071	L.F.	\$ 222.53 \$ 4.40	\$ 1.82	\$ 228.75	\$ 12,572.95	\$ 248.60	\$ 102.83	\$ 12,924.38	\$ 244.26	\$ 7.65	\$ 2.01	\$ 253.92	\$ 13,800.69	\$ 432.23	\$ 113.57 \$ 14,346.48 ST	ГD
		Structural steel member, 100-ton		1	1	1								1			1		1		
		project, 1 to 2 story building, W18x143	,	1	1	1		1				1		1	1		1				
1		A992 steel, shop fabricated, incl shop	Ι.	1		I		l				L				1.			1.		
123	051223757100	primer, bolted connections	E5	1134	1 0.071	L.F.	\$ 222.53 \$ 4.40	\$ 1.82	\$ 228.75	\$ 27,371.19	\$ 541.20	\$ 223.86	\$ 28,136.25	\$ 244.26	\$ 7.65	\$ 2.01	\$ 253.92	\$ 30,043.98	\$ 940.95	\$ 247.23 \$ 31,232.16 ST	ID .
0	032200000000	Welded Wire Fabric Reinforcing					\$ - \$ -	\$-	\$-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$-	\$ -	\$ -	\$ -	\$ - \$ - ST	טו
		W2 9 x W2 9 (6 x 6) 42 lb per C S E		1	1	1								1			1		1		
2244	032205500300	A185	2 Rodm	20	0.552	C.S.F	\$ 34.68 \$ 46.72	s -	\$ 81.40	\$ 77.821.92	\$ 104.839 68	s -	\$ 182,661.60	\$ 38.41	\$ 76.28	\$-	\$ 114.69	\$ 86,192.04	\$ 171.172.32	\$ - \$ 257 364 36 ST	ГD
		NORMAL WEIGHT CONCRETE.		2	2.002		, ¢ 10.172			,021.02	,		,,	+ 00.41	÷ 10.20	ļ.	÷			¢ 201,00 100 01	
0	033105350010	READY MIX					\$ - \$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ - \$ - ST	ГD
		Structural concrete, ready mix, normal																			
		weight, 4000 PSI, includes local		1	1	1								1			1		1		
		aggregate, sand, Portland cement and		1	1	1								1			1		1		
1		water, delivered, excludes all additives		1	1	I		Ι.									. .		1.		
255	033105350300	and treatments	ļ	ļ	<u> </u>	C.Y.	\$ 115.33 \$ -	\$ -	\$ 115.33	\$ 29,409.15	÷ -	- \$	\$ 29,409.15	\$ 126.21	- \$	\$-	\$ 126.21	\$ 32,183.55	- š	5 - \$ 32,183.55 ST	טו

0	052112500010						6	¢	¢	¢	e		•	¢	e	6	6	¢		¢	¢	¢		¢	¢ ISTD
0	055115500010	Metal decking steel non-cellular						φ -	ф -	φ -	ą	-	- v	ъ -	ə -			æ		р -	ə -	æ	-	ф -	\$ - 310
22440	053113505400	composite, galvanized, 2" D, 18 ga	E4	3380	0.009	C.Y.	\$ 3.83	\$ 0.60	\$ 0.04	\$ 4.4	17 \$	85.945.20	\$ 13,464,00	\$ 897.60	\$ 100.306.8	\$ 4.2	1 \$ 1.0	6 \$	0.04	\$ 5.31	\$ 94,472,4	10 S	23,786,40	\$ 897.60	\$ 119.156.40 STD
																· ·	-					-			
Total											\$1	1,033,327.75	\$ 163,534.14	\$22,374.93	\$1,219,236.8						\$1,135,716.3	36 \$	272,868.13	\$ 24,533.45	\$1,003,182.53
																									\$2,222,419.34
Quantity	LineNumber	Description	Crew	Daily Output	Labor Hours	Unit	Material	Labor	Equipment	Total	Ext	t. Mat.	Ext. Labor	Ext. Equip.	Ext. Total	Mat. O&P	Labor O8	P Equi	p. O&P	Total O&P	Ext. Mat. O&	P Ext.	Labor O&P	Ext. Equip. O&P	Ext. Total O&P Notes
110	051223400672	C-Channel-Column: C10X33	E3	36	0.667	' L.F.	\$ 10.71	\$ 43.19	\$ 4.11	\$ 58.0	01 \$	1,178.10	\$ 4,750.90	\$ 452.10	\$ 6,381.1	\$ 11.8	0 \$ 76.4	6 \$	4.52	\$ 92.78	\$ 1,298.0	00 \$	8,410.60	\$ 497.20	\$ 30,617.40 X3
27.5	051223757920	W-Wide Flange-Column: W14X257	E5	1035	0.077	′ L.F.	\$ 445.05	\$ 4.83	\$ 1.99	\$ 451.8	37 \$	12,238.88	\$ 132.83	\$ 54.73	\$ 12,426.4	\$ \$ 491.6	3 \$ 8.3	\$5	2.19	\$ 502.17	\$ 13,519.8	33 \$	229.63	\$ 60.23	\$ 13,809.68 X1
110	051223758100	FB-Flanged Box-Column: FB30X1116	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	56,925.00	\$ 531.30	\$ 218.90	\$ 57,675.2	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 62,617.5	50 \$	918.50	\$ 240.90	\$ 235,974.53 X3.7
55	051223758100	BU-Built Up-Column: W23X1168	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	28,462.50	\$ 265.65	\$ 109.45	\$ 28,837.6	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 31,308.7	75 \$	459.25	\$ 120.45	\$ 123,408.30 X3.87
27.5	051223758100	BU-Built Up-Column: W22X1032	E5	1035	0.077	′ L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	14,231.25	\$ 132.83	\$ 54.73	\$ 14,418.8	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 15,654.3	38 \$	229.63	\$ 60.23	\$ 54,210.38 X3.4
13.75	051223758100	BU-Built Up-Column: W24X985	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	7,115.63	\$ 66.41	\$ 27.36	\$ 7,209.4	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 7,827.1	9 \$	114.81	\$ 30.11	\$ 25,989.08 X3.26
13.75	051223758100	BU-Built Up-Column: W23X729	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	7,115.63	\$ 66.41	\$ 27.36	\$ 7,209.4	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 7,827.1	9 \$	114.81	\$ 30.11	\$ 19,133.06 X2.4
55	051223758100	BU-Built Up-Column: W29X2063	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	28,462.50	\$ 265.65	\$ 109.45	\$ 28,837.6	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 31,308.7	75 \$	459.25	\$ 120.45	\$ 216,841.46 X6.8
27.5	051223758100	BU-Built Up-Column: W25X1401	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	14,231.25	\$ 132.83	\$ 54.73	\$ 14,418.8	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 15,654.3	38 \$	229.63	\$ 60.23	\$ 73,981.23 X4.64
55	051223758100	W-Wide Flange-Column: W14X665	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	28,462.50	\$ 265.65	\$ 109.45	\$ 28,837.6	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 31,308.7	75 \$	459.25	\$ 120.45	\$ 70,154.59 X2.2
55	051223758100	W-Wide Flange-Column: W14X730	E5	1035	0.077	' L.F.	\$ 517.50	\$ 4.83	\$ 1.99	\$ 524.3	32 \$	28,462.50	\$ 265.65	\$ 109.45	\$ 28,837.6	\$ 569.2	5 \$ 8.3	\$5	2.19	\$ 579.79	\$ 31,308.7	75 \$	459.25	\$ 120.45	\$ 76,532.28 X2.4
Total											\$	226,885.74	\$ 6,876.11	\$ 1,327.71	\$ 235,089.5	3					\$ 249,633.4	17 \$	12,084.61	\$ 1,460.81	\$ 940,651.99
																	_								
																								\$3,163,071.33	TOTAL
																		_				_			
																		_				_		•	
																								\$ 177,131,994.66	BLDG TOTAL

BARBEN | CASEY | DUBOWSKI | MILLER

Figure 145: General Conditions Estimate

			D-Mr.	T affine											
Division	Description	Com	Output	Hours	Unit	Material	Labor	Zouitment	Total	Quantity	Total Material	Total Labor	Total Eduitament	Tot	tal Cost
01 51 15 20	Reld Personnel									,					
0020	Clark 6	<u> </u>			Week	<u> </u>	\$ \$80.00		\$ 350.00	1.099	\$	\$ 414,960.00	\$	\$	414 960 00
0140	Field Engineer 45	<u> </u>	<u> </u>	<u> </u>	Week		\$ 1,350,00		\$ 1,350,00	3,002	\$.	\$ 11 056 500 00	\$	š	11 056 500 00
0990	Project Manager 20	<u> </u>		<u> </u>	Week		\$ 9 175.00		\$ 9175.00	1 781	¢ .	\$ 3,873,675,00	\$	ě	3 873 675 00
0220	Subscintendant 35	<u> </u>			Week		\$ 2,175.00		\$ 2,170.00	3/14	\$.	\$ 7,590,850,00	\$.	š	7 590 850 00
0200	Supermeasure, so					<u> </u>	\$ 2,020.00		\$ 2,020.00	5,713	* .	\$ 1,020,000.00	· ·	š	92 865 985 00
01 51 15 90	Terrheur Ibilia	<u> </u>		<u> </u>		<u> </u>								Ť	22,000,000.00
0100	Hast including final and observation that much 10 her	1.51	100	0.05	CSER	\$ 97.00	\$ 9.07		\$ 90.97	18.846	¢ 979.94616	\$ 45.976.09	e .	•	410 193 08
0350	Lighting including rest inclusion per week, 12 ms	1 Fier	100	0.00	CSEE	\$ 570	\$ 99.00		\$ 97.20	15,000	\$ 373,340.13	\$ \$30,000.00	• ·	e e	415,500.00
0600	Permer for info duration including elements at min	1 1400		V. 17 1	CSEE	\$ 0.70	\$ 22.00		\$ 47.00	15,000	* 00,000.00	¢ 550,000.00	•	e e	205,000,00
0650	Power for job duration including elevator, etc., man				CSF FF	<u> </u>			\$ 110.00	15,000	2 - 6	3 . e	• ·	0 0	1 650 000 00
0000	rower for job diration mendang elevator, etc., max				COLLE	<u> </u>			\$ 110.00	10,000	ş .	ş .	· ·	é	3 189 693 08
10 50 15 00	0			<u> </u>		<u> </u>								*	3,105,023.00
10 52 13.20	Office and Storage Space	<u> </u>		<u> </u>	W I	é 169.00			÷ 169.00	574	* 08.655.00				09 999 00
0020	AC contraction and nonzeros, 20 x 5, reat per month, 5 1 staters				Each	\$ 105.00			\$ 165.00	3/0	\$ 95,666.00 \$ 98,616.00	3 - 6	• ·	3	93,888.00
0700	AC, reat per month, and				Lach	\$ 11.00			\$ 41.00	3/6	\$ 23,616.00	3 - 4	· ·	\$	23,016.00
0800	For delivery, and per mile	<u> </u>		<u> </u>	Mile	\$ 4.50			\$ 4.50	600	\$ 2,700.00	ş .	ş .	3	2,700.00
		<u> </u>	<u> </u>			L								\$	120,204.00
01 52 15.90	Sicia Office Expense			 	26.4	A 155.00			A 155.00		A 50.500.00				50 500 00
0100	Office Equipment rental average	<u> </u>			Month	\$ 155.00			\$ 155.00	384	\$ 59,520.00	ş -	ş .	5	59,520.00
0120	Office supplies, average	<u> </u>	<u> </u>	 	Month	\$ 85.00			\$ 85.00	389	\$ 32,640.00	ş .	<u> </u>	2	32,640.00
0140	Telephone bill; avg. bill per month	<u> </u>			Month	\$ 80.00			\$ 80.00	384	\$ 30,720.00	ş -	ş -	\$	30,720.00
0160	Lights & HVAC	<u> </u>			Moath	\$ 150.00	l		\$ 150.00	389	\$ 57,600.00	ş .	5.	\$	57,600.00
			ļ	 										2	180,480.00
01 54 19.50	Truck Grane	<u> </u>			24.4								A		
0600	Truck Mounted, hydrolic, 100 ton capacity	<u> </u>			Moath			\$ 14,100.00	\$ 14,100.00	16	ş .	ş .	\$ 225,600.00	2	225,600.00
	Coort	<u> </u>			Day		\$ 104.90		\$ 104.90	320	ş .	\$ 33,568.00	ş .	\$	33,568.00
														\$	225,600.00
01 54 19.60	Moathly Tower Gease Geew	<u> </u>												-	
0100	Crane, climbing, 106' jib, 6000 fb. capacity, 410 FPM				Moath			\$ 13,200.00	\$ 13,200.00	60	\$ -	\$ -	\$ 792,000.00	\$	792,000.00
	Tomer Crase Crem				Day		\$ 37.40		\$ 37.40	2,400	\$ -	\$ 89,760.00	s .	\$	89,760.00
4550	Hoist and tower, mast type, 6000 fb., 100' high, month				Each		\$ 1,161.60	\$ 2,975.00	\$ 4,136.60	36	\$ -	\$ 100,362.24	\$ 257,040.00	\$	357,402.24
4570	for each added 10' section, add, month				Each		\$ 19.20	\$ 177.00	\$ 196.20	5,616	ş .	\$ 107,827.20	\$ 994,032.00	\$	1,101,859.20
														\$	2,341,021.44
01 56 26.50	Temporary Fenning														
0020	Chain Link, 11 ga, 6 high	2 Clab	400	0.04	L.F.	\$ 7.25	\$ 1.26		\$ 8.51	980	\$ 7,105.00	\$ 1,234.80	\$ -	\$	8,339.80
	Plywood, painted, 4" x 4" frame, 8" high	A-4	110	0.218	L.F.	\$ 9.85	\$ 8.35		\$ 18.20	980	\$ 9,653.00	\$ 8,183.00	s -	\$	17,836.00
														\$	26,175.80
01 56 29.50	Temporary Protestive Walkways														
2200	Sidewalk, 2° x 12° planks, 2 uses	1 Carp	350	0.023	S.F.	\$ 0.69	\$ 0.91		\$ 1.60	16,000	\$ 11,040.00	\$ 14,560.00	\$.	\$	25,600.00
2500	Exterior Phywood, 2 uses, 3/4" thick	1 Carp	600	0.013	S.F.	\$ 0.42	\$ 0.53		\$ 0.95	16,000	\$ 6,720.00	\$ 8,480.00	\$ -	\$	15,200.00
														\$	40,800.00
01 58 15 50	Signa														
0020	High intensity reflectorized, no posts, buy				S.F.	\$ 21.00			\$ 21.00	1,000	\$ 21,000.00	\$-	\$.	\$	21,000.00
01 74 15 20	Cleaning Up														
0040	Maximum				Job				0.87	1,000,000,000	\$ -	\$ -	\$ -	\$	8,000,000.00
0050	Cleanup of floor area, continuous, per day, during construction	A-5	24	0.75	M.S.F.	\$ 1.70	\$ 23.50	\$ 2.03	\$ 27.23	1,670	\$ 2,839.68	\$ 39,254.40	\$ 3,390.91	\$	45,484.99
0100	Final by GC at end of job	A-5	11.8	1.565	M.S.F.	\$ 2.71	\$ 49.50	\$ 4.23	\$ 56.44	1,670	\$ 4,526.78	\$ \$2,684.80	\$ 7,065.79	\$	94,277.38
														\$	8,139,762.37
			1	1											
	Subtotal										\$ 822,914.62	\$ 23,727,176.36	\$ 2,279,128.70	\$	74,313,871.37
	Adjusted for Location (New York City, 130.7)										\$ 1,075,549.41	\$ 31,011,419.51	\$ 2,978,821.22	\$	97,128,229.88

7.2 Structural

Method 2 MWFRS Design Variables									
Varibles and Equations	Val	ues	Reference						
V =	110	mph	Figure 6-1						
K _d =	0.85		Table 6-4						
Occupancy	3		Table 1-1						
Hurrican Prone?	No								
=	1.15		Table 6-1						
Surface Roughness Cat.	В		§ 6.5.6.2						
Exposure Cat.	В		§ 6.5.6.2						
K _{zt} =	1		§ 6.5.7						
α =	7		Table 6-2						
Zg =	1200	ft	Table 6-2						

Table 64: Main Wind Force Resisting System Design Variables

East/West Wind Direction for MWFRS									
External Wall Pressure Coefficient (C _p)									
Surface	L/B	Cp	Reference						
Windward	N/A	0.80							
Leeward	0.81	-0.50	Figure 6-6						
Side	N/A	-0.70							
External Roof P	Pressure Co	efficient (С _р)						
h/L	4.748408								
Cp	-1.3								
Area (sf)	25366	Fig	ure 6-6						
Reduction Factor	0.8								
Cp Corrected	-1.04								
Internal Pres	ssure Coeff	icient (C _{pi})							
GC _{pi}	0.18	Fig	uro 6 5						
GC _{pi}	-0.18	Figi	ure 0-5						

Table 65: East/West Wind Pressure Coefficients

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North/South Wind Direction for MWFRS										
Wall Pre	essure Coef	f. (C _p)								
Surface	L/B	Cp								
Windward	N/A	0.80	Figuro 6-6							
Leeward	1.24	-0.45	Figure 0-0							
Side	N/A	-0.70								
Roof Pre	essure Coef	f. (C _p)								
h/L	3.842784									
С _р	-1.3									
Area (sf)	25366	Fig	ure 6-6							
Reduction Factor	0.8									
C _p Corrected	-1.04									
Internal Pres	Internal Pressure Coefficient (C _{pi})									
GC _{pi}	0.18	Fig	10 6 5							
GC _{pi}	-0.18	Fig	ure 0-5							

Table 66: North/South Wind Pressure Coefficients

Gust Fac	tor				
	D	ire	ction		
Varibles and Equations	West-Ea	st	North-Sou	uth	Reference
h =	745.5	ft	745.5	ft	
B =	194	ft	157	ft	
L=	157	ft	194	ft	
T =	6.46	s	6.64	s	
n ₁ = 1/T =	0.1548	Hz	0.1506	Hz	Eq. 12.8-7
	Flexible		Flexible		
g _Q = g _v =	3.40		3.40		§ 6.5.8.2
g,=√2 ln(3,600n₁) + 0.577 √2 ln (3,600n₁) =	3.72		3.71		§ 6.5.8.2
z bar = max of .6h or z _{min} =	447.30		447.30		§ 6.5.8.1
I _z = c(33/z bar) ^{1/6}	0.194		0.194		§ 6.5.8.1
L₂ = I(z bar/33) [€] =	762.98		762.98		§ 6.5.8.1
$Q = \sqrt{(1/(1+0.63(B+h/L_2)^{0.63}))} =$	0.763		0.767		§ 6.5.8.1
V _z = b(z bar/33) ^a V(88/60) =	139.30		139.30		§ 6.5.8.2
$N_1 = n_1 L_2 / V_z =$	0.848		0.825		§ 6.5.8.2
$R_n = 7.47N_1/(1+10.3N_1)^{5/3} =$	0.143		0.145		§ 6.5.8.2
η (R _h) = 4.6n ₁ η /V _z =	3.811		3.707		§ 6.5.8.2
$R_h = 1/\eta - (1/2\eta^2)(1-e^{-2\eta}) =$	0.228		0.233		§ 6.5.8.2
η (R _B) = 4.6n ₁ B/V _z =	0.992		0.781		§ 6.5.8.2
$R_B = 1/\eta - (1/2\eta^2)(1-e^{-2\eta}) =$	0.570		0.633		§ 6.5.8.2
$\eta (R_L) = 15.4 n_1 L/V_z =$	2.687		3.230		§ 6.5.8.2
$R_L = 1/\eta - (1/2\eta^2)(1-e^{-2\eta}) =$	0.303		0.262		§ 6.5.8.2
ζ =	0.0200		0.0200		
$R = V((1/b)(R_nR_hR_B(0.53+0.47R_L)) =$	0.790		0.835		§ 6.5.8.2
$G = 0.925(1+1.7I_2g_QQ)/(1+1.7g_VI_2) =$	N/A		N/A		§ 6.5.8.1
$G_{f} = 0.925(1+1.7I_{2}\sqrt{(g_{Q}^{2}Q^{2}+g_{R}^{2}R^{2})}/(1+1.7g_{v}I_{z}) =$	1.000		1.019		§ 6.5.8.2

Figure 146: Gust Factor

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	Calculated Wind Pressures for MWFRS															
Height Above			١	West East Di	rection						I	North South	Direction			
Ground (z) (ft)	K _z	q _z & q _h (psf)	GC _p q _z (psf)	GC _p q _h (psf)	GC _{pi} q _h (psf)	p _{ww}	p _{lw}	p _{total} (psf)	Kz	q _z & q _h (psf)	GC _p q _z (psf)	GC _p q _h (psf)	GC _{pi} q _h (psf)	P _{ww}	plw	p _{total} (psf)
15.00	0.57	17.40	13.92	-26.55	-9.56	4.35	-36.11	40.46	0.57	17.40	14.18	-24.50	-9.56	4.62	-34.07	38.68
33.39	0.72	21.87	17.49	-26.55	-9.56	7.93	-36.11	44.04	0.72	21.87	17.82	-24.50	-9.56	8.26	-34.07	42.33
48.86	0.81	24.39	19.50	-26.55	-9.56	9.94	-36.11	46.05	0.81	24.39	19.87	-24.50	-9.56	10.31	-34.07	44.38
63.76	0.87	26.31	21.04	-26.55	-9.56	11.48	-36.11	47.59	0.87	26.31	21.44	-24.50	-9.56	11.88	-34.07	45.94
77.79	0.92	27.85	22.27	-26.55	-9.56	12.71	-36.11	48.82	0.92	27.85	22.69	-24.50	-9.56	13.13	-34.07	47.20
91.54	0.96	29.18	23.33	-26.55	-9.56	13.77	-36.11	49.88	0.96	29.18	23.78	-24.50	-9.56	14.21	-34.07	48.28
105.29	1.00	30.37	24.28	-26.55	-9.56	14.72	-36.11	50.83	1.00	30.37	24.75	-24.50	-9.56	15.18	-34.07	49.25
119.04	1.04	31.45	25.15	-26.55	-9.56	15.59	-36.11	51.70	1.04	31.45	25.63	-24.50	-9.56	16.07	-34.07	50.13
132.79	1.07	32.45	25.95	-26.55	-9.56	16.39	-36.11	52.50	1.07	32.45	26.44	-24.50	-9.56	16.88	-34.07	50.95
146.54	1.10	33.37	26.69	-26.55	-9.56	17.13	-36.11	53.24	1.10	33.37	27.20	-24.50	-9.56	17.63	-34.07	51.70
160.29	1.13	34.24	27.38	-26.55	-9.56	17.82	-36.11	53.93	1.13	34.24	27.90	-24.50	-9.56	18.34	-34.07	52.41
174.04	1.16	35.06	28.03	-26.55	-9.56	18.47	-36.11	54.58	1.16	35.06	28.57	-24.50	-9.56	19.00	-34.07	53.07
188.38	1.18	35.86	28.67	-26.55	-9.56	19.11	-36.11	55.22	1.18	35.86	29.22	-24.50	-9.56	19.66	-34.07	53.72
202.13	1.21	36.59	29.26	-26.55	-9.56	19.69	-36.11	55.81	1.21	36.59	29.81	-24.50	-9.56	20.25	-34.07	54.32
215.29	1.23	37.25	29.79	-26.55	-9.56	20.23	-36.11	56.34	1.23	37.25	30.36	-24.50	-9.56	20.79	-34.07	54.86
229.04	1.25	37.92	30.32	-26.55	-9.56	20.76	-36.11	56.87	1.25	37.92	30.90	-24.50	-9.56	21.34	-34.07	55.40
242.79	1.27	38.55	30.83	-26.55	-9.56	21.27	-36.11	57.38	1.27	38.55	31.42	-24.50	-9.56	21.85	-34.07	55.92
256.54	1.29	39.17	31.32	-26.55	-9.56	21.76	-36.11	57.87	1.29	39.17	31.91	-24.50	-9.56	22.35	-34.07	56.42
270.29	1.31	39.75	31.79	-26.55	-9.56	22.23	-36.11	58.34	1.31	39.75	32.39	-24.50	-9.56	22.83	-34.07	56.90
284.04	1.33	40.32	32.24	-26.55	-9.56	22.68	-36.11	58.79	1.33	40.32	32.86	-24.50	-9.56	23.30	-34.07	57.36
297.79	1.35	40.87	32.68	-26.55	-9.56	23.12	-36.11	59.23	1.35	40.87	33.30	-24.50	-9.56	23.74	-34.07	57.81
311.54	1.37	41.40	33.11	-26.55	-9.56	23.54	-36.11	59.66	1.37	41.40	33.74	-24.50	-9.56	24.17	-34.07	58.24
325.29	1.38	41.91	33.52	-26.55	-9.56	23.96	-36.11	60.07	1.38	41.91	34.15	-24.50	-9.56	24.59	-34.07	58.66
339.04	1.40	42.41	33.92	-26.55	-9.56	24.35	-36.11	60.47	1.40	42.41	34.56	-24.50	-9.56	25.00	-34.07	59.07
352.79	1.42	42.90	34.30	-26.55	-9.56	24.74	-36.11	60.85	1.42	42.90	34.96	-24.50	-9.56	25.39	-34.07	59.46
366.54	1.43	43.37	34.68	-26.55	-9.56	25.12	-36.11	61.23	1.43	43.37	35.34	-24.50	-9.56	25.78	-34.07	59.84
380.71	1.45	43.84	35.06	-26.55	-9.56	25.50	-36.11	61.61	1.45	43.84	35.73	-24.50	-9.56	26.16	-34.07	60.23
401.75	1.47	44.52	35.60	-26.55	-9.56	26.04	-36.11	62.15	1.47	44.52	36.28	-24.50	-9.56	26.72	-34.07	60.78
422.38	1.49	45.16	36.11	-26.55	-9.56	26.55	-36.11	62.66	1.49	45.16	36.80	-24.50	-9.56	27.24	-34.07	61.31

Table 67: Calculated Wind Pressures for MWFRS Part A

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426.12	1 51	45 50	26.45	26.55	0.56	26.00	26.11	62.00	1 5 1	45 50	27.14	24 50	0.56	27.50	24.07	C1 C4
430.13	1.51	45.58	30.45	-20.55	-9.50	20.88	-30.11	03.00	1.51	45.58	37.14	-24.50	-9.50	27.58	-34.07	01.04
449.88	1.52	45.98	36.77	-26.55	-9.56	27.21	-36.11	63.32	1.52	45.98	37.47	-24.50	-9.56	27.91	-34.07	61.97
463.63	1.53	46.38	37.09	-26.55	-9.56	27.53	-36.11	63.64	1.53	46.38	37.79	-24.50	-9.56	28.23	-34.07	62.30
477.38	1.54	46.77	37.40	-26.55	-9.56	27.84	-36.11	63.95	1.54	46.77	38.11	-24.50	-9.56	28.55	-34.07	62.62
491.13	1.56	47.15	37.70	-26.55	-9.56	28.14	-36.11	64.25	1.56	47.15	38.42	-24.50	-9.56	28.86	-34.07	62.93
504.88	1.57	47.52	38.00	-26.55	-9.56	28.44	-36.11	64.55	1.57	47.52	38.73	-24.50	-9.56	29.16	-34.07	63.23
518.63	1.58	47.89	38.30	-26.55	-9.56	28.73	-36.11	64.84	1.58	47.89	39.02	-24.50	-9.56	29.46	-34.07	63.53
532.38	1.59	48.25	38.58	-26.55	-9.56	29.02	-36.11	65.13	1.59	48.25	39.32	-24.50	-9.56	29.76	-34.07	63.82
546.13	1.61	48.60	38.86	-26.55	-9.56	29.30	-36.11	65.41	1.61	48.60	39.60	-24.50	-9.56	30.04	-34.07	64.11
559.88	1.62	48.95	39.14	-26.55	-9.56	29.58	-36.11	65.69	1.62	48.95	39.89	-24.50	-9.56	30.32	-34.07	64.39
573.63	1.63	49.29	39.41	-26.55	-9.56	29.85	-36.11	65.96	1.63	49.29	40.16	-24.50	-9.56	30.60	-34.07	64.67
587.38	1.64	49.62	39.68	-26.55	-9.56	30.12	-36.11	66.23	1.64	49.62	40.44	-24.50	-9.56	30.88	-34.07	64.94
601.13	1.65	49.95	39.95	-26.55	-9.56	30.38	-36.11	66.49	1.65	49.95	40.71	-24.50	-9.56	31.14	-34.07	65.21
614.88	1.66	50.28	40.20	-26.55	-9.56	30.64	-36.11	66.75	1.66	50.28	40.97	-24.50	-9.56	31.41	-34.07	65.47
628.63	1.67	50.60	40.46	-26.55	-9.56	30.90	-36.11	67.01	1.67	50.60	41.23	-24.50	-9.56	31.67	-34.07	65.73
642.38	1.68	50.91	40.71	-26.55	-9.56	31.15	-36.11	67.26	1.68	50.91	41.48	-24.50	-9.56	31.92	-34.07	65.99
656.13	1.69	51.22	40.96	-26.55	-9.56	31.39	-36.11	67.51	1.69	51.22	41.74	-24.50	-9.56	32.17	-34.07	66.24
669.88	1.70	51.52	41.20	-26.55	-9.56	31.64	-36.11	67.75	1.70	51.52	41.98	-24.50	-9.56	32.42	-34.07	66.49
683.63	1.71	51.82	41.44	-26.55	-9.56	31.88	-36.11	67.99	1.71	51.82	42.23	-24.50	-9.56	32.67	-34.07	66.73
697.38	1.72	52.12	41.68	-26.55	-9.56	32.11	-36.11	68.23	1.72	52.12	42.47	-24.50	-9.56	32.91	-34.07	66.97
711.46	1 73	52.42	41 92	-26 55	-9.56	32 35	-36 11	68.46	1 73	52.42	42 71	-24.50	-9.56	33 15	-34.07	67.22
722.09	1 75	52.42	42.52	26.55	9.56	22.00	26.11	60.40	1.75	52.42	42.01	24.50	9.56	22.50	24.07	67.57
732.00	1.75	52.65	42.20	-20.55	-9.50	32.70	-50.11	47.70	1.75	52.65	43.00	-24.50	-9.50	22.30	-34.07	67.37
745.50	1.75	53.12	21.24	-20.55	-9.50	11.68	-30.11	47.79	1.75	53.12	43.29	-24.50	-9.50	33./3	-34.07	67.79
802.00	1.79	54.24	21.69	-13.27	-9.56	12.13	-22.84	34.96							└───┤	
819.00									1.80	54.57	44.47	-12.25	-9.56	34.90	-21.81	56.72

Table 68: Calculated Wind Pressures for MWFRS Part B

BARBEN | CASEY | DUBOWSKI | MILLER

				Calculat	ed Wind Ford	es on Tower f	or MWFRS				
	Story	Height Above	Case 1 L	oading (k)	Case 2 Loa	ding (ft-k)	Case 3 L	oading (k)	Case A	Case 1 Sto	ory Shear (k)
Level	Height (ft)	Ground (z) (ft)	West/ East	North/South	West/ East	North/South	West/ East	North/South	Loading (ft-k)	West/ East	North/South
1	25.66	0	101	78	2198	1376	76	58	2683	8995	7001
2	15.47	25.66	174	135	3801	2392	131	102	4649	8894	6923
3	15.47	41.13	138	108	3016	1903	104	81	3693	8720	6787
4	14.32	56.59	138	107	3001	1898	103	81	3678	8582	6680
5	13.75	70.92	133	104	2901	1837	100	78	3557	8445	6572
6	13.75	84.67	133	104	2904	1841	100	78	3562	8312	6468
7	13.75	98.42	136	106	2959	1878	102	80	3631	8179	6364
8	13.75	112.17	138	108	3010	1911	103	81	3694	8043	6258
9	13.75	125.92	140	110	3056	1942	105	82	3752	7905	6149
10	13.75	139.67	142	112	3099	1971	107	84	3806	7765	6039
11	13.75	153.42	144	113	3140	1998	108	85	3857	7623	5928
12	13.75	167.17	146	115	3178	2024	109	86	3904	7479	5815
13	14.92	180.92	154	121	3351	2135	115	91	4119	7334	5700
14	12.58	195.83	149	117	3249	2071	112	88	3994	7180	5579
15	13.75	208.42	144	113	3141	2003	108	85	3861	7031	5462
16	13.75	222.17	152	120	3311	2112	114	90	4071	6887	5348
17	13.75	235.92	153	121	3340	2132	115	91	4108	6736	5229
18	13.75	249.67	154	122	3369	2151	116	91	4144	6583	5108
19	13.75	263.42	156	123	3396	2169	117	92	4178	6428	4986
20	13.75	277.17	157	124	3423	2187	118	93	4211	6273	4863
21	13.75	290.92	158	125	3448	2204	118	94	4243	6116	4740
22	13.75	304.67	159	126	3473	2221	119	94	4274	5958	4615
23	13.75	318.42	160	127	3497	2237	120	95	4304	5799	4489
24	13.75	332.17	161	128	3520	2252	121	96	4333	5638	4363
25	13.75	345.92	162	128	3543	2267	122	96	4361	5477	4235
26	13.75	359.67	163	129	3565	2282	122	97	4389	5315	4107
27	14.58	373.42	169	134	3695	2366	127	100	4550	5151	3977
28	27.50	388.00	254	201	5537	3547	190	151	6819	4982	3844
29	13.75	415.50	251	199	5472	3506	188	149	6740	4728	3643
30	13.75	429.25	168	133	3667	2350	126	100	4517	4478	3444

Table 69: Calculated Wind Forces on Tower for MWFRS Part A

BARBEN | CASEY | DUBOWSKI | MILLER

31	13.75	443.00	169	134	3686	2363	127	100	4541	4310	3311
32	13.75	456.75	170	134	3705	2375	127	101	4564	4141	3177
33	13.75	470.50	171	135	3723	2387	128	101	4587	3971	3043
34	13.75	484.25	171	136	3741	2399	129	102	4609	3800	2908
35	13.75	498.00	172	136	3758	2411	129	102	4631	3629	2772
36	13.75	511.75	173	137	3775	2422	130	103	4652	3457	2635
37	13.75	525.50	174	138	3792	2433	130	103	4673	3284	2498
38	13.75	539.25	174	138	3808	2444	131	104	4694	3110	2360
39	13.75	553.00	175	139	3824	2455	131	104	4714	2936	2222
40	13.75	566.75	176	140	3840	2466	132	105	4734	2760	2083
41	13.75	580.50	177	140	3856	2476	133	105	4753	2584	1943
42	13.75	594.25	177	141	3871	2486	133	106	4772	2408	1803
43	13.75	608.00	178	141	3886	2496	134	106	4791	2230	1662
44	13.75	621.75	179	142	3901	2506	134	106	4810	2052	1521
45	13.75	635.50	179	142	3916	2516	135	107	4828	1874	1379
46	13.75	649.25	180	143	3930	2526	135	107	4846	1694	1237
47	13.75	663.00	181	144	3944	2535	136	108	4864	1514	1094
48	13.75	676.75	181	144	3958	2544	136	108	4881	1333	950
49	13.75	690.50	182	145	3972	2554	136	108	4899	1152	806
50	14.42	704.25	187	149	4083	2625	140	111	5035	970	662
51	26.83	718.67	275	219	6009	3864	206	164	7412	783	513
Roof		745.50	124	143	2715	2522	93	107	3931	508	294
Screen 1	56.50	802.00	383	0	8364	0	287	0	6278	383	0
Screen 2	73.50	819.00	0	151	0	2674	0	114	2007	0	151

Table 70: Calculated Wind Forces on Tower for MWFRS Part B

BARBEN | CASEY | DUBOWSKI | MILLER

				Proportio	ned Wind Fo	rces on Tower	for MWFRS				
	Story	Height Above	Case 1 Lo	oading (k)	Case 2 Loa	ding (ft-k)	Case 3 L	oading (k)	Case 4	Case 1 Sto	ory Shear (k)
Level	Height (ft)	Ground (z) (ft)	West/ East	North/South	West/ East	North/South	West/ East	North/South	Loading (ft-k)	West/ East	North/South
1	25.66	0	44	36	969	644	33	27	1211	3968	3278
2	15.47	25.66	77	63	1677	1120	58	48	2099	3923	3241
3	15.47	41.13	61	50	1330	891	46	38	1668	3846	3178
4	14.32	56.59	61	50	1324	889	45	38	1661	3785	3127
5	13.75	70.92	59	49	1280	860	44	37	1606	3725	3077
6	13.75	84.67	59	49	1281	862	44	37	1608	3666	3028
7	13.75	98.42	60	50	1305	879	45	37	1640	3607	2979
8	13.75	112.17	61	51	1328	895	46	38	1668	3548	2930
9	13.75	125.92	62	51	1348	909	46	39	1695	3487	2879
10	13.75	139.67	63	52	1367	923	47	39	1719	3425	2827
11	13.75	153.42	63	53	1385	936	48	40	1742	3362	2775
12	13.75	167.17	64	54	1402	947	48	40	1763	3299	2722
13	14.92	180.92	68	57	1478	1000	51	42	1860	3235	2669
14	12.58	195.83	66	55	1433	970	49	41	1804	3167	2612
15	13.75	208.42	63	53	1385	938	48	40	1744	3101	2557
16	13.75	222.17	67	56	1460	989	50	42	1839	3038	2504
17	13.75	235.92	68	57	1473	998	51	42	1855	2971	2448
18	13.75	249.67	68	57	1486	1007	51	43	1871	2903	2391
19	13.75	263.42	69	58	1498	1016	51	43	1887	2835	2334
20	13.75	277.17	69	58	1510	1024	52	43	1902	2767	2277
21	13.75	290.92	70	58	1521	1032	52	44	1916	2697	2219
22	13.75	304.67	70	59	1532	1040	53	44	1930	2628	2161
23	13.75	318.42	71	59	1542	1047	53	44	1944	2558	2102
24	13.75	332.17	71	60	1553	1054	53	45	1957	2487	2042
25	13.75	345.92	72	60	1563	1061	54	45	1970	2416	1983
26	13.75	359.67	72	60	1572	1068	54	45	1982	2344	1923
27	14.58	373.42	75	63	1630	1108	56	47	2055	2272	1862
28	27.50	388.00	112	94	2442	1660	84	71	3080	2197	1799
29	13.75	415.50	111	93	2414	1642	83	70	3044	2086	1705
30	13.75	429.25	74	62	1618	1100	56	47	2040	1975	1612

Table 71: Proportioned Wind Forces Part A

BARBEN | CASEY | DUBOWSKI | MILLER

							1	1		11	1
31	13.75	443.00	74	63	1626	1106	56	47	2051	1901	1550
32	13.75	456.75	75	63	1634	1112	56	47	2061	1826	1488
33	13.75	470.50	75	63	1642	1118	56	47	2072	1751	1425
34	13.75	484.25	76	64	1650	1123	57	48	2082	1676	1361
35	13.75	498.00	76	64	1658	1129	57	48	2092	1601	1298
36	13.75	511.75	76	64	1665	1134	57	48	2101	1525	1234
37	13.75	525.50	77	65	1672	1139	57	48	2111	1448	1170
38	13.75	539.25	77	65	1680	1144	58	49	2120	1372	1105
39	13.75	553.00	77	65	1687	1149	58	49	2129	1295	1040
40	13.75	566.75	78	65	1694	1154	58	49	2138	1218	975
41	13.75	580.50	78	66	1701	1159	58	49	2147	1140	910
42	13.75	594.25	78	66	1707	1164	59	49	2156	1062	844
43	13.75	608.00	79	66	1714	1169	59	50	2164	984	778
44	13.75	621.75	79	66	1721	1173	59	50	2172	905	712
45	13.75	635.50	79	67	1727	1178	59	50	2181	826	646
46	13.75	649.25	79	67	1733	1182	60	50	2189	747	579
47	13.75	663.00	80	67	1740	1187	60	50	2197	668	512
48	13.75	676.75	80	67	1746	1191	60	51	2205	588	445
49	13.75	690.50	80	68	1752	1196	60	51	2213	508	377
50	14.42	704.25	83	70	1801	1229	62	52	2274	428	310
51	26.83	718.67	121	102	2650	1809	91	77	3348	345	240
Roof		745.50	55	138	1197	2433	41	103	2725	224	138
Screen 1	56.50	802.00	169	0	3689	0	127	0	2769	169	0
Screen 2	73.50	819.00	0	71	0	1252	0	53	940	0	71

Table 72: Proportioned Wind Forces Part B

BARBEN | CASEY | DUBOWSKI | MILLER

The follow structural weights were taking from the Revit model and include only the tower. The total weight per floor is divided by the square footage of the floor which is equal to 25888.55 square feet. The gravity mass/area was calculated to be used in the ETABs model to calculate the period of vibration of the structure.

	Slab	Concrete Beam	Steel Beam	Column	Shear Wall	Façade	Partition	Total	Total	Gravity	Gravity Mass/
Story	Weight (k)	Weight (k)	Weight (k)	Weight (k)	Weight (k)	Weight (k)	Weight (k)	Weight (k)	Weight (psf)	Weight (psf)	Area (Kip-in)
1	2201	68	394	546	2003	454	518	6182	238.79	158.83	2.85E-06
2	1191	68	211	336	1590	335	518	4248	164.09	100.06	1.80E-06
3	1191	68	226	268	1406	314	518	3991	154.15	97.22	1.75E-06
4	1191	68	278	268	1406	314	518	4043	156.18	99.25	1.78E-06
5	1191	68	208	251	1313	293	518	3840	148.33	95.03	1.71E-06
6	1191	68	188	138	1219	272	518	3594	138.82	89.14	1.60E-06
7	1191	68	189	149	1313	293	518	3720	143.71	90.41	1.62E-06
8	1191	68	172	149	1313	293	518	3703	143.02	89.72	1.61E-06
9	1191	68	172	137	1313	293	518	3691	142.57	89.26	1.60E-06
10	1191	68	172	127	1219	272	518	3566	137.76	88.07	1.58E-06
11	1191	68	172	147	1406	314	518	3815	147.37	90.45	1.63E-06
12	1191	68	172	117	1219	272	518	3556	137.37	87.69	1.58E-06
13	1191	68	174	127	1313	293	518	3682	142.23	88.93	1.60E-06
14	1191	68	168	117	1219	272	518	3553	137.23	87.55	1.57E-06
15	1191	68	164	15	1313	293	518	3561	137.57	84.26	1.51E-06
16	1191	68	160	15	1313	293	518	3557	137.4	84.1	1.51E-06
17	1191	68	160	15	1313	293	518	3557	137.4	84.1	1.51E-06
18	1191	68	160	94	1219	272	518	3522	136.03	86.34	1.55E-06
19	1191	68	160	102	1313	293	518	3644	140.74	87.44	1.57E-06
20	1191	68	160	102	1313	293	518	3644	140.74	87.44	1.57E-06
21	1191	68	160	100	1313	293	518	3642	140.68	87.38	1.57E-06
22	1191	68	160	93	1219	272	518	3520	135.98	86.29	1.55E-06
23	1191	68	160	100	1313	293	518	3642	140.68	87.38	1.57E-06
24	1191	68	160	100	1313	293	518	3642	140.68	87.38	1.57E-06
25	1191	68	160	100	1313	293	518	3642	140.68	87.38	1.57E-06
26	1191	68	160	93	1219	272	518	3520	135.98	86.29	1.55E-06
27	1191	68	160	100	1313	293	518	3642	140.68	87.38	1.57E-06
28	1191	68	197	193	2531	566	518	5263	203.3	102.92	1.85E-06
29	1191	68	168	100	1313	293	518	3651	141.01	87.71	1.58E-06
30	1191	68	167	66	895	293	518	3197	123.48	86.31	1.55E-06

Figure 147: Structural Tower Weight Take-offs, Part A

BARBEN | CASEY | DUBOWSKI | MILLER

		1			1	1			
31	1191	18	151	61	831	272	518	3042	117.49
32	1191	18	151	66	895	293	518	3131	120.95
33	1191	18	151	58	895	293	518	3124	120.66
34	1191	18	151	58	895	293	518	3124	120.66
35	1191	18	151	54	831	272	518	3035	117.22
36	1191	18	151	50	895	293	518	3116	120.35
37	1191	18	151	50	895	293	518	3116	120.36
38	1191	18	152	50	1063	293	518	3285	126.89
39	1191	18	152	42	831	272	518	3023	116.79
40	1191	18	152	45	895	293	518	3112	120.19
41	1191	18	152	45	665	293	518	2882	111.31
42	1191	14	151	38	665	293	518	2869	110.84
43	1191	14	152	35	617	272	518	2798	108.1
44	1191	14	151	38	665	293	518	2870	110.84
45	1191	14	151	31	665	293	518	2863	110.58
46	1191	14	152	31	665	293	518	2863	110.59
47	1191	14	153	29	617	272	518	2794	107.9
48	1191	14	153	29	665	293	518	2862	110.55
49	1191	14	153	29	665	293	518	2862	110.56
50	1191	14	153	29	665	293	518	2862	110.56
51	1191	14	298	57	1306	576	518	3959	152.94
52	2201	14	215	0	0	0	518	2947	113.84
								180568	6974.83

Figure 148: Structural Tower Weight Take-offs, Part B

84.7	1.52E-06
85.69	1.54E-06
85.4	1.53E-06
85.41	1.53E-06
84.44	1.52E-06
85.1	1.53E-06
85.1	1.53E-06
85.15	1.53E-06
84	1.51E-06
84.94	1.53E-06
84.93	1.53E-06
84.64	1.52E-06
83.73	1.50E-06
84.65	1.52E-06
84.39	1.52E-06
84.39	1.52E-06
83.54	1.50E-06
84.35	1.52E-06
84.36	1.52E-06
84.36	1.52E-06
101.98	1.83E-06
113.31	2.04E-06

Site and Soil Classification								
New York City Building Code								
2-65 (medium hard rock)		recommended by geotechnical report						
4-65 (soft rock)		in areas of lower bearing capacity						
		ASCE 7-05						
Building Height, h	=	745.5	ft					
Site Class	=	С						
Occupancy Category	/ = 3 Table 1-1							
Importance Factor, I	Ш	Table 11.5-1						
Latitude	=	40.756						
Longitude	= -73.990							
Zip Code	=	10018						

Table 73: Site and Soil Classification

	North-South Base Shear									
	R	=	4	System	Table 12.2-1					
	Cd	=	4.5		Table 12.2-1					
	C _T	=	0.02		Table 12.8-2					
	h _n	=	745.5	ft						
	x	=	0.75		Table 12.8-2					
	Cu	=	1.7		Table 12.8-1					
	Ta	=	2.853	s	Eq. 12.8-7					
T - min of	C _u T _a	=	4.851	s	12.8.2					
1 - 11111 01	Tb	=	6.77	s	Computer Output					
	TL	=	6	s	Figure 22-15					
	S _{DS} /(R/I)	=	0.0908		Eq 12.8-2					
	S _{D1} /(TR/I)	=	0.0051		Eq 12.8-3					
C _s =	$S_{D1}T_{I}/(T^{2}R/I)$	=	0.0063		Eq 12.8-4					
		=	0.0100		Eq 12.8-5					
	0.5S1/(R/I)	=	0.0109		Eq 12.8-6					
	W	=	180568	К						
	$V_b = C_s W$	=	1806	к	Eq 12.8-1					

Table 75: North-South Base Shear Calculations

Spectral Response Acceleration								
Fa	=	1.20						
Fv	=	1.70		o u				
Ss	=	0.363	g	Moti				
S _{MS}	=	0.436	g	and I Calo				
S _{DS}	=	0.290	g	Grou				
S1	=	0.070	g	SGS (
S _{M1}	=	0.119	g	n a				
S _{D1}	=	0.079	g					
S _{DS}	=	В	Table 11.6-1					
S _{D1}	=	В	Table 11.6-2					
	Spectr F _a F _v S ₅ S _{MS} S _{DS} S ₁ S _{M1} S _{D1} S _{D2} S _{D1}	$\begin{array}{c c} Spectral R \\ \hline F_a & = \\ \hline F_v & = \\ \hline S_s & = \\ \hline S_{MS} & = \\ \hline S_{MS} & = \\ \hline S_{DS} & = \\ \hline S_{M1} & = \\ \hline S_{M1} & = \\ \hline S_{D1} & = \\ \hline S_{D1} & = \\ \hline S_{D1} & = \\ \hline \end{array}$	Spectral Response Acc F_a = 1.20 F_v = 1.70 S_s = 0.363 S_{MS} = 0.436 S_{DS} = 0.290 S_{1} = 0.070 S_{M1} = 0.119 S_{D1} = 0.079 S_{D5} = B S_{D1} = B	Spectral Response Acceleration F_a = 1.20 F_v = 1.70 S_s = 0.363 g S_{MS} = 0.436 g S_{MS} = 0.436 g S_{DS} = 0.290 g S_{DS} = 0.070 g S_{M1} = 0.0119 g S_{D1} = 0.079 g S_{D1} = B T S_{D1} = B T				

West-East Direction Base Shear									
	R	=	4	System	Table 12.2-1				
	Cd	=	4.5		Table 12.2-1				
	C _T	=	0.02		Table 12.8-2				
	h _n	=	745.5	ft					
	х	=	0.75		Table 12.8-2				
	Cu	=	1.7		Table 12.8-1				
	Ta	=	2.853	s	Eq. 12.8-7				
T-min of	C _u T _a	=	4.851	s	12.8.2				
1-111101	Т _b	=	6.36	s	Model				
	TL	=	6	s	Figure 22-15				
	S _{DS} /(R/I)	=	0.0908		Eq 12.8-2				
	S _{D1} /(TR/I)	=	0.0051	<0.01	Eq 12.8-3				
C _s =	$S_{D1}T_{I}/(T^{2}R/I)$	=	0.0063	<0.01	Eq 12.8-4				
		=	0.0100		Eq 12.8-5				
	0.5S1/(R/I)	=	0.0109		Eq 12.8-6				
	W	=	180568	К					
	$V_b = C_s W$	=	1806	к	Eq 12.8-1				

Table 74: Spectral Response Acceleration

North-South Direction Loading								
T =	4.851	s						
k =	2.000							
V _b =	1806	К						
Level, i	<mark>h (ft)</mark>	h _i (ft)	w (kips)	wh ^k	C _{vx}	f _i (kips)	V _i (kips)	
Roof		745.50	2947	1.64E+09	0.0541	97.60	97.60	
51	26.83	718.67	3959	2.04E+09	0.0675	121.86	219.47	
50	14.42	704.25	2862	1.42E+09	0.0468	84.59	304.06	
49	13.75	690.50	2862	1.36E+09	0.0450	81.32	385.38	
48	13.75	676.75	2862	1.31E+09	0.0433	78.11	463.49	
47	13.75	663.00	2794	1.23E+09	0.0405	73.18	536.67	
46	13.75	649.25	2863	1.21E+09	0.0398	71.91	608.58	
45	13.75	635.50	2863	1.16E+09	0.0382	68.90	677.48	
44	13.75	621.75	2870	1.11E+09	0.0366	66.11	743.59	
43	13.75	608.00	2798	1.03E+09	0.0341	61.65	805.24	
42	13.75	594.25	2869	1.01E+09	0.0334	60.39	865.62	
41	13.75	580.50	2882	9.71E+08	0.0320	57.87	923.49	
40	13.75	566.75	3112	9.99E+08	0.0330	59.56	983.05	
39	13.75	553.00	3023	9.25E+08	0.0305	55.10	1038.14	
38	13.75	539.25	3285	9.55E+08	0.0315	56.93	1095.07	
37	13.75	525.50	3116	8.6E+08	0.0284	51.28	1146.34	
36	13.75	511.75	3116	8.16E+08	0.0269	48.63	1194.97	
35	13.75	498.00	3035	7.53E+08	0.0248	44.85	1239.82	
34	13.75	484.25	3124	7.33E+08	0.0242	43.65	1283.47	
33	13.75	470.50	3124	6.91E+08	0.0228	41.21	1324.68	
32	13.75	456.75	3131	6.53E+08	0.0216	38.93	1363.61	
31	13.75	443.00	3042	5.97E+08	0.0197	35.57	1399.18	
30	13.75	429.25	3197	5.89E+08	0.0194	35.10	1434.28	
29	13.75	415.50	3651	6.3E+08	0.0208	37.56	1471.83	
28	27.50	388.00	5263	7.92E+08	0.0261	47.22	1519.05	
27	14.58	373.42	3642	5.08E+08	0.0168	30.26	1549.32	

	West-East Direction Loading								
T =	4.851	s							
k =	2.000								
V _b =	1806	к							
Level, i	h (ft)	h _i (ft)	w (kips)	wh ^k	C _{vx}	f _i (kips)	V _i (kips)		
Roof		745.50	2947	1.64E+09	0.0541	97.60	97.60		
51	26.83	718.67	3959	2.04E+09	0.0675	121.86	219.47		
50	14.42	704.25	2862	1.42E+09	0.0468	84.59	304.06		
49	13.75	690.50	2862	1.36E+09	0.0450	81.32	385.38		
48	13.75	676.75	2862	1.31E+09	0.0433	78.11	463.49		
47	13.75	663.00	2794	1.23E+09	0.0405	73.18	536.67		
46	13.75	649.25	2863	1.21E+09	0.0398	71.91	608.58		
45	13.75	635.50	2863	1.16E+09	0.0382	68.90	677.48		
44	13.75	621.75	2870	1.11E+09	0.0366	66.11	743.59		
43	13.75	608.00	2798	1.03E+09	0.0341	61.65	805.24		
42	13.75	594.25	2869	1.01E+09	0.0334	60.39	865.62		
41	13.75	580.50	2882	9.71E+08	0.0320	57.87	923.49		
40	13.75	566.75	3112	9.99E+08	0.0330	59.56	983.05		
39	13.75	553.00	3023	9.25E+08	0.0305	55.10	1038.14		
38	13.75	539.25	3285	9.55E+08	0.0315	56.93	1095.07		
37	13.75	525.50	3116	8.6E+08	0.0284	51.28	1146.34		
36	13.75	511.75	3116	8.16E+08	0.0269	48.63	1194.97		
35	13.75	498.00	3035	7.53E+08	0.0248	44.85	1239.82		
34	13.75	484.25	3124	7.33E+08	0.0242	43.65	1283.47		
33	13.75	470.50	3124	6.91E+08	0.0228	41.21	1324.68		
32	13.75	456.75	3131	6.53E+08	0.0216	38.93	1363.61		
31	13.75	443.00	3042	5.97E+08	0.0197	35.57	1399.18		
30	13.75	429.25	3197	5.89E+08	0.0194	35.10	1434.28		
29	13.75	415.50	3651	6.3E+08	0.0208	37.56	1471.83		
28	27.50	388.00	5263	7.92E+08	0.0261	47.22	1519.05		
27	14.58	373.42	3642	5.08E+08	0.0168	30.26	1549.32		

Table 77: North-South & West-East Seismic Forces, Part A

L						L	L
26	13.75	359.67	3520	4.55E+08	0.0150	27.14	1576.45
25	13.75	345.92	3642	4.36E+08	0.0144	25.97	1602.42
24	13.75	332.17	3642	4.02E+08	0.0133	23.95	1626.37
23	13.75	318.42	3642	3.69E+08	0.0122	22.01	1648.37
22	13.75	304.67	3520	3.27E+08	0.0108	19.47	1667.85
21	13.75	290.92	3642	3.08E+08	0.0102	18.37	1686.22
20	13.75	277.17	3644	2.8E+08	0.0092	16.68	1702.90
19	13.75	263.42	3644	2.53E+08	0.0083	15.07	1717.96
18	13.75	249.67	3522	2.2E+08	0.0072	13.08	1731.04
17	13.75	235.92	3557	1.98E+08	0.0065	11.80	1742.84
16	13.75	222.17	3557	1.76E+08	0.0058	10.46	1753.30
15	13.75	208.42	3561	1.55E+08	0.0051	9.22	1762.52
14	12.58	195.83	3553	1.36E+08	0.0045	8.12	1770.64
13	14.92	180.92	3682	1.21E+08	0.0040	7.18	1777.82
12	13.75	167.17	3556	99381382	0.0033	5.92	1783.75
11	13.75	153.42	3815	89799834	0.0030	5.35	1789.10
10	13.75	139.67	3566	69567289	0.0023	4.15	1793.24
9	13.75	125.92	3691	58517891	0.0019	3.49	1796.73
8	13.75	112.17	3703	46584979	0.0015	2.78	1799.51
7	13.75	98.42	3720	36035785	0.0012	2.15	1801.65
6	13.75	84.67	3594	25762831	0.0009	1.54	1803.19
5	13.75	70.92	3840	19312407	0.0006	1.15	1804.34
4	14.32	56.59	4043	12950049	0.0004	0.77	1805.11
3	15.47	41.13	3991	6749258	0.0002	0.40	1805.51
2	15.47	25.66	4248	2796195	0.0001	0.17	1805.68
1	25.66	0.00	6182	0	0.0000	0.00	1805.68
		Σ	180568	3.03E+10		1806	

26	13.75	359.67	3520	4.55E+08	0.0150	27.14	1576.45
25	13.75	345.92	3642	4.36E+08	0.0144	25.97	1602.42
24	13.75	332.17	3642	4.02E+08	0.0133	23.95	1626.37
23	13.75	318.42	3642	3.69E+08	0.0122	22.01	1648.37
22	13.75	304.67	3520	3.27E+08	0.0108	19.47	1667.85
21	13.75	290.92	3642	3.08E+08	0.0102	18.37	1686.22
20	13.75	277.17	3644	2.8E+08	0.0092	16.68	1702.90
19	13.75	263.42	3644	2.53E+08	0.0083	15.07	1717.96
18	13.75	249.67	3522	2.2E+08	0.0072	13.08	1731.04
17	13.75	235.92	3557	1.98E+08	0.0065	11.80	1742.84
16	13.75	222.17	3557	1.76E+08	0.0058	10.46	1753.30
15	13.75	208.42	3561	1.55E+08	0.0051	9.22	1762.52
14	12.58	195.83	3553	1.36E+08	0.0045	8.12	1770.64
13	14.92	180.92	3682	1.21E+08	0.0040	7.18	1777.82
12	13.75	167.17	3556	99381382	0.0033	5.92	1783.75
11	13.75	153.42	3815	89799834	0.0030	5.35	1789.10
10	13.75	139.67	3566	69567289	0.0023	4.15	1793.24
9	13.75	125.92	3691	58517891	0.0019	3.49	1796.73
8	13.75	112.17	3703	46584979	0.0015	2.78	1799.51
7	13.75	98.42	3720	36035785	0.0012	2.15	1801.65
6	13.75	84.67	3594	25762831	0.0009	1.54	1803.19
5	13.75	70.92	3840	19312407	0.0006	1.15	1804.34
4	14.32	56.59	4043	12950049	0.0004	0.77	1805.11
3	15.47	41.13	3991	6749258	0.0002	0.40	1805.51
2	15.47	25.66	4248	2796195	0.0001	0.17	1805.68
1	25.66	0.00	6182	0	0.0000	0.00	1805.68
		Σ	180568	3.03E+10		1806	

Table 78: North-South & West-East Seismic Forces, Part B



Figure 149: SW1 Y-direction hand calculations
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Material P	roperties:							
f' _c =	10000	psi						
f _v =	60000	psi						
Check V _u <	¢ φ V _{n,max} =	φ10SQRT(f	c)hd per §	11.9.3:				
φV _{n,max} =¢	010SQRT(f	_c)hd =	2430	kips	>	1743	kips	ОК
Shear stre	ngth of co	ncrete:	<i>c</i> .					
a =min of	$= I_{w}/2 =$	5.625	ft					
	= h _w /2 =	13.4	ft					
	∴ a =	5.6	ft					
V _c =2SQR	۲(f' _c)hd =	648	kips					
V _c =3.3SQ	RT(f' _c)hd +	N _u d/I _w =	1069	kips				
(M _u /V _u -I _w /	(2)=	187						
V _c =(0.650	QRT(f'c) +Iw	(1.25SQRT((f' _c)+0.2N _u /	/I _w h)/(M _u /\	/ _u -l _w /2))hd	=	487	kips
∴ V _c =	487	kips						
Determine	e required	horizontal	shear rein	forcement	t:			
0.5φV _c =	183	kips						
V _{s, req} =	1837	kips						
A _{v,req} = V _s s	/f _y d =	1.701	in²					
A _{v,used} =	2	in ²	ОК					
s =	7.05	in spacing						
s _{used} =	6.00	in O.C.	ок					
ρ _t =A _v /sh	=	0.0111	>	0.0025	ОК			
s =	= I _w /5 =	27	in					
min of	= 3h =	90	in					
	=	18	in					
	∴ s =	18	in	>	6.00	in	ОК	
Determine	e required	vertical sh	ear reinfo	rcement:				
$\rho_1 = A_v/sh$	=	0.0056						
$\rho_{1 \min} = 0.00$)25+0.5(2.5	-h _w /l _w)(ρ ₊ -	0.0025) =	0.0030	<	ρ	ок	
,			ρ _{l.min} =	0.0025	<	ρ	ок	
			ρ _{l.max} =	0.0111	>	ρ	ок	
	= I _w /3 =	45	in					
S _{max} =	= 3h =	90	in					
min of	=	18	in					
	∴ s =	18	in					
A _{v,used} =	2	in ²						
s =	12.00	in spacing						
s _{used} =	12.00	in O.C.	>	12.00	in	ОК		

Figure 150: SW1 Y-direction hand calculations

Design of wall for shear and flexure per Chapter 11 of ACI 318-08 0 kips N_u = 3283 kips V., = h_w = 26.83 ft N/A M_u = kft - - t а 30 l_w = 67.5 ft t = in 9 62 # bar < ... · · · · · · · · · ٠ • -----٠ ٠ 30 in Typical spacing = 6 in 3 in Typical spacing = 18 in 2 # 8 bar # 8 bar @ 18 in 2

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Figure 151: SW1 X-direction hand calculations

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Material P	roperties:							
f' _c =	10000	psi						
f _y =	60000	psi						
Check V _u <	φV _{n,max} =	φ10SQRT(f	' _c)hd per §	11.9.3:				
φV _{n,max} =¢	10SQRT(f	_c)hd =	14580	kips	>	3283	kips	ОК
Character	anth of cou							
snear stre		22 75	f+					
a =min of	- 1 _W /2 -	12.4	н 4					
	= n _w / 2 =	13.4	11. FF					
	a=	15.4	n					
V _c =2SQRT	r(f' _c)hd =	3888	kips					
V _c =3.3SQ	RT(f' _c)hd +	N _u d/I _w =	6415	kips				
(M _u /V _u -I _w /	2)=	-244						
V _c =(0.650	QRT(f'c) +lw	(1.25SQRT((f' _c)+0.2N _u /	/I _w h)/(M _u /\	/ _u -I _w /2))hd	=	N/A	kips
∴ V _c =	6415	kips						
Determine	e required	horizontal	shear rein	forcement	t:			
0.5φV _c =	2406	kips						
V _{s, req} =	-2038	kips						
A _{v,req} = V _s s	/f _y d =	-0.943	in ²					
A _{v,used} =	1.58	in²	ОК					
s =	-30.14	in spacing						
s _{used} =	18.00	in O.C.	NOT GOO	D				
$\rho_t = A_v/sh$	=	0.0029	>	0.0025	ОК			
s =	= I _w /5 =	162	in					
-max -	= 3h =	90	in					
	=	18	in					
	∴ s =	18	in	>	18.00	in	ОК	
Determine	e required	vertical sh	ear reinfo	rcement:				
$\rho_1 = A_y/sh =$:	0.0029						
$\rho_{l,min} = 0.00$	25+0.5(2.5	-h _w /l _w)(ρ _t -	0.0025) =	0.0029	>	ρ	ок	
			ρ _{l.min} =	0.0025	<	ρι	ок	
			ρ _{l,max} =	0.0029	<	ρι	ок	
	= I _w /3 =	270	in					
S _{max} =	= 3h =	90	in					
min of	=	18	in					
	∴ s =	18	in					
A _{v,used} =	1.58	in²						
s =	18.00	in spacing						
s _{used} =	18.00	in O.C.	>	18.00	in	ОК		

Figure 152: SW1 X-direction hand calculations

Design of wall for shear and flexure per Chapter 11 of ACI 318-08 0 kips N_u = 541 kips V., = h_w = 26.83 ft 11346 kft $M_u =$ t а 30 -10 ft t = in $I_w =$ # 10 bar 10 < 1... ٠ • F <u>)</u> ٠ ٠ 30 in Typical spacing = 6 in 3 in Typical spacing = 16 in 2 # 7 bar # 7 bar @ 16 in 2

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Figure 153: SW2 Y-direction hand calculations

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Material Properties: I I I I I $f_c =$ 10000 psi I I I I I $f_c =$ 10000 psi I I I I I $f_c =$ 60000 psi I I I I I $\phi V_{n,max} = \phi 10SQRT(f_c)hd =$ 2160 kips S 541.2 kips I I $h_{n,max} = \phi 10SQRT(f_c)hd =$ 2160 kips S 541.2 kips I										
	Aaterial P	perties:								
	c =	10000	psi							
$\begin{aligned} \mathbf{Check V_u} < \mathbf{\phi} V_{n,max} = \mathbf{\phi} 10 \mathrm{SQRT}(f', \mathbf{b} \mathbf{d} = 2160 \ \mathrm{kips} > 541.2 \ \mathrm{kips} \\ \mathbf{\phi} V_{n,max} = \mathbf{\phi} 10 \mathrm{SQRT}(f', \mathbf{b} \mathbf{d} = 2160 \ \mathrm{kips} > 541.2 \ \mathrm{kips} \\ \mathbf{Shear strength of correte:} \\ \mathbf{a} = \min of \begin{array}{c c c } = 1_{u}/2 = 5 \ \mathrm{ft} & 1 & 1 & 1 \\ = h_{u}/2 = 13.4 \ \mathrm{ft} & 1 & 1 & 1 \\ \vdots & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \vdots & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 & 1 \\ \hline & \mathbf{a} = 5.0 \ \mathrm{ft} & 1 \\ \hline & $	=	60000	psi							
Check $V_u < \phi V_{n,max} = \phi 10SQRT(f'_1)hd per §11.9.3: \phi V_{n,max} = \phi 10SQRT(f'_2)hd = 2160 kips > 541.2 kips Shear strength of correte:a = \min of \frac{ u /2 = 5 ft}{ u /2 = 13.4 ft}a = \frac{ u /2 = 13.4 ft}{ u /2 = 13.4 ft}\therefore a = 5.0 ftv_c = 2SQRT(f'_c)hd = 576 kipsV_c = 3.3SQRT(f'_c)hd = 576 kipsV_c = 3.3SQRT(f'_c)hd = 100 kipsV_c = 0.6SQRT(f'_c)hd = 100 kipsV_c = 0.6SQRT(f'_c) + u (1.2SSQRT(f'_c) + 0.2N_v/l_wh)/(M_v/V_u^-l_w/2))hd =V_c = 0.6QR in Space III III IIII IIIIIIIIIIIIIIIIIIIIIII$										
$ \begin{array}{c c c c c c c } & \phi V_{n,max} = \phi 10SQRT(f'_{c})hd = 2160 kips > 541.2 kips \\ \hline Shear strement of concrete: \\ a = min of \begin{array}{c c c c c c } = i_{w}/2 = 5 & ft \\ \hline h_{w}/2 = 13.4 & ft \\ \hline a = a = 5.0 & ft \\ \hline h_{w}/2 = 13.4 & ft \\ \hline a = a = 5.0 & ft \\ \hline a = a = 5.0 & ft \\ \hline c = $	heck V _u <	V _{n,max} =	\$10SQRT(f	' _c)hd per §	11.9.3:					
Shear street Image: Shear street	¢V _{n,max} =¢	SQRT(f'c)hd =	2160	kips	>	541.2	kips	ОК	
Shear strength or concrete: Image: strength or concrete: Image: strength or concrete: a =min of = l_u/2 = 5 ft Image: strength or concrete: Image: strength or concrete: a =min of = l_u/2 = 13.4 ft Image: strength or concrete:	.									
$a = \min of \begin{vmatrix} -u_{w}/2 = & 3 & 1 \\ = h_{w}/2 = & 13.4 & ft \\ \therefore a = & 5.0 & ft \\ V_{c} = 3.3 \\ V_{c} = 3.3 \\ V_{c} = 3.3 \\ V_{c} = 0.6 \\ V_{c} = 0.6 \\ V_{c} = & 202 \\ V_{c} = (0.6 \\ V_{c} = & 1.2 \\ V_{c} = & 387 & kips \\ V_{c} = & 338 \\ V_{c} = & 0.002 \\ V_{c} = & 1.2 \\ V_{c} = & 0.0025 \\ V_{c} = & 1.2 \\ V_{c} = & 0.0025 \\ V_{c} = & 1.2 \\ V_{c} = & 0.0025 \\ V_{c} = & 0.0025 \\ V_{c} = & 1.2 \\ V_{c} = & 0.0025 \\ V_{c} = & 1.8 \\ V_{c} = & 1.8 \\ V_{c} = & 1.8 \\ V_{c} = & 0.0025 \\ V_{c} = & 0.002$	near stre	th of con	icrete:	£4						
	=min of	w/2 =	12.4	н љ						
$V_{c} = 2SQRT(f'_{c})hd + N_{u}d/I_{w} = 950 kips $ $V_{c} = 3.3SQRT(f'_{c})hd + N_{u}d/I_{w} = 950 kips $ $V_{c} = 3.3SQRT(f'_{c})hd + N_{u}d/I_{w} = 950 kips $ $V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{u}/I_{w}h)/(M_{u}/V_{u} - I_{w}/2))hd = $ $V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{u}/I_{w}h)/(M_{u}/V_{u} - I_{w}/2))hd = $ $V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{u}/I_{w}h)/(M_{u}/V_{u} - I_{w}/2))hd = $ $V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{u}/I_{w}h)/(M_{u}/V_{u} - I_{w}/2))hd = $ $V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{u}/I_{w}h)/(M_{u}/V_{u} - I_{w}/2))hd = $ $Potetomistre required borizontal shear reinforcement: $ $0.5\varphiV_{c} = 145 kips $ $A_{v,reg} = 335 kips $ $A_{v,reg} = 335 kips $ $A_{v,reg} = 128 in $ $A_{v,used} = 1.2 in^{2} OK $ $A_{v,used} = 16.00 in O.C. OK $ $A_{v,used} = 16.00 in O.C. OK $ $A_{v,used} = 16.00 in O.C. OK $ $P_{t} = A_{u}/Sh = 0 0025 $ $P_{t} = 18 in $ $P_{t} = 18 in $ $P_{t} = 18 in $ $P_{t} = 0.0025 $ $P_{t} = $		n _w /2 =	13.4	π A						
$V_{c} = 2SQRT(f_{c}^{i})hd = 576 kips 0.0000 kips 0.0000 kips 0.00000 kips 0.000000 kips 0.000000 kips 0.000000 kips 0.0$		∴ a =	5.0	π						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	/ _c =2SQRT	_c)hd =	576	kips						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	/ _c =3.3SQ	(f' _c)hd +N	N _u d/I _w =	950	kips					
$V_{c} = (0.6SQRT(f'_{c}) + I_{w}(1.2SSQRT(f'_{c}) + 0.2N_{w}/I_{w}h)/(M_{w}/V_{u} - I_{w}/2))hd =$ $\therefore V_{c} = 387 kips$ $Determine required horizontal shear reinforcement:$ $0.5\varphi V_{c} = 145 kips$ $V_{s, req} = 335 kips$ $A_{V, req} = V_{s}S/f_{y}d = 0.930 in^{2}$ $A_{V, used} = 1.2 in^{2} OK$ $A_{V, used} = 1.2 in^{2} OK$ $S_{s} = 20.64 in spacing$ $S_{used} = 16.00 in O.C. OK$ $P_{t} = A_{v}/sh = 0.0025 > 0.0025 OK$ $P_{t} = A_{v}/sh = 90 in$ $P_{t} = 18 in$ $P_{t} = A_{v}/sh = 0.0025 = 0.0025 < P_{1} OK$ $Determine required vertical shear reinforcement:$ $P_{1} = A_{v}/sh = 0.0025 = 0.0025 < P_{1} OK$ $P_{1,min} = 0.0025 < P_{1} OK$ $S_{max} = a_{min} of = a_{min} of = a_{min} of a_{min} of 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 18 in$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 10 P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 0.0025 < P_{1} OK$ $P_{1,min} = 0.00$	M _u /V _u -I _w /	=	202							
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	/_=(0.6SC	r(f'_) +l_((1.25SQRT	(f'_)+0.2N_/	/l_h)/(M_/\	/I/2))hd	=	387	kips	
$\begin{array}{c c c c c c c } & \cdot & $										
$\begin{array}{c c c c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	∴ V _c =	387	kips							
Determine required horizontal shear reinforcement: Image: math math math math math math math math										
$\begin{array}{c c c c c c c } 0.5 \varphi V_c = & 145 \ \mbox{kips} & & & & & & & & & & & & & & & & & & &$	etermine	equired	horizontal	shear rein	forcemen	t:				
$\begin{split} & V_{s, req} = 335 \ kips & 0.930 \ in^2 & 0.930 \ in 0.0025 \ in 0.0025 \ OK & 0.0025$).5φV _c =	145	kips							
$\begin{array}{c c c c c c c } A_{v,req} = V_{s}s/f_{y}d = & 0.930 & in^{2} & 0K & & & & & & & & & & & & & & & & & $	s, req =	335	kips							
$\begin{array}{c c c c c c } A_{v,used} = & 1.2 & in^2 & OK & I & I & I & I & I & I & I & I & I & $	v,req = V _s s,	d =	0.930	in ²						
s = 20.64 in spacing 0 0 0 0 0 0 0 0 0	v,used =	1.2	in²	ок						
$\begin{split} s_{used} &= 16.00 \text{ in O.C.} OK \qquad In ORC ORC OK \qquad In ORC ORC ORC ORC ORC ORC ORC ORC ORC ORC$	=	20.64	in spacing							
$\begin{array}{c c c c c c c c } \hline P_t = A_v / sh = & 0.0025 & > & 0.0025 & OK & & & & & & & \\ \hline S_{max} = & & & & & & & & & & & & & & & & & & $	used =	16.00	in O.C.	ок						
$\begin{split} s_{max} &= & \begin{tabular}{ c c c c } &= & 1 u in & 1 u u u u u u u u $u$$	t = A _v /sh =		0.0025	>	0.0025	ОК				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	e -	l _w /5 =	24	in						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	⁵ max –	3h =	90	in						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		=	18	in						
Determine required vertical shear reinforcement: $\rho_I = A_v/sh =$ 0.0025 0.0025		∴ s =	18	in	>	16.00	in	ОК		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	etermine	equired	vertical sh	ear reinfo	rcement:					
$\begin{array}{c c c c c c c c c } \rho_{l,min} = 0.0025 + 0.5(2.5 - h_w/l_w)(\rho_t - 0.0025) = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,min} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.0025 & < & \rho_l & OK \\ \hline \rho_{l,max} = & 0.00$	= A, /sh =	quicu	0.0025							
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		+0.5(2.5	-h/l)(0	0.0025) =	0.0025	<	0.	ок		
$s_{max} = \frac{ v_i ^{-1}}{min of} = \frac{ v_i ^{-1}}{ v_i ^{-1}} = \frac{ v_i ^{-1}}{ v_i ^$,min 0.00		-www.w/tPt	$\rho_{\rm Lmin} =$	0.0025	<	ρι	ок		
$s_{max} = \lim_{min \to 0} \frac{ a_{max} ^2}{ a_{max} ^2} = \frac{ a_{max} ^$				ρ _{l.max} =	0.0025	<	ρι	ок		
$s_{max} = \frac{3h}{=3h} = \frac{90}{90} in$ $= \frac{18}{18} in$ $h = \frac{12}{2} iz^{2}$		l/3 =	40	in						
$\begin{array}{c c} min \text{ or } & = & 18 \text{ in} \\ \hline \vdots \text{ s} = & 18 \text{ in} \\ \hline \vdots \text{ s} = & 18 \text{ in} \\ \hline \end{array}$	s _{max} =	3h =	90	in						
$\therefore s = 18 \text{ in}$	min of	=	18	in						
A _ 1.2 :-2		∴ s =	18	in						
A _{v,used} = 1.2 In	v,used =	1.2	in²							
s = 16.00 in spacing	=	16.00	in spacing							
s _{used} = 16.00 in O.C. > 16.00 in OK	used =	16.00	in O.C.	>	16.00	in	ОК			

Figure 154: SW2 Y-direction hand calculations

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Design for flexure:								
A _{s,used} =	25.4	in ²						
d =	108	in						
d _t =	117	in						
a =	5.98	in						
β =	0.65							
c = a/β =	9.19							
ε _t =	0.0352	>	0.005	φ =	0.90			
ε _γ =	0.0021							
φM _n =φA _s f	_y (d-a/2)=	12,003	ftk	>	11,346	ftk	ок	

Figure 155: SW2 Y-direction hand calculations

Load	Level	Loc	Р
DEAD	Ground	bottom	12595.64
LIVE	Ground	bottom	5720.4
LIVE ROOF	Ground	bottom	63
SNOW	Ground	bottom	61

Figure 156: Unfactored Axial Shear Wall Loads

	Load Combination	Loc	Р	MY	MX
1	0.9D-1.6W _X 48W _Y	bottom	11336	-15116	-960055
2	0.9D+1.6W _X 48W _Y	bottom	11336	-15116	960055
3	0.9D-1.6W _X +.48W _Y	bottom	11336	15116	-960055
4	0.9D+1.6W _X +.48W _Y	bottom	11336	15116	960055
5	0.9D-1.6W _Y 48W _X	bottom	-11698	-50386	-288017
6	0.9D+1.6Wy48Wx	bottom	34370	50386	-288017
7	0.9D-1.6W _Y +.48W _X	bottom	-11698	-50386	288017
8	0.9D+1.6Wy+.48Wx	bottom	34370	50386	288017

Figure 157: Factored inputted into PCA Column

STRU Lice B:\?	UCTUREPOIN ensed to: 1 Team 1 Wor)	C - spColum Penn State ting Files\)	n v4.20 (Universit Ben\Shear	TM) y . Licens Wall.col	e ID: 5575	8-1017872	-4-22545-2	5FA0	Page 2 04/06/10 03:45 PM
Ge	eneral Info	ormation:							
=	File Name	e: B:\Team	l Working	Files\Ben	\Shear Wal	l.col			
	Project:	NYT			Freincer	סחס			
	Code:	ACI 318-0	5		Units: En	Iglish			
	Run Optic Run Axis:	on: Investi Biaxial	gation		Slenderne Column Ty	ess: Not o pe: Struc	considered		
Ma	aterial Pro	operties:							
	f'c = 1 Ec = 9 Ultimate Betal = (10 ksi 5700.01 ksi strain = 0 0.65	.003 in/i	n	fy = 60 Es = 29) ksi 0000 ksi			
Se	ection:								
=	Exterior	Points							
	No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
	1	0.0	0.0	2	0.0	135.0	3	810.0	135.0
	4 7	810.0 30.0	0.0 105.0	5 8	780.0 30.0	0.0	6	780.0	105.0
D,	Gross sec Ix = 3.0 Xo = 409	ction area, 04053e+007 : 5 in	Ag = 30 in^4	600 in^2	Iy = 2.2 Yo = 106	873e+009 5.103 in	in^4		
==		==							
	Bar Set: Size Diar	ASTM A615 a (in) Area	(in^2)	Size Diam	(in) Area	(in^2)	Size Diam	(in) Area	(in^2)
	# 3	0.38	0.11	# 4	0.50	0.20	± 5	0.63	0.31
	# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
	# 9 # 14	1.13	2.25	# 10 # 18	2.26	4.00	Ŧ II	1.41	1.56
	Confineme phi(a) = Pattern:	ent: Tied; 0.8, phi() Irregular	#4 ties w b) = 0.9,	ith #10 ba phi(c) =	rs, #4 wi 0.65	th larger.	bars.		
	Total ste	el area, A	s = 528.6	8 in^2 at	1.73%				
	Area in^2	2 X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
	1.50	5 3.0	132.0	1.56	3.0	126.0	1.56	3.0	120.0
	1.50	5 3.0 5 15.0	114.0 132.0	1.56	3.0 21.0	108.0 132.0	1.56	9.0 27.0	132.0 132.0
	1.50	27.0	108.0	1.56	3.0	27.0	1.56	3.0	21.0
	1.50	5 3.0	15.0	1.56	3.0	9.0	1.56	3.0	3.0

ea in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
1.56	3.0	132.0	1.56	3.0	126.0	1.56	3.0	120.0
1.56	3.0	114.0	1.56	3.0	108.0	1.56	9.0	132.0
1.56	15.0	132.0	1.56	21.0	132.0	1.56	27.0	132.0
1.56	27.0	108.0	1.56	3.0	27.0	1.56	3.0	21.0
1.56	3.0	15.0	1.56	3.0	9.0	1.56	3.0	3.0
1.56	9.0	3.0	1.56	15.0	3.0	1.56	21.0	3.0
1.56	27.0	3.0	1.56	27.0	9.0	1.56	27.0	15.0
1.56	27.0	21.0	1.56	27.0	27.0	1.56	783.0	108.0
1.56	783.0	132.0	1.56	807.0	132.0	1.56	801.0	132.0
1.56	795.0	132.0	1.56	789.0	132.0	1.56	807.0	126.0
1.56	807.0	120.0	1.56	807.0	114.0	1.56	807.0	108.0
1.56	783.0	3.0	1.56	789.0	3.0	1.56	795.0	3.0
1.56	801.0	3.0	1.56	807.0	3.0	1.56	783.0	9.0
1.56	783.0	15.0	1.56	783.0	21.0	1.56	783.0	27.0
1.56	807.0	27.0	1.56	807.0	21.0	1.56	807.0	15.0

Figure 158: PCA Column Output for SW1

STRUCTUREPOINT - Licensed to: Penn B:\Team 1 Working	spColumn State U Files\E	n v4.20 (TM University Sen∖Shear W) . License 1 all.col	ID: 55758	-1017872-4	-22545-25FA	.0	Page 3 04/06/10 03:45 PM
1.56	807.0	9.0	1.56	27.0	126.0	1.56	27.0	120.0
1.56	27.0	114.0	1.56	9.0	108.0	1.56	15.0	108.0
1.56	21.0	108.0	1.56	9.0	120.0	1.56	15.0	120.0
1.50	21.0	27.0	1.50	9.0	27.0	1.50	15.0	27.0
1.50	21.0	27.0	1.50	702 0	125.0	1.50	702 0	120.0
1.50	783 0	114 0	1.50	789.0	108.0	1.50	795 0	108.0
1.56	801 0	108 0	1.56	789 0	120 0	1.56	795 0	120.0
1.56	801.0	120.0	1.56	789.0	27.0	1.56	795.0	27.0
1.56	801.0	27.0	1.56	789.0	15.0	1.56	795.0	15.0
1.56	801.0	15.0	1.27	33.1	132.0	1.27	39.2	132.0
1.27	45.3	132.0	1.27	51.4	132.0	1.27	57.5	132.0
1.27	63.6	132.0	1.27	69.7	132.0	1.27	75.8	132.0
1.27	81.9	132.0	1.27	88.0	132.0	1.27	94.1	132.0
1.27	100.2	132.0	1.27	106.3	132.0	1.27	112.4	132.0
1.27	118.5	132.0	1.27	124.5	132.0	1.27	130.6	132.0
1.27	136.7	132.0	1.27	142.8	132.0	1.27	148.9	132.0
1.27	155.0	132.0	1.27	161.1	132.0	1.27	167.2	132.0
1.27	173.3	132.0	1.27	179.4	132.0	1.27	185.5	132.0
1.27	191.6	132.0	1.27	197.7	132.0	1.27	203.8	132.0
1.27	209.9	132.0	1.27	216.0	132.0	1.27	240.4	132.0
1.27	246.2	132.0	1.27	234.3	132.0	1.27	240.4	132.0
1.27	240.5	122.0	1.27	232.0	122.0	1.27	230.7	122.0
1.27	283 1	132.0	1.27	289 2	132.0	1.27	295.3	132.0
1 27	301 4	132 0	1 27	307 5	132 0	1 27	313 5	132 0
1.27	319.6	132.0	1.27	325.7	132.0	1.27	331.8	132.0
1.27	337.9	132.0	1.27	344.0	132.0	1.27	350.1	132.0
1.27	356.2	132.0	1.27	362.3	132.0	1.27	368.4	132.0
1.27	374.5	132.0	1.27	380.6	132.0	1.27	386.7	132.0
1.27	392.8	132.0	1.27	398.9	132.0	1.27	405.0	132.0
1.27	411.1	132.0	1.27	417.2	132.0	1.27	423.3	132.0
1.27	429.4	132.0	1.27	435.5	132.0	1.27	441.6	132.0
1.27	447.7	132.0	1.27	453.8	132.0	1.27	459.9	132.0
1.27	466.0	132.0	1.27	472.1	132.0	1.27	478.2	132.0
1.27	484.3	132.0	1.27	490.4	132.0	1.27	496.5	132.0
1.27	502.5	132.0	1.27	508.6	132.0	1.27	514.7	132.0
1.27	520.8	132.0	1.27	526.9	132.0	1.27	533.0	132.0
1.27	539.1	132.0	1.27	545.2	132.0	1.27	551.3	132.0
1.2/	55/.4	132.0	1.27	563.5	132.0	1.27	569.6	132.0
1.27	594 0	132.0	1.27	600 1	132.0	1 27	606 2	132.0
1 27	612 3	132.0	1 27	618 4	132.0	1 27	624 5	132.0
1 27	630 6	132 0	1 27	636 7	132 0	1 27	642 8	132 0
1.27	648.9	132.0	1.27	655.0	132.0	1.27	661.1	132.0
1.27	667.2	132.0	1.27	673.3	132.0	1.27	679.4	132.0
1.27	685.5	132.0	1.27	691.5	132.0	1.27	697.6	132.0
1.27	703.7	132.0	1.27	709.8	132.0	1.27	715.9	132.0
1.27	722.0	132.0	1.27	728.1	132.0	1.27	734.2	132.0
1.27	740.3	132.0	1.27	746.4	132.0	1.27	752.5	132.0
1.27	758.6	132.0	1.27	764.7	132.0	1.27	770.8	132.0
1.27	776.9	132.0	1.27	783.0	132.0	1.27	33.1	108.0
1.27	39.2	108.0	1.27	45.3	108.0	1.27	51.4	108.0
1.27	57.5	108.0	1.27	63.6	108.0	1.27	69.7	108.0
1.27	/5.8	108.0	1.27	81.9	108.0	1.27	38.0	108.0
1.27	99.1 112 4	108.0	1.27	110.2	108.0	1.27	124 5	108.0
1.27	120 6	108.0	1.27	126.5	108.0	1.27	142 0	108.0
1.27	148 9	108.0	1 27	155.0	108.0	1 27	161 1	108.0
1.27	167.2	108.0	1.27	173.3	108.0	1.27	179 4	108.0
1.27	185.5	108.0	1.27	191.6	108.0	1.27	197.7	108.0
1.27	203.8	108.0	1.27	209.9	108.0	1.27	216.0	108.0
1.27	222.1	108.0	1.27	228.2	108.0	1.27	234.3	108.0
1.27	240.4	108.0	1.27	246.5	108.0	1.27	252.6	108.0
1.27	258.7	108.0	1.27	264.8	108.0	1.27	270.9	108.0
1.27	277.0	108.0	1.27	283.1	108.0	1.27	289.2	108.0

Figure 159: PCA Column Output for SW1

STRUCTUREPOINT - Licensed to: Penn B:\Team Working	spColum State U Files\F	n v4.20 (TM) Jniversity . Rep\Shear Wa	License	ID: 55758	-1017872-4	-22545-25FA	.0	Page 4 04/06/10 02:45 DM
D. (Team I Working	LTTED /I	Sen (Snear Wa	11.001					05.45 PH
1.27	295.3	108.0	1.27	301.4	108.0	1.27	307.5	108.0
1.27	313.5	108.0	1.27	319.6	108.0	1.27	325.7	108.0
1.27	331.8	108.0	1.27	337.9	108.0	1.27	344.0	108.0
1.27	350.1	108.0	1.27	356.2	108.0	1.27	362.3	108.0
1.27	368.4	108.0	1.27	374.5	108.0	1.27	380.6	108.0
1.27	386.7	108.0	1.27	392.8	108.0	1.27	398.9	108.0
1.27	405.0	108.0	1.27	411.1	108.0	1.27	417.2	108.0
1.27	423.3	108.0	1.27	429.4	108.0	1.27	435.5	108.0
1.27	441.6	108.0	1.27	447.7	108.0	1.27	453.8	108.0
1.27	459.9	108.0	1.27	466.0	108.0	1.27	472.1	108.0
1.27	478.2	108.0	1.27	484.3	108.0	1.27	490.4	108.0
1.27	496.5	108.0	1.27	502.5	108.0	1.27	508.6	108.0
1.27	514.7	108.0	1.27	520.8	108.0	1.27	526.9	108.0
1.27	533.0	108.0	1.27	539.1	108.0	1.27	545.2	108.0
1.27	551.3	108.0	1.27	557.4	108.0	1.27	563.5	108.0
1.27	569.6	108.0	1.27	575.7	108.0	1.27	581.8	108.0
1.27	587.9	108.0	1.27	594.0	108.0	1.27	600.1	108.0
1.27	606.2	108.0	1.27	612.3	108.0	1.27	618.4	108.0
1.27	624.5	108.0	1.27	630.6	108.0	1.27	636.7	108.0
1.27	642.8	108.0	1.27	648.9	108.0	1.27	655.0	108.0
1.27	601.1	108.0	1.27	667.2	108.0	1.27	6/3.3	108.0
1.2/	675.4	108.0	1.2/	605.5	108.0	1.27	691.5	108.0
1.2/	69/.6	108.0	1.27	703.7	108.0	1.27	709.8	108.0
1.27	724 2	108.0	1.27	722.0	108.0	1.27	746.1	108.0
1.27	752.2	108.0	1.27	740.3	108.0	1.27	740.4	108.0
1.27	770 0	108.0	1.27	776 0	108.0	1.27	704.7	108.0
1.2/	3 0	27.0	1.27	3.0	100.0	1.27	3 0	100.0
1.56	3.0	29.3	1.56	3.0	83 1	1.56	3.0	76.8
1.50	3.0	70.6	1.56	3.0	64 4	1.50	3.0	59.2
1.56	3.0	51.9	1.56	3.0	45 7	1.56	3.0	39.5
1.56	3.0	33 2	1.56	3.0	27 0	1.56	27 0	101.8
1.56	27 0	95.5	1.56	27 0	89.3	1.56	27 0	83 1
1.56	27 0	76.8	1.56	27.0	70.6	1.56	27.0	64 4
1.56	27.0	58.2	1.56	27.0	51.9	1.56	27.0	45.7
1.56	27.0	39.5	1.56	27.0	33.2	1.56	27.0	27.0
1.56	783.0	101.8	1.56	783.0	95.5	1.56	783.0	89.3
1.56	783.0	83.1	1.56	783.0	76.8	1.56	783.0	70.6
1.56	783.0	64.4	1.56	783.0	58.2	1.56	783.0	51.9
1.56	783.0	45.7	1.56	783.0	39.5	1.56	783.0	33.2
1.56	783.0	27.0	1.56	807.0	101.8	1.56	807.0	95.5
1.56	807.0	89.3	1.56	807.0	83.1	1.56	807.0	76.8
1.56	807.0	70.6	1.56	807.0	64.4	1.56	807.0	58.2
1.56	807.0	51.9	1.56	807.0	45.7	1.56	807.0	39.5
1.56	807.0	33.2	1.56	807.0	27.0	1.56	15.0	126.0
1.56	15.0	114.0	1.56	15.0	21.0	1.56	15.0	9.0
1.56	795.0	126.0	1.56	795.0	114.0	1.56	795.0	21.0
1.56	795.0	9.0						

Factored Loads and Moments with Corresponding Capacities:

No.	Pu kip	Mux k-ft	Muy k-ft	fMnx k-ft	fMny k-ft	fMn/Mu	Phi
1	11336.00	-15116.00	-960055.00	-19169.25	-1217517.00	1.268	0.900
2	11336.00	-15116.00	960055.00	-19154.45	1216536.00	1.267	0.900
3	11336.00	15116.00	-960055.00	19881.89	-1262739.25	1.315	0.900
4	11336.00	15116.00	960055.00	19851.94	1260841.88	1.313	0.900
5	-11698.00	-50386.00	-288017.00	-51090.20	-292042.88	1.014	0.900
6	34370.00	50386.00	-288017.00	119184.49	-681282.81	2.365	0.650
7	-11698.00	-50386.00	288017.00	-51079.19	291979.41	1.014	0.900
8	34370.00	50386.00	288017.00	118900.46	679660.44	2.360	0.650

*** End of output ***

Figure 160: PCA Column Output for SW1



Figure 161: SW1 P-M Diagram



Figure 162: SW1 P-M Diagram



Figure 163: SW1 P-M Diagram

Shear Wall 1	Axial Loads														
Story level	Story Height (ft)	Tributary Area (ft ²)	Live Load Influence Area (ft ²)	Live Load Reduction Factor	Dead Load (kips)	Dead Load of Wall (kips)	Roof Live Load (kips)	Snow Load (kips)	Floor Live Load (kips)	Column Load 1.4D (kips)	Column Load 1.2D+1.6L+.5(Lr or S) (kips)	Column Load 1.2D+1.6(Lr or S)+L (kips)	Column Load 1.2D+L+0.5(Lr or S) (kips)	Column Load 1.2D+L+0.2S (kips)	Column Design Load
60 D . 6		24.50		1.00	074.70		(2.00	(0.00			170		170		
52 Root	0	3150	0 0	1.00	371.70	0.00	63.00	60.80	172.50	520	478	547	478	458	547
51 Mech	26.83	6300	8700	1.00	595.35	392.44			472.50	1383	19/3	1759	1689	1670	1973
50	14.42	9450	17400	0.40	819.00	210.84			560.70	1442	2164	189/	1828	1809	2104
49	13.75	12600	26100	0.40	1042.65	201.09			648.90	1741	2562	2242	2173	2154	2502
48	13.75	15750	34800	0.40	1200.30	201.09			737.10	2054	2972	2599	2529	2510	29/2
4/	13.75	18900	43500	0.40	1489.95	201.09			825.30	2307	3381	2955	2880	2807	3381
40	13.75	22050	52200	0.40	1/13.00	201.09			913.30	2081	3/91	3312	3243	3223	3/91
45	13.75	25200	60900	0.40	1937.23	201.09			1001.70	2994	4200	3009	3099	3080	4200
44	13.75	28550	78200	0.40	2100.90	201.09			1089.90	3307	4010	4023	3930	3930	4010
43	13.75	31300	/8300	0.40	2384.33	201.09			11/6.10	3020	5019	4382	4512	4293	5019
42	13.75	34030	87000	0.40	2008.20	201.09			1200.30	3933	5929	4/38	4009	4000	5925
41	13.75	37800	93/00	0.40	2851.85	201.09			1304.00	4240	2828	5600	5462	5000	2020
40	13.75	40930	112100	0.40	2020.15	208.13			1442.70	4033	6728	5000	5910	5900	6729
20	13.75	44100	121800	0.40	32/9.13	208.13			1530.90	5270	0738	5245	5019	5800	0/30
27	13.75	47230	121800	0.40	2726.45	208.13			1019.10	5502	7147	6602	6522	6512	7147
26	13.75	52550	130300	0.40	3720.43	200.13			1707.30	5006	7357	6052	6990	6870	7066
30	12.75	55550	139200	0.40	4173 75	208.13			1/93.30	6210	8376	7315	7245	7226	900
3.1	12.75	50700	147900	0.40	4175.75	208.13			1003.70	6532	8370	7515	7245	7220	8785
33	12.75	63000	165300	0.40	4521.05	208.13			2060.10	6845	0105	8028	7002	7303	0105
30	12.75	66150	174000	0.40	4844.70	208.13			2148 30	7158	9195	8384	8315	8206	919.
32	13.73	69300	182700	0.40	5068 35	200.13			2140.30	7158	10014	8741	8672	8652	10014
30	12.75	72450	191/00	0.40	5292.00	200.13			2230.30	778/	10014	0000	0072	9002	10423
29	13.75	72450	200100	0.40	5515.65	438.28			2324.70	8336	110423	9658	9589	9570	11032
29 28 Mech	27.50	75000	200100	1.00	5739.30	\$76.56			2412.90	9262	12587	10925	10856	10837	11057
20 NICCH	1/1.59	81900	217500	0.40	5962.95	464.84			2003.40	8000	12503	10725	10350	10699	12507
26	14.56	85050	217500	0.40	6186.60	438.28			3061.80	9275	12505	11112	11043	11024	12505
25	13.75	88200	220200	0.40	6410.25	438.28			3150.00	9588	12000	11112	11400	11380	12000
23	13.75	91350	234500	0.40	6633.90	438.28			3238.20	9901	13699	11405	11756	11737	13600
23	13.75	94500	252300	0.40	6857.55	438.28			3326.40	10214	14109	12182	12113	12094	14109
23	13.75	97650	252500	0.40	7081.20	438.28			3414 60	10527	14518	12102	12113	12051	14518
21	13.75	100800	269700	0.40	7304.85	438.28			3502.80	10840	14928	12895	12105	12150	14028
20	13.75	103950	278400	0.40	7528 50	438.28			3591.00	11153	15337	13252	13183	13163	15337
19	13.75	107100	287100	0.40	7752.15	438.28			3679.20	11467	15747	13609	13539	13520	15747
18	13.75	110250	295800	0.40	7975.80	438.28			3767.40	11780	16156	13965	13896	13876	16156
17	13.75	113400	304500	0.40	8199.45	438.28			3855.60	12093	16566	14322	14252	14233	16566
16	13.75	116550	313200	0.40	8423.10	438.28			3943.80	12406	16975	14678	14609	14590	16975
15	13.75	119700	321900	0.40	8646.75	438.28			4032.00	12719	17385	15035	14966	14946	17385
14 Cafeteria	12.58	122850	330600	1.00	8870.40	401.09)		4347.00	12980	18112	15574	15504	15485	18112
13	14.92	126000	339300	0.40	9094.05	475.47			4435.20	13397	18611	16019	15950	15931	18611
12 Data Center	13.75	129150	348000	1.00	9317.70	438.28			4750.20	13658	19339	16558	16489	16470	19339
11	13.75	132300	356700	0.40	9541.35	438.28			4838.40	13971	19748	16915	16845	16826	19748
10	13.75	135450	365400	0.40	9765.00	438.28			4926.60	14285	20158	17271	17202	17183	20158
9	13.75	138600	374100	0.40	9988.65	438.28			5014.80	14598	20567	17628	17559	17539	20567
8	13.75	141750	382800	0.40	10212.30	438.28			5103.00	14911	20977	17984	17915	17896	i 20977
7	13.75	144900	391500	0.40	10435.95	438.28			5191.20	15224	21386	18341	18272	18252	21386
6	13.75	148050	400200	0.40	10659.60	438.28			5279.40	15537	21796	18698	18628	18609	21796
5	13.75	151200	408900	0.40	10883.25	438.28			5367.60	15850	22205	19054	18985	18966	22205
4	14.32	154350	417600	0.40	11106.90	456.54			5455.80	16189	22637	19433	19363	19344	22637
3	15.47	157500	426300	0.40	11330.55	493.07	,		5544.00	16553	23090	19833	19764	19744	23090
2	15.47	160650	435000	0.40	11554.20	493.07			5632.20	16866	23500	20190	20120	20101	23500
1	25.66	163800	443700	0.40	11777.85	817.79			5720.40	17634	24299	20936	20867	20847	24299

Figure 164: SW1 Axial Loads due to Gravity

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						Redist	ribution									Shear Reinf.	Flexure	e Reinf.	
Story	Spandrel	Load	Loc	V2 (k)	M3 (ftk)	V2 (k)	M3 (ftk)	f'c (psi)	fy (psi)	I _n (ft)	b _w (in)	h (in)	Area (in ²)	V check for N	O Diagonals	# stirrup	#	Bar	Clear cover (in)
STORY52	B6	C1WY	Left	105	526	125	624	6000	60000	10	18	44	792	2.03	OK	4	5	8	1.50
STORY52	B6	C1WY	Right	105	-526	125	624	6000	60000	10	18	44	792	2.03	OK	4	5	8	1.50
STORY51	B6	C1WY	Left	154	771	125	624	6000	60000	10	18	44	792	2.03	ОК	4	5	8	1.50
STORY51	B6	C1WY	Right	154	-771	125	624	6000	60000	10	18	44	792	2.03	ок	4	5	8	1.50
STORY50	B6	C1WY	Left	156	780	125	624	6000	60000	10	18	44	792	2.03	ОК	4	5	8	1.50
STORY50	B6	C1WY	Right	156	-780	125	624	6000	60000	10	18	44	792	2.03	ОК	4	5	8	1.50
STORY49	B6	C1WY	Left	164	818	152	758	6000	60000	10	18	44	792	2.47	ок	4	6	8	1.50
STORY49	B6	C1WY	Right	164	-818	152	758	6000	60000	10	18	44	792	2.47	ОК	4	6	8	1.50
STORY48	B6	C1WY	Left	176	880	152	758	6000	60000	10	18	44	792	2.47	ОК	4	6	8	1.50
STORY48	B6	C1WY	Right	176	-880	152	758	6000	60000	10	18	44	792	2.47	ОК	4	6	8	1.50
STORY47	B6	C1WY	Left	190	948	152	758	6000	60000	10	18	44	792	2.47	OK	4	6	8	1.50
STORY47	B6	C1WY	Right	190	-948	152	758	6000	60000	10	18	44	792	2.47	OK	4	6	8	1.50
STORY46	B6	C1WY	Left	203	1017	182	912	6000	60000	10	18	44	792	2.97	OK	4	7	8	1.50
STORY46	B6	C1WY	Right	203	-1017	182	912	6000	60000	10	18	44	792	2.97	OK	4	7	8	1.50
STORY45	B6	C1WY	Left	216	1082	182	912	6000	60000	10	18	44	792	2.97	ОК	4	7	8	1.50
STORY45	B6	C1WY	Right	216	-1082	182	912	6000	60000	10	18	44	792	2.97	OK	4	7	8	1.50
STORY44	B6	C1WY	Left	228	1140	182	912	6000	60000	10	18	44	792	2.97	OK	4	7	8	1.50
STORY44	B6	C1WY	Right	228	-1140	182	912	6000	60000	10	18	44	792	2.97	OK	4	7	8	1.50
STORY43	B6	C1WY	Left	237	1184	193	967	6000	60000	10	18	44	792	3.15	OK	4	6	9	1.50
STORY43	B6	C1WY	Right	237	-1184	193	967	6000	60000	10	18	44	792	3.15	OK	4	6	9	1.50
STORY42	B6	C1WY	Left	242	1209	193	967	6000	60000	10	18	44	792	3.15	OK	4	6	9	1.50
STORY42	B6	C1WY	Right	242	-1209	193	967	6000	60000	10	18	44	792	3.15	OK	4	6	9	1.50
STORY41	B6	C1WY	Left	339	1694	271	1356	8000	60000	10	24	44	1056	2.87	OK	4	8	9	1.50
STORY41	B6	C1WY	Right	339	-1694	271	1356	8000	60000	10	24	44	1056	2.87	OK	4	8	9	1.50
STORY40	B6	C1WY	Left	371	1854	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY40	B6	C1WY	Right	371	-1854	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY39	B6	C1WY	Left	374	1870	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY39	B6	C1WY	Right	374	-1870	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY38	B6	C1WY	Left	378	1889	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY38	B6	C1WY	Right	378	-1889	302	1511	8000	60000	10	24	44	1056	3.20	OK	4	7	10	1.50
STORY37	B6	C1WY	Left	380	1902	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY37	B6	C1WY	Right	380	-1902	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY36	B6	C1WY	Left	380	1899	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY36	B6	C1WY	Right	380	-1899	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY35	B6	C1WY	Left	374	1871	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY35	B6	C1WY	Right	374	-1871	304	1521	8000	60000	10	24	44	1056	3.22	OK	4	7	10	1.50
STORY34	B6	C1WY	Left	361	1804	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY34	B6	C1WY	Right	361	-1804	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY33	B6	C1WY	Left	336	1682	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY33	B6	C1WY	Right	336	-1682	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY32	B6	C1WY	Left	297	1483	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY32	B6	C1WY	Right	297	-1483	289	1443	8000	60000	10	24	44	1056	3.06	OK	4	9	9	1.50
STORY31	B6	C1WY	Left	234	1172	188	938	8000	60000	10	24	44	1056	1.99	OK	4	7	9	1.50
STORY31	B6	C1WY	Right	234	-1172	188	938	8000	60000	10	24	44	1056	1.99	OK	4	7	9	1.50
STORY30	B6	C1WY	Left	129	646	188	938	10000	60000	10	30	44	1320	1.42	OK	4	7	9	1.50
STORY30	B6	C1WY	Right	129	-646	188	938	10000	60000	10	30	44	1320	1.42	OK	4	7	9	1.50

Figure 165: Coupling Beam Design Hand calculations

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STORY29	B6	C1WY	Left	166	831	188	938	10000	60000	10	30	44	1320	1.42	OK	4	7	9	1.50
STORY29	B6	C1WY	Right	166	-831	188	938	10000	60000	10	30	44	1320	1.42	OK	4	7	9	1.50
STORY28	B6	C1WY	Left	110	549	93	466	10000	60000	10	30	44	1320	0.71	OK	4	8	8	1.50
STORY28	B6	C1WY	Right	110	-549	93	466	10000	60000	10	30	44	1320	0.71	OK	4	8	8	1.50
STORY27	B6	C1WY	Left	108	542	93	466	10000	60000	10	30	44	1320	0.71	OK	4	8	8	1.50
STORY27	B6	C1WY	Right	108	-542	93	466	10000	60000	10	30	44	1320	0.71	ОК	4	8	8	1.50
STORY26	B6	C1WY	Left	116	582	93	466	10000	60000	10	30	44	1320	0.71	ок	4	8	8	1.50
STORY26	B6	C1WY	Right	116	-582	93	466	10000	60000	10	30	44	1320	0.71	OK	4	8	8	1.50
STORY25	B6	C1WY	Left	131	654	134	669	10000	60000	10	30	44	1320	1.01	OK	4	8	8	1.50
STORY25	B6	C1WY	Right	131	-654	134	660	10000	60000	10	30	44	1320	1.01	OK	4	8	8	1.50
STORV24	BG	C1WV	Loft	1/18	7/1	134	000	10000	60000	10	30	44	1320	1.01	OK	4	8	8	1.50
STORT24	DC	CIWY	Dight	140	741	134	600	10000	60000	10	20	44	1320	1.01	OK	4	0	0	1.50
STOR124	DO	CIWY	Right	140	-741	134	600	10000	60000	10	20	44	1320	1.01	OK	4	0	0	1.50
510R123	D0	CIVVY	Dialat	107	030	134	009	10000	60000	10	30	44	1320	1.01	OK	4	0	0	1.50
STORY23	86	CTVVY	Right	167	-836	134	669	10000	60000	10	30	44	1320	1.01	ON	4	8	ð	1.50
STORY22	B6	C1VVY	Left	187	934	181	905	10000	60000	10	30	44	1320	1.37	OK	4	8	ŏ	1.50
STORY22	B6	C1WY	Right	187	-934	181	905	10000	60000	10	30	44	1320	1.37	OK	4	8	8	1.50
STORY21	B6	C1WY	Left	207	1033	181	905	10000	60000	10	30	44	1320	1.37	ОК	4	8	8	1.50
STORY21	B6	C1WY	Right	207	-1033	181	905	10000	60000	10	30	44	1320	1.37	OK	4	8	8	1.50
STORY20	B6	C1WY	Left	226	1131	181	905	10000	60000	10	30	44	1320	1.37	OK	4	8	8	1.50
STORY20	B6	C1WY	Right	226	-1131	181	905	10000	60000	10	30	44	1320	1.37	OK	4	8	8	1.50
STORY19	B6	C1WY	Left	245	1226	225	1124	10000	60000	10	30	44	1320	1.70	OK	4	8	8	1.50
STORY19	B6	C1WY	Right	245	-1226	225	1124	10000	60000	10	30	44	1320	1.70	OK	4	8	8	1.50
STORY18	B6	C1WY	Left	263	1317	225	1124	10000	60000	10	30	44	1320	1.70	ОК	4	8	8	1.50
STORY18	B6	C1WY	Right	263	-1317	225	1124	10000	60000	10	30	44	1320	1.70	ок	4	8	8	1.50
STORY17	B6	C1WY	Left	281	1405	225	1124	10000	60000	10	30	44	1320	1.70	OK	4	8	8	1.50
STORY17	B6	C1WY	Right	281	-1405	225	1124	10000	60000	10	30	44	1320	1 70	OK	4	8	8	1.50
STORY16	B6	C1WY	Left	298	1489	263	1315	10000	60000	10	30	44	1320	1 99	OK	4	8	ğ	1.50
STORY16	B6	C1WY	Right	298	-1489	263	1315	10000	60000	10	30	44	1320	1.99	OK	4	8	ğ	1.50
STORV16	BG	C1WY	Loft	207	1636	263	1315	10000	60000	10	30	44	1320	1.00	OK	4	8	a	1.50
STORT 15	BC	C1WV	Diaht	207	1530	203	1215	10000	60000	10	20	44	1320	1.00	OK	4	0	0	1.50
STORTIS	DO	CIWY	- Kiyin	200	-1550	203	1010	10000	60000	10	20	44	1320	1.55	OK	4	0	5	1.50
STORT 14	D0	CIVVI	Dialet	329	1044	203	1010	10000	60000	10	30	44	1320	1.99	OK	4	0	9	1.50
STORT 14	D0	CIVVY	Right	329	-1044	203	1315	10000	60000	10	30	44	1320	1.99	OK	4	0	9	1.50
STORY13	86	C1VVY	Lett	351	1/55	296	1480	10000	60000	10	30	44	1320	2.24	OK	4	1	10	1.50
STORY13	B6	C1VVY	Right	351	-1/55	296	1480	10000	60000	10	30	44	1320	2.24	OK	4	1	10	1.50
STORY12	B6	C1WY	Left	358	1/88	296	1480	10000	60000	10	30	44	1320	2.24	OK	4	(10	1.50
STORY12	B6	C1WY	Right	358	-1788	296	1480	10000	60000	10	30	44	1320	2.24	ОК	4	7	10	1.50
STORY11	B6	C1WY	Left	370	1850	296	1480	10000	60000	10	30	44	1320	2.24	OK	4	7	10	1.50
STORY11	B6	C1WY	Right	370	-1850	296	1480	10000	60000	10	30	44	1320	2.24	OK	4	7	10	1.50
STORY10	B6	C1WY	Left	382	1908	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY10	B6	C1WY	Right	382	-1908	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY9	B6	C1WY	Left	392	1959	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY9	B6	C1WY	Right	392	-1959	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY8	B6	C1WY	Left	401	2004	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY8	B6	C1WY	Right	401	-2004	321	1603	10000	60000	10	30	44	1320	2.43	OK	4	9	9	1.50
STORY7	B6	C1WY	Left	408	2040	335	1677	10000	60000	10	30	44	1320	2.54	OK	4	10	9	1.50
STORY7	B6	C1WY	Right	408	-2040	335	1677	10000	60000	10	30	44	1320	2.54	OK	4	10	q	1.50
STORYS	B6	C1W/V	Left	/13	2066	335	1677	10000	60000	10	30	44	1320	2.54	OK	4	10	å	1.50
STORYS	BG	C11/1/V	Diaht	/12	2000	335	1677	10000	60000	10	30	44	1320	2.04	OK	4	10	0	1.50
STORIG	D0 PC	C1WT	- Right	413	-2000	333	10//	10000	60000	10	20	44	1020	2.04	OK	4	10	9	1.50
STURY5	D0	CIVVY	Dialet	419	2096	335	10//	10000	00000	10	30	44	1320	2.54	OK	4	10	9	1.50
STORY5	86	CTWY	Right	419	-2096	335	16/7	10000	60000	10	30	44	1320	2.54	OK	4	10	9	1.50
STORY4	86	C1WY	Lett	428	2140	342	1/12	10000	60000	10	30	44	1320	2.59	OK	4	10	9	1.50
STORY4	B6	C1WY	Right	428	-2140	342	1712	10000	60000	10	30	44	1320	2.59	OK	4	10	9	1.50
STORY3	B6	C1WY	Left	423	2114	342	1712	10000	60000	10	30	44	1320	2.59	OK	4	10	9	1.50
STORY3	B6	C1WY	Right	423	-2114	342	1712	10000	60000	10	30	44	1320	2.59	OK	4	10	9	1.50

Figure 166: Coupling Beam Design Hand calculations

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OTODIA	-	041404		40			1 171	40000	00000	40			4000	0.00	014		-	0	4.50
STORY2	B6	C1WY	Left	19	34	35	1/4	10000	60000	10	30	44	1320	0.26	OK	4	1	9	1.50
STORY2	B6	C1WY	Right	19	-34	35	1/4	10000	60000	10	30	44	1320	0.26	OK	4	(9	1.50
STORY1	B6	C1WY	Left	44	218	35	174	10000	60000	10	30	44	1320	0.26	OK	4	7	9	1.50
STORY1	B6	C1WY	Right	44	-218	35	174	10000	60000	10	30	44	1320	0.26	OK	4	7	9	1.50
STORY30	B5	C1WY	Left	591	2786	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY30	B5	C1WY	Right	591	-3126	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY29	B5	C1WY	Left	652	3251	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY29	B5	C1WY	Right	652	-3266	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY28	B5	C1WY	Left	549	2737	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY28	B5	C1WY	Right	549	-2749	521	2600	10000	60000	10	30	44	1320	3.95	OK	4	12	10	1.50
STORY27	B5	C1WY	Left	482	2405	386	1924	10000	60000	10	30	44	1320	2.92	OK	4	10	10	1.50
STORY27	B5	C1WY	Right	482	-2417	386	1924	10000	60000	10	30	44	1320	2.92	OK	4	10	10	1.50
STORY26	B5	C1WY	Left	441	2198	386	1924	10000	60000	10	30	44	1320	2.92	ОК	4	10	10	1.50
STORY26	B5	C1WY	Right	441	-2209	386	1924	10000	60000	10	30	44	1320	2.92	ОК	4	10	10	1.50
STORY25	B5	C1WY	Left	415	2070	386	1924	10000	60000	10	30	44	1320	2.92	ОК	4	10	10	1.50
STORY25	B5	C1WY	Right	415	-2081	386	1924	10000	60000	10	30	44	1320	2.92	OK	4	10	10	1.50
STORY24	B5	C1WY	Left	396	1977	317	1582	10000	60000	10	30	44	1320	2 40	OK	4	9	9	1.50
STORY24	B5	C1WY	Right	396	-1987	317	1582	10000	60000	10	30	44	1320	2 40	OK	4	9	9	1.50
STORY23	B5	C1WY	Left	383	1910	317	1582	10000	60000	10	30	44	1320	2.40	OK	4	ğ	9	1.50
STORY23	B5	C1WY	Right	383	-1920	317	1582	10000	60000	10	30	44	1320	2.40	OK	4	ğ	ğ	1.50
STORY22	B5	C1WY	Loft	373	1862	317	1582	10000	60000	10	30	44	1320	2.40	OK	4	ğ	ğ	1.50
STORY22	B5	C1WY	Right	373	-1871	317	1582	10000	60000	10	30	44	1320	2.40	OK	4	ğ	ğ	1.50
STORV21	B6	C1WY	Loft	367	1829	203	1/63	10000	60000	10	30	44	1320	2.40	OK	4	å	a	1.50
STORY21	DS	C1WV	Dight	267	1023	202	1403	10000	60000	10	20	44	1220	2.22	OK	4	9	9	1.50
STORY20	DD	CIWY	- Kigni	262	-1030	233	1403	10000	60000	10	20	44	1320	2.22	OK	4	9	9	1.50
STORT20	DD	CIVVI	Dialat	202	1007	293	1403	10000	00000	10	20	44	1320	2.22	OK	4	9	9	1.50
STORT20	D0	CIVVI	Right	202	-1010	293	1403	10000	60000	10	20	44	1320	2.22	OK	4	9	9	1.50
STORY 19	D0	CIVVY	Diala	200	1/94	293	1403	10000	60000	10	20	44	1320	2.22	OK	4	9	9	1.50
STORY 19	D0	CIVVY	Right	360	-1003	293	1403	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STURY 18	B5	CTVVY	Lett	358	1/00	207	1431	10000	60000	10	30	44	1320	2.17	OK	4	9	9	1.50
STORY 18	85	CTVVY	Right	358	-1/9/	207	1431	10000	60000	10	30	44	1320	2.17	OK	4	9	9	1.50
STORY17	85	CTVVY	Len	358	1/8/	287	1431	10000	60000	10	30	44	1320	2.17	OK	4	9	9	1.50
STORY17	85	C1VVY	Right	358	-1/96	287	1431	10000	60000	10	30	44	1320	2.17	OK	4	9	9	1.50
STORY16	B5	C1WY	Left	359	1/89	287	1431	10000	60000	10	30	44	1320	2.17	OK	4	9	9	1.50
STORY16	B5	C1WY	Right	359	-1/98	287	1431	10000	60000	10	30	44	1320	2.1/	OK	4	9	9	1.50
STORY15	B5	C1WY	Left	353	1759	298	1484	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY15	B5	C1WY	Right	353	-1768	298	1484	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY14	B5	C1WY	Left	363	1809	298	1484	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY14	B5	C1WY	Right	363	-1818	298	1484	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY13	B5	C1WY	Left	372	1856	298	1484	10000	60000	10	30	44	1320	2.25	ОК	4	9	9	1.50
STORY13	B5	C1WY	Right	372	-1864	298	1484	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY12	B5	C1WY	Left	367	1828	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY12	B5	C1WY	Right	367	-1837	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY11	B5	C1WY	Left	368	1837	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY11	B5	C1WY	Right	368	-1846	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY10	B5	C1WY	Left	370	1845	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY10	B5	C1WY	Right	370	-1854	296	1476	10000	60000	10	30	44	1320	2.24	OK	4	9	9	1.50
STORY9	B5	C1WY	Left	371	1850	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY9	B5	C1WY	Right	371	-1859	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY8	B5	C1WY	Left	371	1850	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY8	B5	C1WY	Right	371	-1860	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50

Figure 167: Coupling Beam Design Hand calculations

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STORY7	B5	C1WY	Left	370	1845	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY7	B5	C1WY	Right	370	-1854	297	1480	10000	60000	10	30	44	1320	2.25	OK	4	9	9	1.50
STORY6	B5	C1WY	Left	367	1829	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY6	B5	C1WY	Right	367	-1838	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY5	B5	C1WY	Left	365	1819	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY5	B5	C1WY	Right	365	-1827	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY4	B5	C1WY	Left	364	1814	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY4	B5	C1WY	Right	364	-1822	293	1464	10000	60000	10	30	44	1320	2.22	OK	4	9	9	1.50
STORY3	B5	C1WY	Left	348	1738	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50
STORY3	B5	C1WY	Right	348	-1745	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50
STORY2	B5	C1WY	Left	324	1611	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50
STORY2	B5	C1WY	Right	324	-1627	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50
STORY1	B5	C1WY	Left	129	661	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50
STORY1	B5	C1WY	Right	129	-630	279	1390	10000	60000	10	30	44	1320	2.11	OK	4	10	8	1.50

Figure 168: Coupling Beam Design Hand calculations

						As,n	nin Check		As,max	c Check			F	lexure				B _{min}	check	Crack c	ontrol check
Story	Spandrel	d (in)	dt (in)	β	A _s (in ²)	3√f [*] _c bd/f _v	200bd/f,	A _{s,min}	0.025bd	A _{s,max}	a	с	$\epsilon_s = 0.003 (d-c)/c$	ε _y	ф	ϕM_n (ftk)	$\phi M_n > M_u$	b _{min}	$b > b_{min}$	min	used > min
STORY52	B6	41.50	41.50	0.75	3.95	2.89	2.49	OK	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	OK	3	OK
STORY52	B6	41.50	41.50	0.75	3.95	2.89	2.49	ок	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	ОК	3	ОК
STORY51	B6	41.50	41.50	0.75	3.95	2.89	2.49	ОК	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	ОК	3	ОК
STORY51	B6	41.50	41.50	0.75	3.95	2.89	2.49	ОК	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	ОК	3	ОК
STORY50	B6	41.50	41.50	0.75	3.95	2.89	2.49	ок	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	ОК	3	ОК
STORY50	B6	41.50	41.50	0.75	3.95	2.89	2.49	OK	18.68	OK	2.58	3.44	0.0332	0.0021	0.90	715	ОК	13.00	ОК	3	OK
STORY49	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	ОК	15.00	ОК	3	ОК
STORY49	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	ОК	15.00	ОК	3	ОК
STORY48	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	ОК	15.00	ОК	3	OK
STORY48	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	OK	15.00	OK	3	OK
STORY47	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	OK	15.00	OK	3	OK
STORY47	B6	41.50	41.50	0.75	4.74	2.89	2.49	OK	18.68	OK	3.10	4.13	0.0271	0.0021	0.90	852	OK	15.00	OK	3	OK
STORY46	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY46	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY45	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY45	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY44	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY44	B6	41.50	41.50	0.75	5.53	2.89	2.49	OK	18.68	OK	3.61	4.82	0.0228	0.0021	0.90	988	OK	17.00	OK	3	OK
STORY43	B6	41.44	41.44	0.75	6.00	2.89	2.49	OK	18.65	OK	3.92	5.23	0.0208	0.0021	0.90	1066	OK	16.38	OK	3	OK
STORY43	B6	41.44	41.44	0.75	6.00	2.89	2.49	OK	18.65	OK	3.92	5.23	0.0208	0.0021	0.90	1066	OK	16.38	OK	3	OK
STORY42	B6	41.44	41.44	0.75	6.00	2.89	2.49	OK	18.65	OK	3.92	5.23	0.0208	0.0021	0.90	1066	OK	16.38	OK	3	OK
STORY42	B6	41.44	41.44	0.75	6.00	2.89	2.49	OK	18.65	OK	3.92	5.23	0.0208	0.0021	0.90	1066	OK	16.38	OK	3	OK
STORY41	B6	41.44	41.44	0.65	8.00	4.45	3.32	OK	24.86	OK	2.94	4.52	0.0245	0.0021	0.90	1439	OK	20.88	OK	3	OK
STORY41	B6	41.44	41.44	0.65	8.00	4.45	3.32	OK	24.86	OK	2.94	4.52	0.0245	0.0021	0.90	1439	OK	20.88	OK	3	OK
STORY40	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	ОК	3	OK
STORY40	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY39	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY39	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY38	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY38	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY37	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY37	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY36	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK
STORY36	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27	5.03	0.0217	0.0021	0.90	1590	OK	20.25	OK	3	OK

Figure 169:Coupling Beam Design Hand calculations

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STORY35	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27 5.	03 0.021	7 0.0021 (0.90	1590
STORY35	B6	41.38	41.38	0.65	8.89	4.44	3.31	OK	24.83	OK	3.27 5.	03 0.021	7 0.0021 (0.90	1590
STORY34	B6	41.44	41.44	0.65	9.00	4.45	3.32	OK	24.86	OK	3.31 5.	09 0.021	4 0.0021 0	0.90	1611
STORY34	B6	41.44	41.44	0.65	9.00	4.45	3.32	OK	24.86	OK	3.31 5.	09 0.021	4 0.0021 0	0.90	1611
STORY33	B6	41.44	41.44	0.65	9.00	4.45	3.32	ОК	24.86	OK	3.31 5.	09 0.021	4 0.0021 (0.90	1611
STORY33	B6	41.44	41.44	0.65	9.00	4.45	3.32	OK	24.86	OK	3.31 5.	09 0.021	4 0.0021 0	0.90	1611
STORY32	B6	41.44	41.44	0.65	9.00	4.45	3.32	ОК	24.86	OK	3.31 5.	09 0.021	4 0.0021 0	0.90	1611
STORY32	B6	41.44	41.44	0.65	9.00	4.45	3.32	ОК	24.86	OK	3.31 5.	09 0.021	4 0.0021 (0.90	1611
STORY31	B6	41.44	41.44	0.65	7.00	4.45	3.32	ОК	24.86	OK	2.57 3.	96 0.028	4 0.0021 0	0.90	1265
STORY31	B6	41.44	41.44	0.65	7.00	4.45	3.32	ОК	24.86	OK	2.57 3.	96 0.028	4 0.0021 (0.90	1265
STORY30	B6	41.44	41.44	0.55	7.00	6.22	4.14	ок	31.08	ОК	1.65 2.	99 0.038	5 0.0021 (0.90	1279
STORY30	B6	41.44	41.44	0.55	7.00	6.22	4.14	ок	31.08	ОК	1.65 2.	99 0.038	5 0.0021 (0.90	1279
STORY29	B6	41.44	41.44	0.55	7.00	6.22	4.14	ок	31.08	ОК	1.65 2.	99 0.038	5 0.0021 (0.90	1279
STORY29	B6	41.44	41.44	0.55	7.00	6.22	4.14	ок	31.08	ОК	1.65 2.	99 0.038	5 0.0021 (0.90	1279
STORY28	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY28	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY27	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY27	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY26	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY26	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY25	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY25	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY24	B6	41.50	41.50	0.55	6.32	6.23	4 15	OK	31.13	OK	149 2	70 0.043	0 0 0021 0	0.90	1159
STORY24	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY23	B6	41.50	41.50	0.55	6.32	6.23	4 15	OK	31.13	OK	149 2	70 0.043	0 0 0021 0	0.90	1159
STORY23	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY22	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 0	0.90	1159
STORY22	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY21	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY21	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY20	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY20	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY19	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY19	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY18	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY18	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2.	70 0.043	0 0.0021 (0.90	1159
STORY17	B6	41.50	41.50	0.55	6.32	6.23	4.15	OK	31.13	OK	1.49 2	70 0.043	0 0.0021 (0.90	1159
STORY17	B6	41.50	41.50	0.55	6.32	6.23	4.15	ок	31.13	ок	1.49 2.	70 0.043	0 0.0021 (0.90	1159
STORY16	B6	41.44	41.44	0.55	8.00	6.22	4.14	ок	31.08	ОК	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY16	B6	41.44	41.44	0.55	8.00	6.22	4.14	ОК	31.08	OK	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY15	B6	41.44	41.44	0.55	8.00	6.22	4.14	ок	31.08	ок	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY15	B6	41.44	41.44	0.55	8.00	6.22	4.14	ок	31.08	ОК	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY14	B6	41.44	41.44	0.55	8.00	6.22	4.14	ок	31.08	ОК	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY14	B6	41.44	41.44	0.55	8.00	6.22	4.14	ок	31.08	ОК	1.88 3.	42 0.033	3 0.0021 (0.90	1458
STORY13	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3.	80 0.029	6 0.0021 (0.90	1613
STORY13	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3	80 0.029	6 0.0021 0	0.90	1613
STORY12	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3	80 0.029	6 0.0021 0	0.90	1613
STORY12	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3	80 0.029	6 0.0021 0	0.90	1613
STORY11	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3	80 0.029	6 0.0021 0	0.90	1613
STORY11	B6	41.38	41.38	0.55	8.89	6.21	4.14	OK	31.03	OK	2.09 3	80 0.029	6 0.0021 0	0.90	1613
STORY10	B6	41.44	41.44	0.55	9.00	6.22	4,14	OK	31.08	OK	2.12 3	85 0.029	3 0.0021 0	0.90	1635
STORY10	B6	41.44	41.44	0.55	9.00	6.22	4.14	OK	31.08	OK	2.12 3	85 0.029	3 0.0021 (0.90	1635

Figure 170: Coupling Beam Design Hand calculations

OK	20.25	OK	3	OK
ОК	20.25	ОК	3	ОК
OK	23.13	OK	3	OK
OK	23 13	OK	3	OK
OK	23.13	OK	3	OK
OK	23.13	OK	3	OK
OK	23.13	OK	3	OK
OK	23.13	OK	3	OK
OK	18.63	OK	3	OK
OK	18.63	OK	3	OK
OK	19.63	OK	1	OK
OK	10.00	OK	4	OK
OK	10.00	OK	4	OK
OK	10.00	OK	4	OK
OK	10.03	OK	4	OK
OK	19.00	OK	4	OK
ON	19.00	ON	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	ОК	4	ок
OK	19.00	OK	4	ОК
OK	19.00	OK	4	ОК
OK	19.00	ОК	4	ОК
OK	19.00	OK	4	OK
OK	19.00	OK	4	ОК
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	19.00	ОК	4	OK
OK	19.00	ОК	4	OK
OK	19.00	OK	4	OK
OK	19.00	OK	4	OK
OK	20.88	OK	4	OK
OK	20.88	OK	4	OK
OK	20.88	OK	4	OK
OK	20.88	ОК	4	OK
OK	20.88	ОК	4	OK
OK	20.88	ОК	4	OK
ок	20.25	ок	4	ОК
OK	20.25	OK	4	OK
OK	20.25	ОК	4	OK
OK	20.25	OK	4	OK
OK	20.25	OK	4	OK
ОК	20.25	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK

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STODVO	B6	41.44	41.44	0.66	9.00	6.22	1 14	OK	31.08	OK	2 12 3 85	0 0203	0.0021_0.90	1635	OK	23.13	OK	4	OK
STORYS	D0 DC	41.44	41.44	0.55	9.00	6.22	4.14	OK	21.00	OK	2.12 3.03	0.0200	0.0021 0.30	1625	OK	23.13	OK	4	OK
STORTS	D0	41.44	41.44	0.55	9.00	0.22	4.14	OK	31.00	OK	2.12 3.05	0.0293	0.0021 0.50	1035	OK	23.13	OK	4	OK
STORTO	D0	41.44	41.44	0.55	9.00	0.22	4.14	ON	31.00	ON	2.12 3.05	0.0293	0.0021 0.90	1035	OK	23.13	OK	4	OK
STURYS	D0	41.44	41.44	0.55	9.00	6.22	4.14	ON	31.00	ON	2.12 3.05	0.0293	0.0021 0.90	1035	OK	23.13	ON	4	OK
STORY/	86	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	OK	25.38	OK	4	OK
STORY/	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	OK	25.38	OK	4	OK
STORY6	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	OK	25.38	OK	4	OK
STORY6	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	OK	4	ОК
STORY5	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ок	25.38	ок	4	ок
STORY5	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	OK	4	ок
STORY4	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	ок	4	ОК
STORY4	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	ОК	4	ОК
STORY3	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	ок	4	ОК
STORY3	B6	41.44	41.44	0.55	10.00	6.22	4.14	OK	31.08	OK	2.35 4.28	0.0261	0.0021 0.90	1812	ОК	25.38	OK	4	OK
STORY2	B6	41.44	41.44	0.55	7.00	6.22	4.14	OK	31.08	OK	1.65 2.99	0.0385	0.0021 0.90	1279	ОК	18.63	OK	4	ОК
STORY2	B6	41.44	41.44	0.55	7.00	6.22	4.14	OK	31.08	OK	1.65 2.99	0.0385	0.0021 0.90	1279	ОК	18.63	OK	4	ОК
STORY1	B6	41.44	41.44	0.55	7.00	6.22	4.14	OK	31.08	OK	1.65 2.99	0.0385	0.0021 0.90	1279	ОК	18.63	OK	4	OK
STORY1	B6	41.44	41.44	0.55	7.00	6.22	4.14	OK	31.08	OK	1.65 2.99	0.0385	0.0021 0.90	1279	OK	18.63	OK	4	OK
STORY30	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	OK	17.75	OK	4	OK
STORY30	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	OK	17.75	OK	4	OK
STORY29	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	OK	17.75	OK	4	OK
STORY29	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	OK	17.75	OK	4	OK
STORY28	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	ОК	17.75	OK	4	OK
STORY28	B5	40.75	41.38	0.55	15.24	6.11	4.08	OK	30.56	OK	3.59 6.52	0.0160	0.0021 0.90	2672	ОК	17.75	OK	4	OK
STORY27	B5	40.75	41.38	0.55	12.70	6.11	4.08	OK	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	OK	4	OK
STORY27	B5	40.75	41.38	0.55	12.70	6.11	4.08	OK	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	OK	4	OK
STORY26	B5	40.75	41.38	0.55	12.70	6.11	4.08	ок	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	ОК	4	ОК
STORY26	B5	40.75	41.38	0.55	12.70	6.11	4.08	ок	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	ок	4	ОК
STORY25	B5	40.75	41.38	0.55	12.70	6.11	4.08	ок	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	ок	4	ОК
STORY25	B5	40.75	41.38	0.55	12.70	6.11	4.08	ок	30.56	OK	2.99 5.43	0.0198	0.0021 0.90	2243	ОК	15.25	ОК	4	ОК
STORY24	B5	41.44	41.44	0.55	9.00	6.22	4.14	ок	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	ОК	23.13	ок	4	ОК
STORY24	B5	41.44	41.44	0.55	9.00	6.22	4.14	ок	31.08	ОК	2.12 3.85	0.0293	0.0021 0.90	1635	ОК	23.13	ок	4	ОК
STORY23	B5	41.44	41.44	0.55	9.00	6.22	4.14	ок	31.08	ОК	2.12 3.85	0.0293	0.0021 0.90	1635	ОК	23.13	ок	4	ОК
STORY23	B5	41.44	41.44	0.55	9.00	6.22	4.14	ок	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	ОК	23.13	ОК	4	OK
STORY22	B5	41.44	41.44	0.55	9.00	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY22	B5	41.44	41.44	0.55	9.00	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY21	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY21	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY20	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY20	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY19	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY19	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY18	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY18	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY17	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY17	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY16	B5	41.44	41 44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY16	B5	41.44	41.44	0.55	9	6 22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY15	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.00	1635	OK	23.13	OK	4	OK
STORY15	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.90	1635	OK	23.13	OK	4	OK
STORY14	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.00	1635	OK	23.13	OK	4	OK
STORY14	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.00	1635	OK	23.13	OK	4	OK
STORY13	B5	41.44	41.44	0.55	9	6.22	4 14	OK	31.08	OK	2 12 3 85	0.0293	0.0021 0.00	1635	OK	23.13	OK	4	OK
STORV13	B6	41.44	11.44	0.55	9	6.22	1 14	OK	31.00	OK	2.12 3.05	0.0200	0.0021 0.00	1635	OK	23.13	OK	4	OK
STOKT 13	00	41.44	41.44	0.00	J	0.22	4.14	OIL	51.00	OIL	2.12 0.00	0.0200	0.0021 0.00	1000	ON	20.10	ON	4	ON

Figure 171: Coupling Beam Design Hand calculations

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STORY12	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY12	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY11	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY11	B5	41.44	41.44	0.55	9	6.22	4.14	ок	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY10	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY10	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY9	B5	41.44	41.44	0.55	9	6.22	4.14	ок	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY9	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY8	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY8	B5	41.44	41.44	0.55	9	6.22	4.14	ок	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY7	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY7	B5	41.44	41.44	0.55	9	6.22	4.14	ок	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY6	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY6	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY5	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY5	B5	41.44	41.44	0.55	9	6.22	4.14	ОК	31.08	ОК	2.12 3.8	0.0293	0.0021 0.90	1635
STORY4	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY4	B5	41.44	41.44	0.55	9	6.22	4.14	OK	31.08	OK	2.12 3.8	0.0293	0.0021 0.90	1635
STORY3	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442
STORY3	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442
STORY2	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442
STORY2	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442
STORY1	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442
STORY1	B5	41.50	41.50	0.55	7.9	6.23	4.15	OK	31.13	OK	1.86 3.3	0.0338	0.0021 0.90	1442

Figure 172: Coupling Beam Design Hand calculations

Story	Spandrel	V _e =M _{pr1} +M _{pr2} /I _n (kip)	$\mathbf{V}_{c}=2\;\lambda\mathbf{V}\mathbf{f'}_{c}\mathbf{b}_{w}\mathbf{d}$	$\phi V_n = 0.5 \phi V_c$	$V_u @ d$	$\mathbf{V_s} = \mathbf{V_u}/\boldsymbol{\varphi}\text{-}\mathbf{V_c}$	$V_s \le 8 \sqrt{f_c} b_w d$		Smax
STORY52	B6	125	116	43	125	51	463	OK	8.00
STORY52	B6	125	116	43	125	51	463	OK	8.00
STORY51	B6	125	116	43	125	51	463	OK	8.00
STORY51	B6	125	116	43	125	51	463	OK	8.00
STORY50	B6	125	116	43	125	51	463	OK	8.00
STORY50	B6	125	116	43	125	51	463	OK	8.00
STORY49	B6	152	116	43	152	86	463	OK	8.00
STORY49	B6	152	116	43	152	86	463	OK	8.00
STORY48	B6	152	116	43	152	86	463	OK	8.00
STORY48	B6	152	116	43	152	86	463	OK	8.00
STORY47	B6	152	116	43	152	86	463	OK	8.00
STORY47	B6	152	116	43	152	86	463	OK	8.00
STORY46	B6	182	116	43	182	127	463	OK	8.00
STORY46	B6	182	116	43	182	127	463	OK	8.00
STORY45	B6	182	116	43	182	127	463	OK	8.00
STORY45	B6	182	116	43	182	127	463	OK	8.00
STORY44	B6	182	116	43	182	127	463	OK	8.00
STORY44	B6	182	116	43	182	127	463	OK	8.00
STORY43	B6	193	116	43	193	142	462	OK	9.00
STORY43	B6	193	116	43	193	142	462	OK	9.00

Figure 173: Coupling Beam Design Hand calculations

OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.13	OK	4	OK
OK	23.00	OK	4	OK
OK	23.00	OK	4	OK
OK	23.00	OK	4	OK
OK	23.00	OK	4	OK
OK	23.00	OK	4	OK
OK	23.00	OK	4	OK

Sused	$V_s = A_v f_y d/s$	
8.00	124.50	OK
6.00	166.00	OK
6.00	165.75	OK
6.00	165.75	OK

OTODY		L 100	110	10	400	110	100	014	0.00
STORY42	B6	193	116	43	193	142	462	OK	9.00
STORY42	B6	193	116	43	193	142	462	ОК	9.00
STORY41	B6	271	178	67	271	184	712	OK	9.00
STORY41	B6	271	178	67	271	184	712	OK	9.00
STORY40	B6	302	178	67	302	225	711	OK	10.00
STORY40	B6	302	178	67	302	225	711	OK	10.00
STORY39	B6	302	178	67	302	225	711	OK	10.00
STORY39	B6	302	178	67	302	225	711	OK	10.00
STORY38	B6	302	178	67	302	225	711	OK	10.00
STORY38	B6	302	178	67	302	225	711	OK	10.00
STORY37	B6	304	178	67	304	228	711	OK	10.00
STORY37	B6	304	178	67	304	228	711	OK	10.00
STORY36	B6	304	178	67	304	228	711	OK	10.00
STORY36	B6	304	178	67	304	228	711	OK	10.00
STORY35	B6	304	178	67	304	228	711	OK	10.00
STORY35	B6	304	178	67	304	228	711	OK	10.00
STORY34	B6	289	178	67	289	207	712	OK	9.00
STORY34	B6	289	178	67	289	207	712	OK	9.00
STORY33	B6	289	178	67	289	207	712	OK	9.00
STORY33	B6	289	178	67	289	207	712	ОК	9.00
STORY32	B6	289	178	67	289	207	712	ОК	9.00
STORY32	B6	289	178	67	289	207	712	ОК	9.00
STORY31	B6	188	178	67	188	72	712	OK	9.00
STORY31	B6	188	178	67	188	72	712	OK	9.00
STORY30	B6	188	249	93	188	1	995	OK	9.00
STORY30	B6	188	249	93	188	1	995	OK	9.00
STORY29	B6	188	249	93	188	1	995	OK	9.00
STORY29	B6	188	249	93	188	1	995	OK	9.00
STORY28	B6	93	249	93	93	-125	996	OK	8.00
STORY28	B6	93	249	93	93	-125	996	OK	8.00
STORY27	B6	93	249	93	93	-125	996	OK	8 00
STORY27	B6	93	249	93	93	-125	996	OK	8 00
STORY26	B6	93	249	93	93	-125	996	OK	8 00
STORY26	B6	93	249	93	93	-125	996	OK	8 00
STORY25	B6	134	249	93	134	-71	996	OK	8 00
STORY25	B6	134	249	93	134	-71	996	OK	8.00
STORY24	B6	134	249	93	134	-71	996	OK	8.00
STORY24	B6	134	249	93	134	-71	996	OK	8.00
STORY23	B6	134	249	93	134	-71	996	OK	8.00
STORY23	B6	134	249	93	134	-71	996	OK	8.00
STORY22	B6	181	249	93	181	-8	996	OK	8.00
STORY22	B6	181	240	93	181	-8	300	OK	8.00
STOPV21	B6	181	243	03	181	-0	300	OK	8.00
STORV21	B6	181	243	03	101	-0	006	OK	8.00
STORY20	B6	181	243	93	101	-0	006	OK	8.00
STORY20	BC	101	243	02	101	-0	000	OK	0.00 0.00
510K120	00	101	249	93	101	-0	990	UN	0.00

Figure 174: Coupling Beam Design Hand calculations

6.00	165.75	OK
6.00	165.75	OK
4.00	248.63	OK
4.00	248.63	OK
4.00	248.25	OK
4.00	248.63	OK
8.00	124.31	OK
8.00	124.50	OK

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STORY19	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY19	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY18	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY18	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY17	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY17	B6	225	249	93	225	51	996	OK	8.00	8.00	124.50	OK
STORY16	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY16	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY15	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY15	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY14	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY14	B6	263	249	93	263	102	995	OK	9.00	8.00	124.31	OK
STORY13	B6	296	248	93	296	147	993	OK	10.00	6.00	165.50	OK
STORY13	B6	296	248	93	296	147	993	ОК	10.00	6.00	165.50	ОК
STORY12	B6	296	248	93	296	147	993	OK	10.00	6.00	165.50	OK
STORY12	B6	296	248	93	296	147	993	OK	10.00	6.00	165.50	OK
STORY11	B6	296	248	93	296	147	993	OK	10.00	6.00	165.50	OK
STORY11	B6	296	248	93	296	147	993	OK	10.00	6.00	165.50	OK
STORY10	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY10	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY9	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY9	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY8	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY8	B6	321	249	93	321	179	995	OK	9.00	4.00	248.63	OK
STORY7	B6	335	249	93	335	199	995	OK	9.00	4.00	248.63	OK
STORY7	B6	335	249	93	335	199	995	OK	9.00	4 00	248 63	OK
STORY6	B6	335	249	93	335	199	995	OK	9.00	4 00	248 63	OK
STORY6	B6	335	249	93	335	199	995	OK	9.00	4.00	248.63	OK
STORY5	B6	335	249	93	335	199	995	OK	9.00	4.00	248.63	OK
STORY5	B6	335	249	93	335	199	995	OK	9.00	4.00	248.63	OK
STORY4	B6	342	249	93	342	208	995	OK	9.00	4.00	248.63	OK
STORY4	B6	342	249	93	342	208	995	OK	9.00	4.00	248.63	OK
STORY3	B6	342	249	93	342	208	995	OK	9.00	4.00	248.63	OK
STORY3	B6	342	249	93	342	208	995	OK	9.00	4.00	248.63	OK
STORY2	B6	35	249	93	35	-202	995	OK	9.00	9.00	110.50	OK
STORY2	B6	35	249	93	35	-202	995	OK	9.00	9.00	110.50	OK
STORY1	B6	35	249	93	35	-202	995	OK	9.00	9.00	110.50	OK
STORY1	B6	35	249	93	35	-202	995	OK	9.00	9.00	110.50	OK
STORY30	B5	520	245	92	520	449	978	OK	10 00	2 00	489.00	OK
STORY30	B5	520	245	92	520	449	978	OK	10.00	2.00	489.00	OK
STORY29	B5	520	245	92	520	449	978	OK	10.00	2.00	489.00	OK
STORY29	B5	520	245	92	520	449	978	OK	10.00	2.00	489.00	OK
STORY28	B5	520	245	92	520	449	978	OK	10.00	2.00	489.00	OK
STORY28	B5	520	245	92	520	445	978	OK	10.00	2.00	405.00	OK
STORY27	B5	385	245	92	385	268	978	OK	10.00	2.00	489.00	OK
STORY27	B5	385	245	92	385	268	978	OK	10.00	2.00	489.00	OK
STORY26	B5	385	245	92	385	268	978	OK	10.00	2.00	489.00	OK
STORV26	BE	385	240	02	395	200	079	OK	10.00	2.00	403.00	OK
STOR 120	00	305	240	52	305	200	510	ON	10.00	2.00	405.00	ON

Figure 175: Coupling Beam Design Hand calculations

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STORY25	B5	385	245	92	385	268	978	ОК	10.00	2.00	489.00	ОК
STORY25	B5	385	245	92	385	268	978	ОК	10.00	2.00	489.00	ОК
STORY24	B5	316	249	93	316	173	995	OK	9.00	4.00	248.63	OK
STORY24	B5	316	249	93	316	173	995	ОК	9.00	4.00	248.63	ОК
STORY23	B5	316	249	93	316	173	995	ОК	9.00	4.00	248.63	OK
STORY23	B5	316	249	93	316	173	995	ОК	9.00	4.00	248.63	OK
STORY22	B5	316	249	93	316	173	995	ОК	9.00	4.00	248.63	OK
STORY22	B5	316	249	93	316	173	995	OK	9.00	4.00	248.63	OK
STORY21	B5	293	249	93	293	141	995	ОК	9.00	6.00	165.75	OK
STORY21	B5	293	249	93	293	141	995	OK	9.00	6.00	165.75	OK
STORY20	B5	293	249	93	293	141	995	OK	9.00	6.00	165.75	OK
STORY20	B5	293	249	93	293	141	995	OK	9.00	6.00	165.75	OK
STORY19	B5	293	249	93	293	141	995	OK	9.00	6.00	165.75	OK
STORY19	B5	293	249	93	293	141	995	OK	9.00	6.00	165.75	OK
STORY18	B5	286	249	93	286	133	995	OK	9.00	6.00	165.75	OK
STORY18	B5	286	249	93	286	133	995	ОК	9.00	6.00	165.75	OK
STORY17	B5	286	249	93	286	133	995	ОК	9.00	6.00	165.75	OK
STORY17	B5	286	249	93	286	133	995	ОК	9.00	6.00	165.75	OK
STORY16	B5	286	249	93	286	133	995	OK	9.00	6.00	165.75	OK
STORY16	B5	286	249	93	286	133	995	OK	9.00	6.00	165.75	OK
STORY15	B5	297	249	93	297	147	995	ОК	9.00	6.00	165.75	ОК
STORY15	B5	297	249	93	297	147	995	ОК	9.00	6.00	165.75	OK
STORY14	B5	297	249	93	297	147	995	ОК	9.00	6.00	165.75	ОК
STORY14	B5	297	249	93	297	147	995	OK	9.00	6.00	165.75	OK
STORY13	B5	297	249	93	297	147	995	ОК	9.00	6.00	165.75	ОК
STORY13	B5	297	249	93	297	147	995	ОК	9.00	6.00	165.75	ОК
STORY12	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	ОК
STORY12	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	OK
STORY11	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	OK
STORY11	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	OK
STORY10	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	OK
STORY10	B5	295	249	93	295	145	995	ОК	9.00	6.00	165.75	OK
STORY9	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY9	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY8	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY8	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY7	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY7	B5	296	249	93	296	146	995	OK	9.00	6.00	165.75	OK
STORY6	B5	293	249	93	293	142	995	OK	9.00	6.00	165.75	OK
STORY6	B5	293	249	93	293	142	995	OK	9.00	6.00	165.75	OK
STORY5	B5	293	249	93	293	142	995	ОК	9.00	6.00	165.75	OK
STORY5	B5	293	249	93	293	142	995	OK	9.00	6.00	165.75	OK
STORY4	B5	293	249	93	293	142	995	OK	9.00	6.00	165.75	OK
STORY4	B5	293	249	93	293	142	995	ОК	9.00	6.00	165.75	OK
STORY3	B5	278	249	93	278	122	996	OK	8.00	8.00	124.50	OK
STORY3	B5	278	249	93	278	122	996	ОК	8.00	8.00	124.50	OK
STORY2	B5	278	249	93	278	122	996	ОК	8.00	8.00	124.50	OK
STORY2	B5	278	249	93	278	122	996	OK	8.00	8.00	124.50	OK
STORY1	B5	278	249	93	278	122	996	OK	8.00	8.00	124.50	OK
STORY1	B5	278	249	93	278	122	996	OK	8.00	8.00	124.50	OK
				-					-			

Figure 176: Coupling Beam Design Hand calculations

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B =	161	ft		
H =	745.5	ft		
H/B =	4.633			
W _T =	180568	kips		
V _R =	96.880	MPH		
T =	50.000	year		
F _c =0.36+0).1ln(12T) =	0.9997		
V _R F _c =	96.85	MPH		
V _{mh} =	63.30	MPH		
V _{fm} =	80.39	MPH		
t _{fm} =	44.78	sec		
U _H =	63.30	MPH		
T _L =	6.46	sec		
T _D =	6.64	sec		
T _e =	4.41	sec		
ρ =	9.36	pcf		
ζ =	0.02			
g _p =	3.75			
Along-wir	ıd:			
M _D =	81,904,331	kg		
$K_D = (2\pi N)$) ² M =	24,471,132	N/m	
$C_D(Z) = 0.0$	116B ^{0.26} Z =	7.252		
$A_D(Z) = C_D$	(Z)U _H ^{2.74} /(K _D ⁰	^{0.37} ζ ^{0.5} M _D ^{0.63}) =	1.86	mg
Across-wi	nd:			
ML =	81,904,331	kg		
K _I = (2πN)	² M =	25,824,979	N/m	
$C_1(Z) = 0.02$	263B ^{-0.54} Z =	0.730		
$A_1(Z) = CL$	(Z)Uu ^{3.54} /(Ki ^{0.}	$^{77}z^{0.5}M_1^{0.23}) =$	2.72	ma
	(-/-1) -(-2			
Torsional				
MMI =M(B	² +W ²)/12 =	482	M	
M _e =	81,904,331	kg		
K _e = (2πN)	² M =	26,773,689,688	N/m	
$N_{\theta}B/U_{H} =$	0.393			
C _e (Z) =0.0	0341B ^{2.12} Z =	N/A		
C _e (Z) =0.0	0510B ^{1.24} Z =	144.657		
$A_{\theta}(Z) = C_{\theta}$	(Z)U _H ^{1.88} /(K _e -0.	. ⁰⁶ ζ ^{0.5} Μ _θ ^{1.06}) =	N/A	mg
$A_{\theta}(Z) = C_{\theta}$	(Z)U _H ^{2.76} /(K _e ^{0.3}	³⁸ ζ ^{0.5} Μ _θ ^{0.62}) =	0.06	mg
BA ₈ /SQRT	(2) =		2.09	mg
		2.0.5		
$A_R = (A_D^2 +$	+A [∠] L+(BA₀/SQ	2RT(2)) ²) ^{0.0} =	3.902	mg
$A_{peak} = g_p A$	λ _R =		14.631	mg

Figure 177: Building Acceleration Hand calculations

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Gravity Redesign																
			One 40'-0	" Long Infill H	Beam Spanning W	Vest-East			Two 30'-0" Long Infill Beam Spanning North-South							
		Light weig	ght concrete			Normal wei	ght concrete			Light weig	ht concrete		Normal weight concrete			
	Long Span De	ck (EC450)	Typical Deck	(CF DEK 3)	Long Span Deck (EC450) Typical Deck		Long Span Deck (WC450) Typical Deck (3" Lok)			k (3'' Lok)	Long Span Deck (EC450) Typical Deck		k (3VLI16)			
	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal	SMARTBeam	Normal
Slab depth (in)	8	8	6.25	6.25	8.75	8.75	NA	NA	8	8	6.25	6.25	8.75	8.75	7.5	7.5
Girder depth (in)	17.9	17.9	17.9	17.9	20.8	20.8	NA	NA	34.57	23.7	34.57	23.7	39.09	26.7	39.09	26.7
Beam Depth (in)	30.12	20.7	25.82	17.9	30.12	20.8	NA	NA	15.7	15.7	15.7	15.7	15.9	15.9	15.9	15.9
Total Structural Depth (in)	38.12	28.7	32.07	24.15	38.87	29.55	NA	NA	42.57	31.7	40.82	29.95	47.84	35.45	46.59	34.2
Beam size	LB30X44	W21X44	LB27X40	W18X40	LB30X44	W21X50	NA	NA	W16X26	W16X26	W16X26	W16X26	W16X31	W16X31	W16X31	W16X31
Hole Diameter (in)	20.75	NA	17.75	NA	20.75	NA	NA	NA	23.5	NA	23.5	NA	26.5	NA	26.5	NA
Girder Size	W18X40	W18X40	W18X40	W18X40	W21X50	W21X50	NA	NA	LB36X68/76	W24X68	LB36X68/76	W24X68	LB40X84/94	W27X84	LB40X84/94	W27X84
Deck Span (ft)	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	NA	NA	13'-4"	13'-4"	13'-4"	13'-4"	13'-4"	13'-4"	13'-4"	13'-4"
Deck Span Capacity (ft)	15'-7"	15'-7"	15'-7"	15'-7"	16'-3"	16'-3"	NA	NA	14'-1"	14'-1"	13'-4"	13'-4"	14'-4"	14'-4"	13'-4"	13'-4"
Beam Weights (psf)	3.43	3.43	3.17	3.17	3.56	3.96	NA	NA	4.03	3.89	4.03	3.89	4.90	4.74	4.90	4.74
Deck Weight (psf)	56.2	56.2	47.2	47.2	72.4	72.4	NA	NA	52.3	52.3	48.4	48.4	71.2	71.2	78.58	78.58
Structural Weight (psf)	59.63	59.63	50.37	50.37	75.96	76.36	NA	NA	56.33	56.19	52.43	52.29	76.10	75.94	83.48	83.32
Relative Cost (\$/SF)							NA	NA								

Figure 178: Potential Gravity System Matrix

	One 40'-0)" Long Infill B	eam Spanning	West-East	Two 30'-0" Long Infill Beam Spannin					
		LWC		NWC	LV	VC				
	EC	3.5	CF DEK 3	EC450	WC	450	EC450			
	SMARTBeam	Wide Flange	SMARTBeam	Wide Flange	SMARTBeam	Wide Flange	Wide Fla			
Slab depth (in)	5.5	5.5	6.25	8.75	8	8	8.75			
Girder depth (in)	17.9	20.7	17.9	20.8	34.57	23.7	26.7			
Beam Depth (in)	30.12	20.7	25.82	20.8	15.7	15.7	15.9			
Total Structural Depth (in)	35.62	26.2	32.07	29.55	42.57	31.7	35.45			
Beam size	LB30X44	W21X44	LB27X40	W21X50	W16X26	W16X26	W16X3			
Hole Diameter (in)	20.75	NA	17.75	NA	23.5	NA	NA			
Girder Size	W18X40	W21X44	W18X40	W21X50	LB36X68/76	W24X68	W27X8			
Deck Span (ft)	15'-0"	15'-0"	15'-0"	15'-0"	13'-4"	13'-4"	13'-4"			
Deck Span Capacity (ft)	17'-7"	17'-7"	15'-8"	16'-0''	14'-1"	14'-1"	14'-4"			
Beam Weights (psf)	3.43	3.48	3.17	3.96	4.03	3.89	4.74			
Deck Weight (psf)	56	56	47.2	72.4	52.3	52.3	71.2			
Structural Weight (psf)	59.43	59.48	50.37	76.36	56.33	56.19	75.94			
WF Beam Cost (\$/ton)	3500	3500	3500	3500	3500	3500	3500			
WF Beam Cost (\$/ton)	4500	4500	4500	4500	4500	4500	4500			
SMARTBeam Cost (\$/ton)	3600	NA	3600	NA	3600	NA	NA			
SMARTBeam Cost (\$/ton)	4700	NA	4700	NA	4700	NA	NA			
Slab/Deck Cost (\$/SF)	13.60	13.60	11.00	14.10	15.10	15.10	14.10			
Steel Cost(\$/SF) Low	6.16	6.10	5.68	6.93	7.16	6.81	8.29			
Steel Cost(\$/SF) High	8.02	7.84	7.39	8.91	9.30	8.76	10.66			
Relative Cost (\$/SF) Low	19.76	19.70	16.68	21.03	22.26	21.91	22.39			
Relative Cost (\$/SF) High	33.36	33.30	27.68	35.13	37.36	37.01	36.49			

Figure 179: Reduced Potential Gravity System Matrix

ng N	orth-South
NV	VC
)	3VLI16
nge	Wide Flange
	7.5
	26.7
	15.9
	34.2
31	W16X31
	NA
34	W27X84
	13'-4"
	13'-4"
	4.74
	78.58
	83.32
	3500
	4500
	NA
	NA
	10.00
	8.29
	10.66
	18.29
	28.29

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Thesis Bay Design For Walking Excitation					
Material Properties:					
Slab & Deck Properties:					
	w -	110	ncf		
	w _c -	110	lee!		
	r _c =	4	KS1		
	t _d =	4.50	in		
	t _c =	4.00	in		
	t _s =	8.50	in		
	L _s =	15.00	ft		
	W. =	54.20	psf		
Beam Properties:			-		
•	Size	W21X44			
	F., =	50	ksi		
	- y	65	ksi		
	-0	10.00	:2		
	A _b =	13.00	m		
	I _{bx} =	843	in"		
	d _b =	20.70	in		
	Camber =	1.5	in		
	S _j =	15.00	ft		
	B _i =	120	in		
	L. =	40	ft		
	w. =	44	plf		
	с. –	2.00	r		
Cirder Properties:	Cj -	2.00			
Gilder Properties.	Sizo	W19V40			
	5120	W10A40	1		
	r _y =	50	KSI		
	F _u =	65	KS1		
	A _g =	11.80	in ²		
	I _{ex} =	612	in ⁴		
	d. =	17.90	in		
	Camber =	0.75	in		
	S =	30.00	П		
	B =	90.0	н Ө		
		20.0	μ Δ		
	L _g –	50	10		
	w _g =	40	pli		
	C _g =	1.80			
Additional Information for Vibration Analysis:					
	width _{floor} =	160	ft		
	length _{floor} =	145	ft		
	w _{LL} =	11	psf		
	w _{SDL} =	4	psf		
Loads:					
Dead Loads:					
Slab:	0.054	ksf			
Beam Weight:	0.003	ksf			
MEP/Ceiling:	0.015	ksf			
Live Loads:					
Non-Reduced (L _o):	0.070	ksf			
% Reduced (L):	31.700	%			
Reduced:	0.048	ksf			
Total dead load:	1.082	klf			
Total live load:	1.050	klf			
Total reduced live load:	0.717	klf			
Const. dead load (unshored):	0.857	klf			
Const. live load (unshored):	0.300	klf			

Figure 180: EPICORE 4.5 Composite Beam Design and Vibration Analysis

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Required Flexural Strength:							
w _{u,o} =1.2D+1.6L _o =	3.0	klf					
w _u =1.2D+1.6L=	2.4	klf					
V _u =w _{u,o} 1/2=	59.6	k					
V _u =w _u 1/2=	48.9	k					
$M_u = w_{u,o}l^2/8 =$	595.7	ftk					
M _u =w _u 1 ² /8=	489.2	ftk					
Determine b _{eff} :							
$b_{eff} = min \text{ of } (span/8, 1/2 \text{ distance to adj. bm},$	100						
dist. 10 edge of slab)=	120	m					
Moment Arm for Concrete Force:							
Assume a=	3	in					
Y ₂ =t ₁₁₂ -a/2=	7.000	in	Table 3-19				
- 2 -stab		_					
Check Irea:							
Δ=1/240+camber=	3.500	in					
I=5wopt 14/(384FA)=	486 337	in ⁴	<	843	in ⁴	ОК	Table 3-20
Tred 2.4 CDT1 (201777)-	100.557			015		OR	14010 5 20
Check member strength as un-shored:							
w _{u(unshored)} =1.2D+1.6L=	1.508	klf					
M _{u(unshored)} =w _u l ² /8=	301.68	ftk	<	358	ftk	OK	Table 3-19
PNA location=	6						
ΣQ _n =	162	k					Table 3-19
Check member strength:		01		100	01	077	T 11 0 10
φM _n =	541	ftk	>	489	ftk	OK.	Table 3-19
φV _n =	217	k	>	49	k	OK	Table 3-3
Check a:	0 207	in		2	in.	OV	
a-2Qii/0.831 c0eff-	0.397	ш		3	ш	UK	
Check Arr:							
Δ ₁₁ =1/360=	1.333	in	I _{LB} =	1620	in ⁴	Table 3-20	
$\Lambda_{1} = 5 W_{1} I^{4} / (384 FL_{2}) =$	0.879	in	< 22	1 333	in	OK	
Check studs:	0.075			1.555			
O_=	17.2	kips/stud		Table 3-21			
# of studs= $\Sigma O_{e}/O_{e}$ =	9 419	use	10	studs/side			
Total studs=	20						
Slab Mode Properties:							
A ₁ = 12t _c =	48						
$A_2 = 12t_d/2 =$	27						
A _s =	48	in ²					
$y_s = (A_1t_c/2+A_2(t_c+t_d/2)/(A_1+A_2) =$	3.530	in					
$I_{s} = 12t^{3}/12 + 12(0.5)t^{3}/12 + A_{1}(v_{s}-t_{s}/2)^{2} +$							
$\Delta_{-}(t + t / 2 - t - 1)^{2} =$	408 120	in ⁴					
$E = \dots \frac{1.5 * c \text{ ODT}(2)}{2}$	2207	1.00					
$E_{c} = W_{c} - SQRT(\Gamma_{c}) =$ $W_{c} = (W + W + W) / 1000 =$	0.0602	ksi ksf					
$w_{s1} = (w_s + w_{LL} + w_{SDL})/1000 =$	0.0092	in					
$\Delta_{\rm s} = 5 W_{\rm s1} L_{\rm s} = 1/2 \delta / (584 E L_{\rm s}) = $	12 220	ш Ц-					
$f_{s} = 0.15^{\circ} SQR1(380.4/\Delta_{s}) =$ $R_{s} = (2/2) laggeth = -$	12.230	A					
$D_8 = (2/3) \text{length}_{\text{floor}} =$ $W = w \mathbf{R} \mathbf{I} -$	100 3/10	ri k					
$w_s - w_{sl}D_sL_s -$	100.540	K					

Figure 181: EPICORE 4.5 Composite Beam Design and Vibration Analysis

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Beam Mode Properties:							
$d_e = t_c + t_d/2 =$	6.25	in					
$n = E_s/1.35E_c =$	9.31						
$y_{bar} = (B_j t_c^2 / 2n + A_b (d_b / 2 + t_c + t_d)) / (B_j t_c / n + A_b) =$	5.393	in					
$I_{i} = B_{i}t_{c}^{3}/(12n)+I_{bx}+B_{i}t_{c}/n(y_{bar}-$							
$t_c/2)^2 + A_b(d_b/2 + t_c + t_d - y_{bar})^2 =$	3859.484	in ⁴					
$w_i = (B_i/12)(W_{slab}+W_{LL}+W_{SDL})+w_b =$	736	plf					
$\Delta_i = 5 w_i L_i^4 / (384 E I_i) =$	0.379	in					
$f_{\rm j} = 0.18^* {\rm SQRT}(386.4/\Delta_{\rm j}) =$	5.749	Hz					
$D_s = d_e^3/n =$	26.224	in ⁴ /ft					
$\mathbf{D}_{i} = \mathbf{I}_{i} / \mathbf{S}_{i} =$	257.299	in ⁴ /ft					
$B_{i1} = C_i (D_s/D_i)^{1/4} L_i =$	45.202	ft					
$B_{i2} = (2/3)$ width _{floor} =	106.667	ft					
$\mathbf{B}_{j} = \operatorname{Min} \operatorname{of}(\mathbf{B}_{j1} \& \mathbf{B}_{j2}) =$	45.202	ft					
W _j modifier (1.5 if continuous) =	1.500						
$W_{i} = (W_{i}/S_{i})B_{i}L_{i}/1000 =$	133.074	k					
Girder Mode Properties:							
$y_{bar} = (B_g d_e^2/2n + A_g (d_g/2 + t_c + t_d))/(B_g d_e/n + A_g) =$	5.466	in					
$I_{g} = B_{g}d_{e}^{3}/(12n)+I_{gx}+(B_{g}d_{e}/n)(y_{bar}-$							
$d_{a}/2)^{2}+A_{a}(d_{a}/2+t_{a}+t_{d}-y_{har})^{2}=$	2834.466	in ⁴					
$\mathbf{w}_{\sigma} = (\mathbf{w}_i / \mathbf{S}_i) \mathbf{L}_i + \mathbf{w}_{\sigma} =$	2003	plf					
$\Delta_{\sigma} = 5 w_{\sigma} L_{\sigma}^{4} / (384 \text{EI}_{\sigma}) =$	0.444	in					
$f_{g} = 0.18 \text{*} \text{SQRT}(386.4/\Delta_{g}) =$	5.310	Hz					
$D_g = I_g/L_i =$	70.862	in ⁴ /ft					
$B_{s1} = C_s (D_i/D_s)^{1/4} L_s =$	74.542	ft					
$B_{g2} = (2/3) \text{length}_{floor} =$	96.667	ft					
$B_g = Min of(B_{j1} \& B_{j2}) =$	74.542	ft					
$W_{g} = (w_{g}/L_{j})B_{g}L_{g}/1000 =$	111.962	k					
Combined Mode Properties:							
$W_{c} = \Delta_{g}W_{g}/(\Delta_{g} + \Delta_{j} + \Delta_{s}) + \Delta_{j}W_{j}/(\Delta g + \Delta_{j} + \Delta_{s}) +$	110710.04	lbc					
$\Delta_{s}W_{s}/(\Delta_{g}+\Delta_{j}+\Delta_{s}) =$	119/10.04	105					
					_		
					_		
$f_n = 0.18 \text{*}\text{SQRT}(386.4/(\Delta_g + \Delta_j + \Delta_s) =$	3.716	Hz					
β =	0.03		Table 4.1 AIS	C DG11	_		
P _o =	65	lbs	Table 4.1 AIS	C DG11			
$a_p/g=P_0e^{-0.35fn}/\beta W =$	0.005	<	0.005	OK		Equation 4.	1 AISC DG
β =	0.05		Table 4.1 AIS	C DG11	_		
P ₀ =	65	Ibs	Table 4.1 AIS	C DG11	_		
$a_p/g=P_0e^{-0.55fn}/\beta W =$	0.0030	<	0.005	ОК		Equation 4.	1 AISC DG

Figure 182: EPICORE 4.5 Composite Beam Design and Vibration Analysis

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Thesis Bay Design For Walking Excitation					
Material Properties:					
Slab & Deck Properties:					
	w -	110	ncf		
	w _c -	110	1:		
	r _c =	4	KS1		
	t _d =	3.50	in		
	t _c =	2.00	in		
	t _s =	5.50	in		
	L _s =	15.00	ft		
	W. =	56.00	psf		
Beam Properties:			-		
•	Size	W30X108			
	F., =	50	ksi		
	F. =	65	ksi		
		21.70	:2		
	A _b =	31.70	m		
	I _{bx} =	4470	in"		
	d _b =	29.80	in		
	Camber =	0.0	in		
	S _j =	15.00	ft		
	B _i =	120	in		
	L, =	40	ft		
	w. =	108	plf		
	C. =	2.00			
Cirder Properties:	C)	2.00			
Girder Properties.	Siza	W24X84			
	5120	50	1-ai		
	r _y -	50	KSI		
	F _u =	00	KS1		
	A _g =	24.70	in ²		
	I _{gx} =	2370	in ⁴		
	d, =	24.10	in		
	Camber =	0.00	in		
	S. =	30.00	ft		
	B =	90.0	Ĥ		
	g	30	A		
	L _g –	50			
	w _g -	04	рп		
	C _g =	1.80			
Additional Information for Vibration Analysis:					
	width _{floor} =	160	ft		
	length _{floor} =	145	ft		
	w _{LL} =	11	psf		
	w _{SDL} =	4	psf		
Loads:					
Dead Loads:					
Slab:	0.056	ksf			
Beam Weight:	0.007	ksf			
MEP/Ceiling:	0.015	ksf			
Live Loads:					
Non-Reduced (L _o):	0.070	ksf			
% Reduced (L):	31.700	%			
Reduced:	0.048	ksf			
Total dead load:	1.173	klf			
Total live load:	1.050	klf			
Total reduced live load:	0.717	klf			
Const. dead load (unshored):	0.948	klf			
Const. live load (unshored):	0.300	klf			

Figure 183: EPICORE 3.5 Composite Beam Design and Vibration Analysis

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Required Flexural Strength:							
w _{u,o} =1.2D+1.6L _o =	3.1	klf					
w _u =1.2D+1.6L=	2.6	klf					
V _u =w _{u,o} 1/2=	61.8	k					
V _u =w _u 1/2=	51.1	k					
$M_u = W_{u,o} l^2 / 8 =$	617.5	ftk					
$M_u = w_u l^2 / 8 =$	511.0	ftk					
Determine b _{eff} :							
b _{eff} = min of (span/8, 1/2 distance to adj. bm, dist. To edge of slab)=	120	in					
Moment Arm for Concrete Force:							
	1	in					
Y ₂ =t ₁₄ -a/2=	5.00	in	Table 3-19				
- 2 - 5120							
Check I _{req} :							
Δ=1/240+camber=	2.000	in					
$I_{reg} = 5 W_{CDI} \frac{1}{4} / (384 E \Delta) =$	941.462	in ⁴	<	4470	in ⁴	OK	Table 3-20
Check member strength as un-shored:							
Wu/unshored)=1.2D+1.6L=	1.618	klf					
Muunshorad)=wul ² /8=	323.52	ftk	<	1300	ftk	OK	Table 3-19
PNA location=	7						
ΣQ _n =	396	k					Table 3-19
Check member strength:							
φM _n =	1670	ftk	>	511	ftk	OK	Table 3-19
φV _n =	488	k	>	51	k	OK	Table 3-3
Check a:	0.071	:		1	:	OV	
a=2Qti/0.831_0 _{eff} =	0.971	ш	~	1	ш	UK	
Check Arr:							
∧ -1/260-	1 2 2 2	in	L=	7510	in ⁴	Table 3-20	
Δ _{LL} =1/300=	0.100	111 i.e.	ILB-	1 222		OV	
$\Delta_{LL} = 3W_{LL} I / (384EI_{LB}) =$	0.190	ш	~	1.555	ш	OK	
Check studs.	17.2	leine/stud		Table 3-21			
\neq of studs= $\Sigma \Omega / \Omega =$	23.023	1150	24	studs/side			
Total studs=	48	use	21	Study Side			
Slab Mode Properties:							
$A_1 = 12t_c =$	24						
$A_2 = 12t_d/2 =$	21						
A _s =	24	in ²					
$y_s = (A_1t_c/2 + A_2(t_c+t_d/2)/(A_1+A_2) =$	2.283	in					
$I_{s} = 12t^{3}/12 + 12(0.5)t^{3}/12 + A_{1}(v_{s}-t_{s}/2)^{2} +$							
$A_{s}(t_{+}t_{z}/2-v_{z})^{2}=$	96 700	in ⁴					
$F = w^{1.5} + CRT(4) - F$	20.700	ksi					
$L_c - w_c = SQR1(L_c) - W_{cr} = (W + W_{cr} + W_{cr})/1000 =$	0 0710	ksf					
$\Lambda = 5 \dots T \frac{4*1729}{204 \text{ET}} = 1000 \text{ m}^{-1}$	0.262	in					
$\Delta_{s} = 5 W_{s1} L_{s} = 1/26/(564 \text{LI}_{s}) = f = 0.18 \text{*}\text{SORT}(386.4/\text{A}) = 0.18 *$	5 877	Hz					
$B_s = (2/3) \text{length}_s =$	96 667	ft					
$W_s = W_s B_{I_s}$	102.950	k					
		1.5					

Figure 184: EPICORE 3.5 Composite Beam Design and Vibration Analysis

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Beam Mode Properties:							
$d_e = t_c + t_d/2 =$	3.75	in					
$n = E_s/1.35E_c =$	9.31						
$y_{bar} = (B_j t_c^2/2n + A_b(d_b/2 + t_c + t_d))/(B_j t_c/n + A_b) =$	11.699	in					
$I_{i} = B_{i}t_{c}^{3}/(12n)+I_{bx}+B_{i}t_{c}/n(y_{bar}-$							
$t_c/2)^2 + A_b(d_b/2 + t_c + t_d - y_{bar})^2 =$	9829.403	in ⁴					
$w_i = (B_i/12)(W_{slab}+W_{LL}+W_{SDL})+w_b =$	818	plf					
$\Delta_i = 5 w_i L_i^4 / (384 E I_i) =$	0.165	in					
$f_j = 0.18 \text{*} \text{SQRT}(386.4/\Delta_j) =$	8.703	Hz					
$D_s = d_e^3/n =$	5.664	in ⁴ /ft					
$\mathbf{D}_{i} = \mathbf{I}_{i} / \mathbf{S}_{i} =$	655.294	in ⁴ /ft					
$B_{i1} = C_i (D_s/D_i)^{1/4} L_i =$	24.393	ft					
$B_{i2} = (2/3)$ width _{floor} =	106.667	ft					
$\mathbf{B}_{j} = \operatorname{Min} \operatorname{of}(\mathbf{B}_{j1} \& \ \mathbf{B}_{j2}) =$	24.393	ft					
W _i modifier (1.5 if continuous) =	1.500						
· · · · · · · · · · · · · · · · · · ·							
$W_{i} = (w_{i}/S_{i})B_{i}L_{i}/1000 =$	79.814	k					
Girder Mode Properties:							
$y_{har} = (B_{g}d_{a}^{2}/2n + A_{g}(d_{g}/2 + t_{c} + t_{d}))/(B_{g}d_{g}/n + A_{g}) =$	8.227	in					
$I_{p} = B_{p}d_{s}^{3}/(12n) + I_{px} + (B_{p}d_{s}/n)(y_{hsr})$							
$d_{z}/2)^{2}+A_{z}(d_{z}/2+t_{z}+t_{z}-v_{hac})^{2}=$	6022.046	in ⁴					
$\mathbf{w}_{\sigma} = (\mathbf{w}_i / \mathbf{S}_i) \mathbf{L}_i + \mathbf{w}_{\sigma} =$	2265	plf					
$\Delta_{n} = 5 w_{n} L_{n}^{4} / (384 \text{EL}_{n}) =$	0.236	in					
$f_{\sigma} = 0.18 \text{*SQRT}(386.4/\Delta_{\sigma}) =$	7.277	Hz			_		
$D_{\sigma} = I_{\sigma}/L_{i} =$	150.551	in ⁴ /ft					
$B_{r1} = C_r (D_i / D_r)^{1/4} L_r =$	77,998	ft					
$B_{r2} = (2/3) \text{length}_{for} =$	96.667	ft					
$B_g = Min of(B_{11}\& B_{12}) =$	77.998	ft					
$W_{g} = (w_{g}/L_{j})B_{g}L_{g}/1000 =$	132.518	k					
Combined Mode Properties:							
$W_{c} = \Delta_{g}W_{g}/(\Delta_{g} + \Delta_{j} + \Delta_{s}) + \Delta_{j}W_{j}/(\Delta g + \Delta_{j} + \Delta_{s}) +$	107002.05	11.0					
$\Delta_{s}W_{s}/(\Delta_{g}+\Delta_{j}+\Delta_{s}) =$	10/093.05	IDS					
$f_n = 0.18*SQRT(386.4/(\Delta_g + \Delta_j + \Delta_s) =$	4.048	Hz					
β =	0.03		Table 4.1 AISC DG11				
P _o =	65	1bs	Table 4.1 AIS	C DG11			
$a_p/g=P_oe^{-0.35fn}/\beta W =$	0.005	<	0.005	OK		Equation 4.	1 AISC DG
β =	0.05		Table 4.1 AIS	C DG11			
P _o =	65	1bs	Table 4.1 AIS	C DG11			
$a_p/g=P_oe^{-0.35fn}/\beta W =$	0.0029	<	0.005	OK		Equation 4.	1 AISC DG

Figure 185: EPICORE 3.5 Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Existing Bay Design For Walking Excitation	n				
Material Properties:					
Slab & Deck Properties:					
-	w. =	150	pcf		
	f -	4	r		
	1 _c -		· ·		
	t _d =	3.00	m		
	t _c =	2.50	in		
	t _s =	5.50	in		
	L _s =	10.00	ft		
	W _s =	53.00	psf		
Beam Properties:					
	Size	W18X35			
	$F_v =$	50	ksi		
	F., =	65	ksi		
	Δ	10.30	in ²		
	- n _b -	10.50	. 4		
	I _{bx} =	510	m'		
	d _b =	17.70	in		
	Camber =	1.5	in		
	S _j =	10.00	ft		
	B _j =	120	in		
	L _i =	40	ft		
	w _b =	35	plf		
	C; =	2.00			
Girder Properties:					
	Size	W18X40			
	F. =	50	ksi		
	- y F =	65	kei		
	10-		• 2		
	A _g =	11.80	m ⁻		
	I _{gx} =	612	in ⁴		
	d _g =	17.90	in		
	Camber =	1.5	in		
	S _g =	30.00	ft		
	B, =	90.0	ft		
	L. =	30	ft		
	w. =	40	plf		
	C =	1.80	F		
Additional Information for Vibration Analysis:	Ug -	1.00			
Adduonal mormation for vioration Analysis.	width -	150	₽		
	1	1.10	n 0		
	lengun _{floor} -	145	п С		
	W _{LL} =	11	pst		
	w _{SDL} =	4	psf		
Loads:					
Dead Loads:					
Slab:	0.053	ksf			
Beam Weight:	0.004	kst			
MEP/Ceiling:	0.025	kst			
Live Loads:		1.0			
Non-Reduced (L _o):	0.070	kst			
% Reduced (L):	31.700	%			
Reduced:	0.048	ksf			
Total dead load:	0.815	klf			
Total live load:	0.700	klf			
Total reduced live load:	0.478	klf			
Const. dead load (unshored):	0.565	klf			
Const. live load (unshored):	0.200	klf			

Figure 186: Existing Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Required Flexural Strength:							
w _{u,o} =1.2D+1.6L _o =	2.1	klf					
w _u =1.2D+1.6L=	1.7	klf					
V _u =w _{u,o} 1/2=	42.0	k					
$V_u = w_u l/2 =$	34.9	k					
M _u =w _{u,0} 1 ² /8=	419.6	ftk					
M _u =w _u 1 ² /8=	348.6	ftk					
Determine b _{eff} :							
b_{eff} = min of (span/8 , 1/2 distance to adj. bm,							
dist. To edge of slab)=	120	in					
Moment Arm for Concrete Fores							
Assume an	1	in					
V-=t2/2=	5 000	in in	Table 3-10				
12 Glab 22	5.000		Table 5 17				
Check I:							
Δ=1/240+camber=	3,500	in					
I=5woor14/(384EA)=	320 631	in ⁴	<	510	in ⁴	OK	Table 3-20
Hed a webra (200 mm)	520.051	_		510		012	14010 5 20
Check member strength as un-shored:							
w _{u(unshored)} =1.2D+1.6L=	0.998	klf					
M _{u/unshored})=w _u l ² /8=	199.60	ftk	<	249	ftk	OK	Table 3-19
PNA location=	BFL						
ΣQ _n =	260	k					Table 3-19
Check member strength:							
φM _n =	435	ftk	>	420	ftk	OK	Table 3-19
φV _n =	159	k	>	42	k	OK	Table 3-3
Check a:	0.627	in.		1	in.	OV	
a-2Q100.831 def	0.037	ш		1	ш	OK	
Chock Arri							
▲ =1/260-	1 3 3 3	in	L.==	1170	in ⁴	Table 3-20	
	1.333	111 i.e.	ILB-	1 222		OV	
$\Delta_{LL}=5W_{LL}I/(384EI_{LB})=$	1.188	m	< .	1.555	m	UK	
Check studs.	17.2	kins/stud		Table 3-21			
$\pm \text{ of studs} = \Sigma \Omega / \Omega =$	15 116	1150	16	studs/side			
Total studs=	32	use	10	studs/side			
Slab Mode Properties:							
$A_1 = 12t_c =$	30						
$A_2 = 12t_d/2 =$	18						
A _s =	30	in ²					
$y_s = (A_1t_c/2 + A_2(t_c+t_d/2)/(A_1+A_2) =$	2.281	in					
$I_{s} = 12t_{r}^{3}/12 + 12(0.5)t_{r}^{3}/12 + A_{s}(v_{r}-t_{r}/2)^{2} +$							
$A_{a}(t_{a}+t_{a}/2-v_{a})^{2}=$	108 516	in^4					
$E = \frac{1.5 * cOPT(2)}{2}$	2674	 1/cei					
$W_{c} = (W + W_{c} + W_{c})/1000 =$	0.0680	ksf					
$\Lambda = 5$ $4 \times 1720 / (204 \text{ ET}) =$	0.0000	in					
$\Delta_{\rm s} = 5 {\rm w}_{\rm s1} \Delta_{\rm s} = 1/20/(564 {\rm EI}_{\rm s}) = f = 0.18 {\rm scort}(386.4/{\rm A}) = 0.18 {\rm scort}(386.4/{\rm scort}(386.4/{\rm A})) = 0.18 {\rm scort}(386.4/{\rm scort}(386.4/{$	18 062	Hz					
$B_s = (2/3)$ length. =	96 667	ft					
$W_{\rm s} = W_{\rm s} B_{\rm L}$	65 733	k					
		1.5					

Figure 187: Existing Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Beam Mode Properties:							
$d_{e} = t_{c} + t_{d}/2 =$	4.00	in					
$n = E_s/1.35E_c =$	5.85						
$y_{bar} = (B_{i}t_{c}^{2}/2n + A_{b}(d_{b}/2 + t_{c} + t_{d}))/(B_{i}t_{c}/n + A_{b}) =$	3.440	in					
$I_i = B_i t_c^3 / (12n) + I_{bx} + B_i t_c / n(y_{bar})$							
$t_{r}/2)^{2} + A_{b}(d_{b}/2 + t_{r} + t_{t} - V_{bar})^{2} =$	2008.815	in^4					
$w_i = (B_i/12)(W_{s1ab}+W_{LL}+W_{SDL})+w_b =$	715	plf					
$\Delta_i = 5 w_i L_i^4 / (384 E I_i) =$	0.707	in					
$f_i = 0.18 \text{*} \text{SQRT}(386.4/\Delta_i) =$	4.208	Hz					
$D_{s} = d^{3}/n =$	10.947	in ⁴ /ft					
$D_i = I_i / S_i =$	200.882	in ⁴ /ft					
$B_{i1} = C_i (D_s/D_i)^{1/4} L_i =$	38.652	ft					
$B_{i2} = (2/3)$ width _{floor} =	100.000	ft					
$B_{j} = Min of(B_{j1}\& B_{j2}) =$	38.652	ft					
W _i modifier (1.5 if continuous) =	1.500						
-							
$W_{i} = (w_{i}/S_{i})B_{i}L_{i}/1000 =$	165.818	k					
Girder Mode Properties:							
$y_{bar} = (B_{g}d_{e}^{2}/2n + A_{g}(d_{g}/2 + t_{c} + t_{d}))/(B_{g}d_{g}/n + A_{g}) =$	4.002	in					
$I_{g} = B_{g}d_{e}^{3}/(12n)+I_{gx}+(B_{g}d_{g}/n)(y_{bar})$							
$d_{a}/2)^{2} + A_{a}(d_{a}/2 + t_{r} + t_{d} - y_{har})^{2} =$	2228.990	in ⁴					
$w_{\alpha} = (w_i/S_i)L_i + w_{\alpha} =$	2900	plf					
$\Delta_{\pi} = 5 w_{\pi} L_{\pi}^{4} / (384 \text{EL}_{\pi}) =$	0.818	in					
$f_{p} = 0.18 \text{*} \text{SQRT}(386.4/\Delta_{p}) =$	3.913	Hz					
$D_p = I_p/L_i =$	55.725	in ⁴ /ft					
$\mathbf{B}_{\sigma 1} = \mathbf{C}_{\sigma} (\mathbf{D}_{i} / \mathbf{D}_{\sigma})^{1/4} \mathbf{L}_{\sigma} =$	74.408	ft					
$B_{g2} = (2/3) \text{length}_{floor} =$	96.667	ft					
$B_g = Min of(B_{j1}\& B_{j2}) =$	74.408	ft					
$W_{g} = (w_{g}/L_{j})B_{g}L_{g}/1000 =$	161.836	k					
Combined Mode Properties:							
$W_{\rm c} = \Delta_{\rm g} W_{\rm g} / (\Delta_{\rm g} + \Delta_{\rm j} + \Delta_{\rm s}) + \Delta_{\rm j} W_{\rm j} / (\Delta {\rm g} + \Delta_{\rm j} + \Delta_{\rm s}) +$	161278-01	lbc					
$\Delta_{s}W_{s}/(\Delta_{g}+\Delta_{j}+\Delta_{s}) =$	1012/0.01	105					
					_		
$f_{\rm n} = 0.18 \text{*} \text{SQRT}(386.4/(\Delta_{\rm g} + \Delta_{\rm j} + \Delta_{\rm s}) =$	2.830	Hz					
β =	0.03		Table 4.1 AISC	CDG11	_		
P ₀ =	65	lbs	Table 4.1 AISC	C DG11			
$a_p/g=P_0e^{-0.35fn}/\beta W=$	0.0050	<	0.005	OK	_	Equation 4.	1 AISC DG
β=	0.05	11	Table 4.1 AISC	DG11	_		
$P_0 =$	65	IDS	1 able 4.1 AISC	DGII	_		
$a_p/g=P_0e^{-0.55/n}/\beta W =$	0.0030	<	0.005	OK		Equation 4.	1 AISC DG

Figure 188:Existing Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Redesigned Bay Design For Walking Excit	ation				
Material Properties:					
Slab & Deck Properties:					
· · · · · · · · · · · · · · · · · · ·	w. =	110	pcf		
	f _	4	r		
	1 _c -		· ·		
	t _d =	3.00	in		
	t _c =	3.25	in		
	t _s =	6.25	in		
	L _s =	10.00	ft		
	W _s =	44.00	psf		
Beam Properties:					
	Size	W18X35			
	$F_v =$	50	ksi		
	F _u =	65	ksi		
	A. =	10 30	in ²		
		10.50	:4		
	I _{bx} =	510	шı		
	d _b =	17.70	m		
	Camber =	1.5	in		
	S _j =	10.00	ft		
	B _j =	120	in		
	L _j =	40	ft		
	w _b =	35	plf		
	C _j =	2.00			
Girder Properties:					
	Size	W18X40			
	$F_y =$	50	ksi		
	F _u =	65	ksi		
	A. =	11.80	in ²		
	I =	612	in ⁴		
	d =	17.90	in		
	Camber =	1.5	in .		
	S. =	30.00	Ĥ		
	B =	90.0	Ĥ		
	g	30	Ĥ		
		40	nlf		
	~ ~ ~ ~	1 00	ри		
Additional Information for Vibration Analysis:	C _g –	1.00			
Additional Information for Vioration Analysis.	width. =	150	Ĥ		
	length -	1/15	A		
	icinguigoor -	11	nef		
	••LL -	11	psi		
Taadaa	WSDL -		psi		
Loads:					
Slah	0.044	lvsf			
Beam Weight:	0.044	ksf			
MEP/Ceiling	0.004	ksf			
Live Loads:	0.025				
Non-Reduced (L.):	0.070	ksf			
% Reduced (L):	31 700	%			
Reduced:	0.048	ksf			
Total dead load:	0.725	klf			
Total live load:	0.700	klf			
Total reduced live load:	0.478	klf			
Const. dead load (unshored):	0.475	klf			
Const. live load (unshored):	0.200	klf			

Figure 189: Final Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Required Flexural Strength:							
w _{u,o} =1.2D+1.6L _o =	2.0	klf					
w _u =1.2D+1.6L=	1.6	klf					
V _u =w _{u,0} 1/2=	39.8	k					
$V_u = w_u l/2 =$	32.7	k					
$M_u = w_{u,o}l^2/8 =$	398.0	ftk					
$M_u = w_u l^2/8 =$	327.0	ftk					
Determine b _{eff} :							
b_{eff} = min of (span/8, 1/2 distance to adj. bm,	100						
dist. To edge of slab)=	120	m					
Moment Arm for Concrete Force:							
Assume a=	1	in					
$Y_2 = t_{slab} - a/2 =$	5.750	in	Table 3-19				
2 0.00							
Check I _{req} :							
Δ=1/240+camber=	3.500	in					
$I_{reg} = 5 w_{CDL} l^4 / (384 E \Delta) =$	269.557	in ⁴	<	510	in ⁴	OK	Table 3-20
Check member strength as un-shored:							
w _{u(unshored)} =1.2D+1.6L=	0.890	klf					
M _{u(unshored)} =w _u l ² /8=	178.00	ftk	<	249	ftk	OK	Table 3-19
PNA location=	BFL						
ΣQ _n =	260	k					Table 3-19
Chool: mombor strongth:							
M -	135	0 1/2	~	308	0 1-	OK	Table 3-10
ψινι _n -	150	1.	ĺ.	390	1.	OK	Table 3-19
φv _n =	159	ĸ	~	40	ĸ	UK	Table 3-3
Check a:							
a=ΣQn/0.85f,b _a #=	0.637	in	<	1	in	OK	
Check Δ_{LL} :							
Δ _{LL} =I/360=	1.333	in	I _{LB} =	1170	in ⁴	Table 3-20	
$\Delta_{11} = 5 W_{11} I^4 / (384 EI_{1B}) =$	1.188	in	<	1.333	in	OK	
Check studs:							
Q _n =	17.2	kips/stud		Table 3-21			
# of studs= $\Sigma Q_n/Q_n$ =	15.116	use	16	studs/side			
Total studs=	32						
Slab Mode Properties:							
$A_1 = 12t_c =$	39						
$A_2 = 12t_d/2 =$	18	• 2					
A _s =	39	111 ⁻					
$y_s = (A_1 t_c/2 + A_2 (t_c + t_d/2)/(A_1 + A_2) =$	2.612	m					
$I_s = 12t_c^3/12 + 12(0.5)t_c^3/12 + A_1(y_s-t_c/2)^2 +$							
$A_2(t_c+t_d/2-y_s)^2 =$	171.764	in ⁴					
$E_c = w_c^{1.5} * SQRT(f_c) =$	2307	ksi					
$W_{s1} = (W_s + W_{LL} + W_{SDL})/1000 =$	0.0590	ksf					
$\Delta_{s}=5w_{s1}L_{s}^{4}+1728/(384EI_{s})=$	0.033	in					
$f_{\rm s} = 0.18 \text{*} \text{SQRT}(386.4/\Delta_{\rm s}) =$							
	19.333	Hz					
$B_s = (2/3) length_{floor} =$	19.333 96.667	Hz ft					

Figure 190: Final Composite Beam Design and Vibration Analysis

BARBEN | CASEY | DUBOWSKI | MILLER

Beam Mode Properties:							
$d_e = t_c + t_d/2 =$	4.75	in					
$n = E_s / 1.35E_c =$	9.31						
$y_{bar} = (B_{i}t_{c}^{2}/2n+A_{b}(d_{b}/2+t_{c}+t_{d}))/(B_{i}t_{c}/n+A_{b}) =$	4.284	in					
$I_i = B_i t_c^3 / (12n) + I_{bx} + B_i t_c / n(y_{bar})$							
$t_{r}/2)^{2}+A_{h}(d_{h}/2+t_{r}+t_{d}-V_{har})^{2}=$	2048.007	in ⁴					
$w_i = (B_i/12)(W_{s1sb}+W_{LL}+W_{SDL})+w_b =$	625	plf					
$\Delta_i = 5 w_i L_i^4 / (384 E I_i) =$	0.606	in					
$f_i = 0.18 \text{*} \text{SQRT}(386.4/\Delta_i) =$	4.545	Hz					
$D_s = d_s^3/n =$	11.512	in ⁴ /ft					
$\mathbf{D}_{i} = \mathbf{I}_{i} / \mathbf{S}_{i} =$	204.801	in ⁴ /ft					
$B_{i1} = C_i (D_s/D_i)^{1/4} L_i =$	38.953	ft					
$B_{j2} = (2/3) \text{width}_{\text{floor}} =$	100.000	ft					
$\mathbf{B}_{j} = \mathbf{Min} \text{ of}(\mathbf{B}_{j1} \& \mathbf{B}_{j2}) =$	38.953	ft					
W _j modifier (1.5 if continuous) =	1.500						
$W_{i} = (W_{i}/S_{i})B_{i}L_{i}/1000 =$	146.074	k					
Girder Mode Properties:							
$y_{bar} = (B_g d_e^2/2n + A_g (d_g/2 + t_c + t_d))/(B_g d_e/n + A_g) =$	4.997	in					
$I_g = B_g d_e^{3}/(12n) + I_{gx} + (B_g d_e/n)(y_{bar})$							
$d_{e}/2)^{2}+A_{g}(d_{g}/2+t_{c}+t_{d}-y_{bar})^{2}=$	2242.418	in ⁴					
$w_g = (w_i/S_i)L_i + w_g =$	2540	plf					
$\Delta_p = 5 w_p L_p^4 / (384 \text{EI}_p) =$	0.712	in					
$f_g = 0.18 * SQRT(386.4/\Delta_g) =$	4.194	Hz					
$D_g = I_g/L_i =$	56.060	in ⁴ /ft					
$B_{g1} = C_g (D_i / D_g)^{1/4} L_g =$	74.656	ft					
$B_{g2} = (2/3) length_{floor} =$	96.667	ft					
$B_g = Min of(B_{j1}\& B_{j2}) =$	74.656	ft					
W _g =(w _g /L _j)B _g L _g /1000 =	142.219	k					
Combined Mode Properties:							
$W_{c} = \Delta_{g} W_{g} / (\Delta_{g} + \Delta_{j} + \Delta_{s}) + \Delta_{j} W_{j} / (\Delta_{g} + \Delta_{j} + \Delta_{s}) +$	141836 59	lbs					
$\Delta_{s}W_{s}/(\Delta_{g}+\Delta_{j}+\Delta_{s}) =$	111050.55	105					
					_		
$f_{\rm n} = 0.18 \text{*} \text{SQRT}(386.4/(\Delta_{\rm g} + \Delta_{\rm j} + \Delta_{\rm s}) =$	3.044	Hz	matta A t A 700	DOIL	_		
β=	0.03	11	Table 4.1 AISC	DGII	_		
$P_0 =$	65	Ibs	Table 4.1 AISC	DG11	_	-	
$a_p/g=P_oe^{-0.55fn}/\beta W =$	0.005	<	0.005	OK		Equation 4.	1 AISC DG
β=	0.05	1hc	Table 4.1 AISC	DGII	_		
$P_0 = -\frac{1}{2} - \frac{1}{2}	C0	105	Table 4.1 AISC	OV	_	Transford 4	
$a_p/g=P_0e^{-\alpha s/\alpha}/\beta W =$	0.003	<	0.005	OK		Equation 4.	I AISC DG

Figure 191: Final Composite Beam Design and Vibration Analysis
Serg Height of Thumy Are phone Area Live Load Diago Deal Load Diago Seor Load Diago Columa Load Diago Columa Load Lab	Column C2-5	5													
13 Mer. 9 9 9 9 9 146 195 18.5 16.5 16.6 16.6 197 117 13 Mer. 3233 3235 3230 0.0 117.2	Story level	Story Height (ft)	Tributary Area (ft ²)	Live Load Influence Area (ft ²)	Live Load Reduction Factor	Dead Load (kips)	Roof Live Load (kips)	Snow Load (kips)	Floor Live Load (kips)	Column Load 1.4D (kips)	Column Load 1.2D+1.6L+.5(Lr or S) (kips)	Column Load 1.2D+1.6(Lr or S)+L (kips)	Column Load 1.2D+L+0.5(Lr or S) (kips)	Column Load 1.2D+L+0.2S (kips)	Column Design Load
31 Mech 34 9 9 10 1132 193 1431 1431 109 1432 131 16 34.2															
31 Abad 129 120 1412 1413 1413 1413 1413 1413 1413 1413 1413 1413 1413 1413 1413 1414 1414 1414 1414 1414 1414 1414 1414 1414 1414 1414 1414 1414 14144 1414 1414 14	52 Roof	0	975	0	1.00	115.05	5 19.50	18.82	2	161	148	169	148	142	169
30 M.37 (2.5) (1.5) (3.5) $(3.5$	51 Mech	26.83	1950	3900	1.00	184.28	5		140.25	258	405	399	377	3/1	40:
30 123 200 110 200 210 200 <th< td=""><td>50</td><td>14.42</td><td>2925</td><td>/800</td><td>0.42</td><td>253.50</td><td></td><td></td><td>1/4.90</td><td>300</td><td>394</td><td>510</td><td>489</td><td>483</td><td>594</td></th<>	50	14.42	2925	/800	0.42	253.50			1/4.90	300	394	510	489	483	594
	49	13.75	3900	11/00	0.40	322.7	5		202.20	432	847	721	710	704	21
i i <td>40</td> <td>12.75</td> <td>4075</td> <td>19500</td> <td>0.40</td> <td>461.19</td> <td>2</td> <td></td> <td>229.30</td> <td>646</td> <td>07/</td> <td>731</td> <td>710 820</td> <td>704 814</td> <td>07/</td>	40	12.75	4075	19500	0.40	461.19	2		229.30	646	07/	731	710 820	704 814	07/
45 13.75 700 2300 0.44 596 11140 339 1228 100 1191 1015 44 13.75 975 3120 0.46 78.08 338.70 9135 1171 1181 1185 41 13.75 975 3100 0.46 78.08 338.70 1033 1416 1333 1235 1416 41 13.75 1170 4590 0.46 87.53 40.06 1227 175 1504 1442 1475 40 13.75 11505 5070 0.46 10149 47.528 1421 198 172 170 1977 31 13.75 1505 5070 0.46 113.46 52.58 1611 222 194 192 1918 34 13.75 1505 5600 0.46 121.48 54.44 160 246 246 244 213.8 35 13.75 1350 660	46	13.75	6825	23400	0.40	530.40	2		230.80	743	1101	952	930	924	110
44 13.75 8.75 12.00 0.40 668.85 938.00 936 1354 1172 1151 1145 42 13.75 1072 3900 0.40 807.30 393.80 1130 1068 1339 132 166 41 13.75 1267 4680 0.40 876.53 420.60 127 175 1544 149 137 40 13.75 1267 4680 0.40 947.5 447.50 132 1861 164 159 137 38 13.75 1462 5400 0.40 104.24 522.50 131 2115 183 183 1807 36 13.75 1505 6400 0.40 122.65 557.10 1712 238 2055 204 223 134 13.75 1825 7020 0.40 140.33 645.00 209 237 236 234 223 236 234 237 237	45	13.75	7800	23400	0.40	599.63	2		311.40	839	1228	1062	1041	1035	1225
	44	13.75	8775	31200	0.40	668.84	5		338 70	936	1354	1173	1151	1055	1354
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	43	13.75	9750	35100	0.40	738.08	3		366.00	1033	1481	1283	1261	1255	1481
1113.7511704.290 0.46 57.51 4.40.66122127.51504147.6147.61913.75136.95.070 0.46 104.194.77.2142.1198.117.41.0010971313.75136.05.500 0.46 104.194.72.2142.1198.1131.310713713.7515005.500 0.46 1153.435.29.2611312.1151.38.5131.013713.751.5006.500 0.46 122.255.271.61.1222.485.5052.942.0313513.771.7506.600 0.46 122.255.271.61.1722.4862.0552.932.23513413.751.8507.00 0.46 1.361.106.11.761.9662.0222.2762.2352.24913313.771.8507.00 0.46 1.490.336.39.002.0022.7492.3672.3671313.752.9477.4000.461.496.356.69.302.992.2572.2472.24713113.752.9468.9000.401.568.786.69.302.2992.3572.3062.3092913.752.2468.5800.401.658.786.99.602.1963.3022.0072.382.3092913.752.3408.9700.401.764.548.44.52.3713.3073.3063.309 <td>42</td> <td>13.75</td> <td>10725</td> <td>39000</td> <td>0.40</td> <td>807.30</td> <td>2</td> <td></td> <td>393.30</td> <td>1130</td> <td>1608</td> <td>1393</td> <td>1372</td> <td>1366</td> <td>1608</td>	42	13.75	10725	39000	0.40	807.30	2		393.30	1130	1608	1393	1372	1366	1608
40 13.7 13.67 4460 0.46 9457 447.5 447.5 13.4 161 114 193 157 138 13.7 1463 5460 0.40 1014.2 502.9 131 115 113 107 138 13.7 1463 5460 0.40 1034.2 502.9 518 211 1183 113 107 137 13.75 1557 6490 0.40 1222.6 557.16 1172 236 225 224 223 135 11355 6690 0.40 129.48 649.0 617.0 996 222 278 2255 2249 131 1375 1853 7000 0.40 190.33 669.0 202 278 2235 2249 131 1375 2243 8590 0.40 1995.5 666.3 299 233 247 236 239 131 1375 2243 8590 0.40 1995.5 669.6 2196 233 247 236 239 131 1375 2243 8590 0.40 1995.5 669.6 2196 233 237 238 239 132 1375 2243 8590 0.40 1995.5 70.99 239 313 217 230 239 231 1375 2243 8590 0.40 1995.5 70.59 333 357 333 357 <t< td=""><td>41</td><td>13.75</td><td>11700</td><td>42900</td><td>0.40</td><td>876.53</td><td>3</td><td></td><td>420.60</td><td>1227</td><td>1735</td><td>1504</td><td>1482</td><td>1476</td><td>173</td></t<>	41	13.75	11700	42900	0.40	876.53	3		420.60	1227	1735	1504	1482	1476	173
	40	13.75	12675	46800	0.40	945.75	5		447.90	1324	1861	1614	1593	1587	186
38 12.75 14625 54600 0.40 1084.20 592.25 1518 2115 1835 1133 1197 37 13.75 16575 62400 0.40 1122.265 577.10 1712 2265 2055 2034 2023 35 13.75 1755 66430 0.40 1222.265 557.10 1711 2268 2055 2034 2023 34 13.75 1755 66430 0.46 1291.86 844.0 1800 2495 2166 2144 2138 33 13.75 12900 0.46 1361.10 669.00 2002 2749 2387 2325 2294 31 13.75 21475 78000 0.40 1499.53 666.53 2099 2375 2497 2476 2477 31 13.75 21445 85900 0.40 1588.78 693.60 2296 3022 2007 2256 2250 29 13.75 22440 89700 0.40 1707.33 784.80 2230 3226 2828 2807 2801 27 14.56 22550 1375 22350 1369 3346 3146 3146 3146 27.5 2375 97500 0.40 194.490 994.965 2281 3326 3228 3225 3251 23 13.75 22730 10530 0.40 194.490 994.95 2971 3951 335	39	13.75	13650	50700	0.40	1014.98	3		475.20	1421	1988	1724	1703	1697	1988
37 3.75 1500 9.8500 0.40 1153.45 529.80 1015 2.242 1945 1926 1918 35 3.75 17550 66300 0.40 1221.86 55710 1712 236 2055 0244 2235 34 3.75 11525 7000 0.40 1291.86 934.40 1809 2495 2166 2144 2138 33 31.75 11520 0.40 1490.15 661.70 000 2279 237 2265 2289 32 3.275 21450 61000 0.46 1490.55 663.60 2090 2373 2377 2265 2259 31 3.75 21450 61900 0.46 1499.55 663.60 2090 2873 2477 2476 2470 30 1.75 22425 83600 0.46 1656.78 663.60 2096 2002 2079 238 2807 30 1.75 22425 83600 0.46 1656.78 663.60 2196 3002 2007 2386 2380 29 3.75 22425 83600 0.46 1695.78 673.60 2395 3129 2118 2686 2387 29 3.75 22425 83600 0.40 1776.45 894.45 2477 3573 3057 3057 3056 27 43.68 2375 26255 101.400 0.40 2953.35 <	38	13.75	14625	54600	0.40	1084.20	D		502.50	1518	2115	1835	1813	1807	2115
36 13.75 10575 6.040 $1.22.65$ 557.10 1712 2368 2055 2014 2028 35 13.75 18525 7020 0.40 136110 611.70 1906 2022 2276 2255 2249 33 13.75 19500 74100 0.40 1430.33 659.00 2002 2749 2287 2255 2249 31 13.75 29475 74000 0.40 1490.33 666.30 2099 2375 2497 2476 2476 31 13.75 21450 81900 0.40 1568.78 6695.60 2196 3002 2007 2386 2380 29 13.75 22400 89700 0.40 1568.78 695.60 2196 3002 2007 2386 2380 29 13.75 22400 89700 0.40 1707.33 7482.0 2390 3256 2232 2007 2381 27 14.58 2335 97500 0.40 1914.90 94905 2818 3826 3372 33257 33251 25 13.75 2330 97500 0.40 1984.13 976.35 2778 3933 3389 3367 33451 25 13.75 23257 13000 0.40 1984.13 976.35 2778 3933 3389 3367 33451 25 13.75 23275 13100 0.40 2192.18	37	13.75	15600	58500	0.40	1153.43	3		529.80	1615	2242	1945	1924	1918	2242
3513.7517550660000.40129.18584.4018924952166214421883413.751852577000.401430.33619.0020222792237226522393213.7524475780000.401499.55666.30200923732497247624703013.7521450810000.401656.78695.6021062007225623893013.7522425855000.401656.78695.60210923732497247624703013.752244087000.401656.78695.602126300220672288280728012913.752340087000.40170.72748.20239031252828280728012882.502437597000.401776.45894.4524873373307303630302714.58235997000.401914.96949.0526133263278322732512513.7526325101.4000.401914.90949.052613336336733612413.752730165300.401984.11976.3527183335338936733612413.7522525101.4000.402125.851003.6528154606349934773471	36	13.75	16575	62400	0.40	1222.65	5		557.10	1712	2368	2055	2034	2028	2368
34 13.75 1825 7020 0.40 130.10 611.70 100 222 22.76 22.55 22.94 33 13.75 19.90 7410 0.40 1430.33 639.00 2000 2479 237 2467 2476 2470 31 13.75 21450 81900 0.40 156.78 666.30 2099 2375 2497 2476 2470 31 13.75 21450 81900 0.40 156.78 695.60 2196 300.2007 258 2580 29 13.75 22425 85800 0.40 170.74 783.0 290 32.56 282.8 2807 2801 26 13.75 22150 9750 0.40 1984.56 921.75 2584 3699 3168 3146 3140 26 13.75 223.70 10350 0.40 1984.13 976.35 277 3389 3367 3361 24 13.75 </td <td>35</td> <td>13.75</td> <td>17550</td> <td>66300</td> <td>0.40</td> <td>1291.88</td> <td>3</td> <td></td> <td>584.40</td> <td>1809</td> <td>2495</td> <td>2166</td> <td>2144</td> <td>2138</td> <td>249</td>	35	13.75	17550	66300	0.40	1291.88	3		584.40	1809	2495	2166	2144	2138	249
33 13.75 19500 74100 0.40 14303 639.00 2002 2749 2387 2365 2359 31 13.75 21450 81900 0.40 1568.78 666.30 2099 2875 2497 2476 2470 31 13.75 22425 85800 0.40 1568.78 669.30 2196 3002 2607 2586 2580 30 13.75 22425 85800 0.40 1707.23 778.20 299 3125 2718 2606 2600 2001 29 13.75 22437 97500 0.40 1776.45 894.45 2487 3573 3057 3036 3030 26 13.75 22325 101400 0.40 1949.90 949.05 2681 3326 3278 3257 3251 24 13.75 2225 109200 0.40 21258 1003.65 2875 4060 3499 3477 3471	34	13.75	18525	70200	0.40	1361.10)		611.70	1906	2622	2276	2255	2249	2622
32 13.75 2017 7800 0.40 1499.55 666.30 2099 2875 2497 2476 2470 31 13.75 22425 81900 0.40 1558.78 693.60 2196 3002 2070 2586 2580 29 13.75 22400 89700 0.40 1707.23 748.20 2390 3256 28.82 2807 2301 27 14.58 2550 97500 0.40 1845.68 921.75 2584 3699 3168 3146 3140 26 13.75 22300 105300 0.40 1944.93 976.35 2778 3953 3389 3367 3361 24 13.75 28250 11300 0.40 2122.58 1030.65 2875 4060 3499 3477 3471 22 13.75 32250 11300 0.40 2122.58 1030.56 2875 4060 3499 3477 3471 <td< td=""><td>33</td><td>13.75</td><td>19500</td><td>74100</td><td>0.40</td><td>1430.33</td><td>3</td><td></td><td>639.00</td><td>2002</td><td>2749</td><td>2387</td><td>2365</td><td>2359</td><td>2749</td></td<>	33	13.75	19500	74100	0.40	1430.33	3		639.00	2002	2749	2387	2365	2359	2749
31 13.75 21450 81900 0.40 158.78 693.60 2196 3002 2607 2586 2580 30 13.75 22425 85800 0.40 1638.00 720.90 2293 3129 2718 2666 2680 29 13.75 2340 89700 0.40 170.23 744.20 2390 3256 2282 2007 2508 3036 3036 27 14.58 2530 97500 0.40 1914.90 949.05 2681 3826 3278 3257 3251 26 13.75 26325 101400 0.40 1914.90 949.05 2681 3826 3278 3257 3251 24 13.75 2709 0.40 2053.5 1003.65 2775 3953 3389 3367 3361 24 13.75 2920 113100 0.40 2122.58 1003.95 2972 4206 3609 3588 3582	32	13.75	20475	78000	0.40	1499.55	5		666.30	2099	2875	2497	2476	2470	287
30 13.75 22425 8580 0.40 158.00 720.90 223 31.29 2718 2690 2690 29 13.75 22400 8970 0.40 170.22 748.20 2390 325 528.220 2601 2301 28 Mech 27.50 24375 9360 1.00 1776.45 894.45 2437 3573 3057 3036 3030 27 14.58 2335 9750 0.40 191.490 949.05 2681 3826 278 3327 32351 26 13.75 23201 105300 0.40 191.490 949.05 2681 3826 3389 3367 3361 24 13.75 28250 1030.05 2972 4206 3699 3477 3471 22 13.75 31200 0.40 212.26 1030.95 2972 4206 3699 3692 21 13.75 31200 0.40 2251.5 1	31	13.75	21450	81900	0.40	1568.78	8		693.60	2196	3002	2607	2586	2580	3002
29 13.75 23400 89700 0.40 1707.23 748.20 2390 3256 2828 2807 2811 28 Mech 27.50 24375 93600 1.00 177.64 884.45 2487 3573 3057 3036 3036 27 14.58 25350 97500 0.40 1845.68 921.75 2584 3699 3166 3140 26 13.75 26325 101400 0.40 1944.90 949.05 2681 3826 3278 3257 3251 24 13.75 28275 109200 0.40 2053.35 1003.65 2875 4080 3499 3477 3471 23 13.75 29220 113100 0.40 212.58 1050.95 3069 333 3700 5698 3622 21 13.75 31200 120900 0.40 2261.03 1085.55 3165 4460 3830 3809 3802 20	30	13.75	22425	85800	0.40	1638.00	0		720.90	2293	3129	2718	2696	2690	3129
28 Mech 27.50 24375 99600 1.00 1776.45 894.45 2487 3573 30.57 30.36 30.30 27 14.58 2350 97500 0.40 1845.68 921.75 2584 3692 31.68 31.46 31.40 26 13.75 26325 101400 0.40 194.49 940.05 2681 382.0 32.78 32.57 32.51 25 13.75 227300 105300 0.40 292.15 1003.65 2875 40.00 3499 33.67 33.61 24 13.75 222.50 113100 0.40 212.2.8 1030.95 2972 42.06 3609 3588 352 22 13.75 320.25 117000 0.40 223.0.25 31.65 44.60 38.30 38.09 38.02 20 13.75 312.01 12.090 0.40 223.0.25 1112.8 32.62 45.87 3940 3919 3913	29	13.75	23400	89700	0.40	1707.23	3		748.20	2390	3256	2828	2807	2801	325
27 14.58 25350 97500 0.40 1845.68 921.75 2.584 3099 3168 3140 3140 26 13.75 26322 101400 0.40 1914.90 949.05 261 326 3278 3257 3251 25 13.75 28275 109200 0.40 1984.13 976.35 2778 3953 3389 3367 3361 24 13.75 28275 109200 0.40 205.35 1003.65 2875 4080 3499 3477 3471 23 13.75 29250 11700 0.40 212.58 1003.05 2875 4080 3499 3477 3471 22 13.75 30225 11700 0.40 226.03 1085.25 3165 4460 3330 3692 21 13.75 31200 129900 0.40 2230.25 1112.85 3262 4887 3940 3919 39313 19 <	28 Mech	27.50	24375	93600	1.00	1776.45	5		894.45	2487	3573	3057	3036	3030	3573
26 13.75 26325 101400 0.40 1914.90 940.05 2681 3826 3278 3257 3251 25 13.75 27300 105300 0.40 1984.13 976.35 2778 3953 3369 3361 24 13.75 28275 109200 0.40 2053.35 1003.65 2875 4060 3499 3477 3471 23 13.75 29250 113100 0.40 2122.58 1030.95 2972 4206 3609 3588 3582 21 13.75 30225 11700 0.40 2181.80 1058.25 3069 4333 3720 3698 3692 21 13.75 32175 124800 0.40 2330.25 1112.85 3262 4587 3940 3919 3913 19 13.75 34125 12800 0.40 239.48 1140.15 3359 4713 4051 404.9 4029 4023	27	14.58	25350	97500	0.40	1845.68	3		921.75	2584	3699	3168	3146	3140	369
25 13.75 27300 105300 0.40 1984.13 976.35 2778 3953 3389 3367 3361 24 13.75 28275 109200 0.40 2053.35 1003.65 2875 4080 3499 3477 3471 23 13.75 29250 113100 0.40 2122.58 1030.95 2972 4206 3609 3588 3582 22 13.75 30225 11700 0.40 2191.80 1085.55 3165 4460 3830 3809 3803 20 13.75 32175 124800 0.40 239.25 1110.15 3359 4713 4051 4029 4023 18 13.75 33150 128700 0.40 239.94 1140.15 3359 4967 4271 4250 4244 16 13.75 35100 13650 0.40 2537.93 1194.75 3553 4967 4271 4250 4244	26	13.75	26325	101400	0.40	1914.90	0		949.05	2681	3826	3278	3257	3251	3820
24 13.75 28275 109200 0.40 2053.35 1003.65 2875 4080 3499 3477 3471 23 13.75 29250 113100 0.40 2122.58 1030.95 2972 4206 3609 3588 3582 21 13.75 30202 11700 0.40 2191.80 1058.25 3069 4333 3720 3698 3692 21 13.75 31200 120900 0.40 2261.03 1085.55 3165 4460 3830 3809 3803 20 13.75 32175 12800 0.40 2330.25 1112.85 3262 4587 3940 3919 3913 19 13.75 33105 128700 0.40 2399.48 1140.15 3359 4713 4051 4020 4023 18 13.75 34125 132600 0.40 267.15 1167.45 3456 4840 4161 4140 4134 16 13.75 35100 13650 0.40 2676.38 1224.05 36	25	13.75	27300	105300	0.40	1984.13	3		976.35	2778	3953	3389	3367	3361	3953
23 13,75 2920 113100 0.40 2122.8 1030.95 2972 4206 3609 3588 3582 22 13,75 30225 117000 0.40 2191.80 1058.25 3069 4333 3720 3698 3699 3609 21 13,75 31200 12090 0.40 221.03 1088.55 3165 4460 3830 3809 3803 20 13,75 32175 12480 0.40 2330.25 1112.85 3262 4587 3940 3919 3913 19 13,75 33150 128700 0.40 2399.48 1140.15 3359 4713 4051 4029 4023 18 13,75 34125 132600 0.40 2537.93 1194.15 3553 4967 4271 4250 4244 16 13,75 36075 14400 0.40 267.38 1292.05 3565 5094 4382 4360 4354 15 13,75 37050 144300 0.40 2676.38 12943.5<	24	13.75	28275	109200	0.40	2053.35	5		1003.65	2875	4080	3499	3477	3471	4080
22 13.75 30225 117000 0.40 2191.80 1058.25 3069 4333 3720 3698 3692 21 13.75 31200 120900 0.40 2261.03 1085.55 3165 4460 3830 3809 3809 3809 20 13.75 32175 124800 0.40 239.25 1112.85 3262 4587 3940 3919 3913 19 13.75 33150 128700 0.40 2399.48 1140.15 3359 4713 4051 4029 4023 18 13.75 34125 132600 0.40 268.70 1167.45 3456 4840 4161 4140 4134 17 13.75 35100 136500 0.40 2537.93 1194.75 3553 4967 4271 4250 4244 16 13.75 36075 140400 0.40 2667.38 1222.05 3650 5094 4382 4360 4354 15 13.75 37050 144400 0.40 2676.38 124	23	13.75	29250	113100	0.40	2122.58	8		1030.95	2972	4206	3609	3588	3582	4200
21 13.75 31200 120900 0.40 220.03 1083.55 3165 4400 3830 3809 3803 20 13.75 32175 124800 0.40 2330.25 1112.85 3262 4587 3940 3919 3913 19 13.75 33150 12200 0.40 2399.48 1140.15 3359 4713 4051 4029 4023 18 13.75 34125 13200 0.40 2537.93 1167.45 3456 4840 4161 4140 4134 17 13.75 35100 13650 0.40 2537.93 1194.75 3553 4967 4271 4250 424 16 13.75 36075 140400 0.40 2607.15 1222.05 3650 5094 4382 4360 4354 15 13.75 37050 144300 0.40 2676.38 1249.35 3747 5220 4492 4471 4465 14 Cafeteria 12.58 38025 148200 1.00 2745.60 1346.85	22	13.75	30225	117000	0.40	2191.80)		1058.25	3069	4333	3720	3698	3692	4333
20 13.75 32175 124800 0.40 2330.25 1112.85 3202 4587 3940 3919 3915 19 13.75 33150 128700 0.40 2399.48 1140.15 3359 4713 4051 4029 4023 18 13.75 34125 132600 0.40 2468.70 1167.45 3456 4840 4161 4140 4134 17 13.75 35100 136500 0.40 2537.93 1194.75 3553 4967 4271 4250 4244 16 13.75 36075 140400 0.40 2676.38 1222.05 3650 5094 4382 4360 4354 15 13.75 37050 14430 0.40 2745.60 1346.85 3844 5459 4673 4651 4645 14 Cafeteria 12.58 38025 14820 1.00 2745.60 1346.85 3844 5459 4673 4651 4645 12 Data Center 13.75 39975 156000 1.00 2884.05 1	21	13.75	31200	120900	0.40	2261.03	-		1085.55	3105	4400	3830	3809	3803	4400
19 13.75 33130 128/00 0.40 2399.48 1140.15 3339 4713 4031 4029 4029 4029 18 13.75 34125 132600 0.40 268.70 1167.45 3456 4840 4161 4140 4134 17 13.75 35100 13600 0.40 2537.93 1192.75 3553 4967 4211 4250 4244 16 13.75 36075 140400 0.40 2607.15 1192.205 3650 5094 4382 4360 4354 15 13.75 37050 144300 0.40 2607.15 1249.35 3747 5220 4492 4471 4465 14 Cafeteria 12.58 38025 148200 1.00 2745.60 1346.85 3844 5459 4673 4651 4645 13 14.92 39000 152100 0.40 2814.83 1374.15 3941 5586 4783 4762 4756 12 Data Center 13.75 39975 156000 1.00 288	20	13.75	32175	124800	0.40	2330.2			1112.85	3202	458/	3940	3919	3913	458
1813.7334123132000.402480.01107.43343046404101410041341713.75351001365000.402537.931194.75355349674271425042441613.75360751404000.402607.151222.05365050944382436043541513.75370501443000.402676.381249.353747522044924471446514 Cafeteria12.58380251482001.002745.601346.85384454594673465146451314.92390001521000.402814.831374.153941558647834762475612 Data Center13.75399751560001.002884.051478.61498.95413559525074505350471013.7540950159900.402953.281498.95413559525074505350471013.75419251638000.403022.501526.5423260795184516351571013.75419251638000.403022.501526.5423260795184516351571013.75419251638000.403022.501526.542326079518451635157	19	13.75	24125	128/00	0.40	2399.40	»		1140.15	2456	4/13	4051	4029	4023	4/1.
17 13.75 33100 130300 0.40 2337.35 1194.75 3333 4907 4271 4230 4244 16 13.75 36075 140400 0.40 2607.15 1222.05 3650 5094 4382 4360 4354 15 13.75 37050 14430 0.40 2676.38 1249.35 3747 5220 4492 4471 4465 14 Cafeteria 12.58 38025 148200 1.00 2745.60 1346.85 3844 5459 4673 4651 4645 13 14.92 39000 152100 0.40 2814.83 1374.15 3941 5586 4783 4762 4756 12 Data Center 13.75 39975 156000 1.00 2884.05 1471.65 4038 5825 4964 4942 4936 11 13.75 40950 159900 0.40 2953.28 1498.95 4135 5952 5074 5053 5047 10 13.75 4192.5 163800 0.40 3022.50 <td< td=""><td>10</td><td>13.75</td><td>34123</td><td>132000</td><td>0.40</td><td>2408.70</td><td>2</td><td></td><td>1107.45</td><td>3450</td><td>4040</td><td>4101</td><td>4140</td><td>4134</td><td>404</td></td<>	10	13.75	34123	132000	0.40	2408.70	2		1107.45	3450	4040	4101	4140	4134	404
10 10.75 100 100 100 100 1222.05 3030 5034 4362 4360 4354 15 13.75 37050 144300 0.40 2676.38 1249.35 3747 5220 4492 4471 4465 14 Cafeteria 12.58 38025 148200 1.00 2745.60 1346.85 3844 5459 4673 4651 4645 13 14.92 39000 152100 0.40 2814.83 1374.15 3941 5586 4783 4762 4756 12 Data Center 13.75 39975 156000 1.00 2884.05 1471.65 4038 5825 4964 4942 4936 11 13.75 40950 159900 0.40 2953.28 1498.95 4135 5952 5074 5053 5047 10 13.75 41925 16380 0.40 3022.50 1526.25 4232 6079 5184 5163 5157	17	13.73	36075	130500	0.40	2557.5	5		1194.75	3650	5094	4271	4250	4244	5004
15 14.05 5703 14100 0.40 200.00 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000 14000	15	13.75	37050	144300	0.40	2676 39	2		1222.05	3747	5220	4382	4300	4465	5220
13 14.92 39000 152100 0.40 2814.83 1374.15 3941 5586 4783 4762 4756 12 Data Center 13.75 39975 156000 1.00 2884.05 1471.65 4038 5825 4964 4942 4936 11 13.75 40950 159900 0.40 2953.28 1498.95 4135 5952 5074 5053 5047 10 13.75 41925 163800 0.40 3022.50 1526.25 4232 6079 5184 5163 5157	14 Cafeteria	12.58	38025	148200	1.00	2745.60	2		1346.85	3844	5459	4673	4651	4645	5450
12 Data Center 13.75 39975 156000 1.00 2884.05 1471.65 4038 5825 4964 4942 4936 11 13.75 40950 159900 0.40 2953.28 1498.95 4135 5952 5074 5053 5047 10 13.75 41925 163800 0.40 3022.50 1526.25 4232 6079 5184 5163 5157	13	14.92	39000	152100	0.40	2814 83	3		1374.15	3941	5586	4783	4762	4756	558
11 13.75 40950 159900 0.40 2953.28 1498.95 4135 5952 5074 5053 5047 10 13.75 41925 163800 0.40 3022.50 1526.25 4232 6079 5184 5163 5157	12 Data Center	13.75	39975	156000	1 00	2884.04	5		1471.65	4038	5825	4964	4942	4936	582
10 13.75 41925 163800 0.40 3022.50 1526.25 4232 6079 5184 5163 5157	11	13.75	40950	159900	0.40	2953.28	3		1498.95	4135	5952	5074	5053	5047	5952
	10	13.75	41925	163800	0.40	3022.50	0		1526.25	4232	6079	5184	5163	5157	6079
9 13.75 42900 167700 0.40 3091.73 1553.55 4328 6206 5295 5273 5267	9	13.75	42900	167700	0.40	3091.73	3		1553.55	4328	6206	5295	5273	5267	6200
8 13.75 43875 171600 0.40 3160.95 1580.85 4425 6332 5405 5384 5378	8	13.75	43875	171600	0.40	3160.95	5		1580.85	4425	6332	5405	5384	5378	6332
7 13.75 44850 175500 0.40 3230.18 1608.15 4522 6459 5516 5494 5488	7	13.75	44850	175500	0.40	3230.18	3		1608.15	4522	6459	5516	5494	5488	6459
6 13.75 45825 179400 0.40 3299.40 1635.45 4619 6586 5626 5604 5598	6	13.75	45825	179400	0.40	3299.40)		1635.45	4619	6586	5626	5604	5598	6580
5 13.75 46800 183300 0.40 3368.63 1662.75 4716 6713 5736 5715 5709	5	13.75	46800	183300	0.40	3368.63	3		1662.75	4716	6713	5736	5715	5709	6713
4 14.32 47775 187200 0.40 3437.85 1690.05 4813 6839 5847 5825 5819	4	14.32	47775	187200	0.40	3437.85	5		1690.05	4813	6839	5847	5825	5819	6839
3 15.47 48750 191100 0.40 3507.08 1717.35 4910 6966 5957 5936 5930	3	15.47	48750	191100	0.40	3507.08	3		1717.35	4910	6966	5957	5936	5930	6960
2 15.47 49725 195000 0.40 3576.30 1744.65 5007 7093 6067 6046 6040	2	15.47	49725	195000	0.40	3576.30	0		1744.65	5007	7093	6067	6046	6040	7093
1 25.66 50700 198900 0.40 3645.53 1771.95 5104 7220 6178 6156 6150	1	25.66	50700	198900	0.40	3645.53	3		1771.95	5104	7220	6178	6156	6150	7220

Figure 192: Gravity Column Loads



Gravity Column Design

04/07/10 04:27:47 Steel Code: AISC360-05 LRFD

Story level Level 52, Column Line C.2-5 . Fy (ksi)

= 50.00 = 0.0 Column Size = W14X90 Orientation (deg.)

INPUT DESIGN PARAMETERS:

CI DESIGN IMAGINE IERS.		
	X-Axis	Y-Axis
Lu (ft)	26.83	26.83
К	1	1
Braced Against Joint Translation	Yes	Yes
Column Eccentricity (in) Top _	9.50	9.75
Bottom	9.50	9.75

CONTROLLING COLUMN LOADS - Load Case 10:

ULKOLLIN,	O COLUMN LOADS - Load Case 10.			
		Dead	Live	Roof
Axial (kip)		105.72	74.83	9.63
Moments	Top Mx (kip-ft)	0.00	0.00	0.00
	My (kip-ft)	-1.65	-60.80	-7.82
	Bot Mx (kip-ft)	0.00	0.00	0.00
	My (kip-ft)	-0.36	10.12	0.00

Single curvature about X-Axis Single curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip)	=	251.41	0.90*Pn (kip)	=	684.60
Mux (kip-ft)	=	0.00	0.90*Mnx (kip-ft)	=	489.05
Muy (kip-ft)	=	103.18	0.90*Mny (kip-ft)	=	272.68
Rm	=	1.00			
Cbx	=	1.00			
Cmx	=	1.00	Cmy	=	0.66
Pex (kip)	=	2757.73	Pey (kip)	=	999.30
B1x	=	1.10	B1y	=	1.00

Figure 193: RAM output for Column C2.5 @ 51-52



Gravity Column Design

04/07/10 04:30:55 Steel Code: AISC360-05 LRFD

- -

Story level Level 2, Col	lumn Line C.2-5			
Fy (ksi)	= 50.00	Column Size	=	W14X730
Orientation (deg.)	= 0.0			

INPUT DESIGN PARAMETERS:

	X-Axis	Y-Axis
Lu (ft)	41.66	25.66
К	1	1
Braced Against Joint Translation	Yes	Yes
Column Eccentricity (in) Top	13.70	11.45
Bottom	0.00	11.45

CONTROLLING COLUMN LOADS - Load Case 1:

		Dead	Live	ROOI
Axial (kip) .		3589.67	1607.25	18.80
Moments	Top Mx (kip-ft)	0.00	0.00	0.00
	My (kip-ft)	-0.72	-0.26	0.00
	Bot Mx (kip-ft)	0.00	0.00	0.00
	My (kip-ft)	0.01	0.00	0.00

Single curvature about X-Axis Single curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL + 0.5RF)

Pu (kip)	=	6888.60	0.90*Pn (kip)	=	7055.81
Mux (kip-ft)	=	0.00	0.90*Mnx (kip-ft)	=	6124.24
Muy (kip-ft)	=	1.50	0.90*Mny (kip-ft)	=	3060.00
Rm	=	1.00			
Cbx	=	1.00			
Cmx	=	1.00	Cmy	=	0.61
Pex (kip)	=	16379.85	Pey (kip)	=	14252.44
B1x	=	1.73	B1y	=	1.17

Figure 194:RAM output for Column C2.5 @ 1-2

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																			Fla	nge slende	er check	Web slend	er check
d (in)	b _f (in)	t _f (in)	t _w (in)	A (in ²)	l _x (in ⁴)	S _x (in ³)	Z _x (in ³)	r _x (in)	l _y (in ⁴)	S _y (in ³)	Z _y (in ³)	r _y (in)	r _{ts} (in)	h₀ (in)	J (in⁴)	C _w (in ⁶)	plf	k _e	k _c	b/t		h/t	
24	22	5	5	290	21457	1557	2335	8.60	9019	865	1298	5.58	7.42	19.00	2416.67	813980	987	7.8	0.76	4.40	13.4	2.80	35.9
24	22	4	4	240	19200	1344	2016	8.94	7184	688	1032	5.47	7.31	20.00	1280.00	718400	817	8.9	0.76	5.50	13.4	4.00	35.9

Figure 195: Built-Up Section Properties

Elastic flex	ural buckl	ing stress						
K _v =	1							
L _v =	25.66	ft						
KL _y /r _y =	55.2							
K _x =	1							
L _x =	25.66	ft						
$KL_x/r_x =$	35.8							
$F_e = \pi^2 E/(KL$./r) ² =	93.88	ksi					
Elastic crit	ical torsior	al bucklin	g stress					
$F_e = (\pi^2 E C_w$	/(K _z L) ² + G	$J)/(I_x+I_y) =$	968.76					
4.71SQRT(E/Fy) =	113.4318						
F _{cr} = 0.658	'(F _v /F _e)F _v =	:	49.988	ksi				
F _{cr} = 0.877	F _e =		NA	ksi				
∳Pn = F _{cr} Ag	=		13047	kip				
Flexural Y	ielding							
$\phi M_{nx} = \phi M_{px}$	$f = \phi F_y Z_x =$	8756	kft					
$\phi M_{ny} = \phi M_{py}$	$y = \phi F_y Z_y =$	4866	kft					
$L_p = 1.76r_y$	SQRT(E/Fy)	=	19.70	ft				
$L_r = 1.95r_{st}$	E/0.7Fy)SC	RT(Jc/S _x h _o)SQRT(1+S	SQRT(1+6.	76(0.7F _y S _x l	h₀/EJc)²)) =	403.9	ft

Figure 196: BU24x987 Stress Checks at Ground Floor

Member Code Check
b DataBase: NYT 04/06/10 15:53:02 Building Code: IBC Steel Code: AISC360-05 LRFD
COLUMN INFORMATION: Frame Number Column Number T Story Level = Level 2 Frame Number 0 Column Number 17 Fy (ksi) = 50.00 Column Size = BU24X987
INPUT DESIGN PARAMETERS:
X-Axis Y-Axis
Lu (ft) 25.66 25.66
K 1.00 1.00
CONTROLLING COLUMN FORCES - SHEAR
Load Combination: 1.200 D + 1.600 Lp + 0.500 Sp
Shear Top Vux (kip)32.30
Vuy (kip) 0.03
Shear Bot. Vux (kip)32.30
Vuy (kip) 0.03
SHEAR CHECK:
Vux (kip) = -32.30 0.90Vnx (kip) = 3240.00 Vux/0.90Vnx = 0.010
Vuy (kip) = 0.03 0.90Vny (kip) = 5940.00 Vuy/0.90Vny = 0.000
CONTROLLING COLUMN FORCES - FLEXURE
Load Combination: $1.200 \text{ D} + 1.600 \text{ Lp} + 0.500 \text{ Sp}$
Axial Load (kip) 8523.27
Moment Top Mux (hip-ft) 584.14
Muy (kip-ft) 0.43
Moment Bot. Mux (kip-ft)193.70
Muy (kip-ft) 1.15
CALCULATED PARAMETERS:
$P_{U}(kin) = 8523.27 + 0.90P_{R}(kin) = 10443.08$
Mux (kip-ft) = 584.14 = 0.90 Mnx (kip-ft) = 8756.25
Muv(kip-ft) = 0.43 0.90Mnv (kip-ft) = 4867.50
Cbx = 2.11
INTERACTION EQUATION:

Figure 197: RAM output of BU24X987 @ Ground Floor



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Figure 198: Concrete to Steel Connection Design

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ne the stren	gth of t	he bolt	group:										
	4.15		Table 10-10										
	2.5	in	Table 10-	-10 is	Conse	rvative							
h r	66.0	k.	>	P =	45.6	k	ок						
r-n =	00.0		-	- 0	10.0								
elding of and	de:												
6FA. =	117.5	k	>	P. =	45.6	k	ок						
yg				- 5									
pture of ang	le:												
.6F"A" =	99.1	k	>	$\mathbf{P}_{n} =$	45.6	k	ок						
				-									
ear of angle	:												
	46.2	k/in	x	t _{reals} =	17.3	k		Table	9-3a				
=	219	k/in	x	tangle	82.1	k		Table	9-3b				
=	250	k/in	x	t . =	93.8	k		Table	9-30				
$\frac{1}{2} \Delta + \min(\phi)$) 6E A	φEΔ)=	QQ 5	k	~	P =	45.6	ŀ	ок			
ur int · min(w)	J.OI yr q	γ·Ψ· υ· 4	nv/	77.5	ĸ	-	10	15.0	IL.	on			
violding													
7 /a -	241	1r	~	D -	45.6	1-	OK						
y ² g ^{/c} a =	241	ĸ		r ₈ -	45.0	ĸ	UK						
rupture:													
15.1	in ³	Table 1	5.2										
15.1	247.0	14010 1	5-2	D -	15.6	1-	OV						
'v∠ _{eff} 'c _a –	247.9	ĸ		r _u -	45.0	ĸ	UK						
& Tearout:													
0.727	in ²	Table 9	-1										
.0L_tF_ =	31.62	k	>	φr _n =	15.9	k	ок						
.0dtF., =	24.47	k	>	φr. =	15.9	k	ок						
5													
pture:													
119.0	k	>	P _u =	45.6	k	ок		Table	10-11				
0.75	in	>	t _{support min} =	0.476	in	ок		Table	10-11				
			sopport,min										
ent Plate Li	mit Sta	tes:											
.5*d.=	0.375	in	<	te =	0.750	in	ок	PCI H	andboo	k EO.	6.5.1.1		
				P									
ength Capaci	ity:												
A _{se} f _{ut} =	74.66	k	>	$P_u =$	45.6	k	ок	PCI H	andboo	k EQ.	6.5.2.1		
e Capacity in	ı side e	dge fail	ure:										
e Capacity in xSORT(f_)d	side e	dge fail	ure: 68.0	k									
e Capacity ir xSQRT(f_)d, X/2.5d_1+2-n	i side e 1 ^{1.33} do	dge fail ^{0.75} = 1.533	ure: 68.0	k				PCI H	andboo	k EO	6.5.5.14		
e Capacity in xSQRT(f_)d _e X/2.5d _{e1} +2-n X) ^{0.25} /0.6d -	side e 1.33do sides = +1.5=	dge fail ^{0.75} = 1.533 0.617	ure: 68.0	k				PCI H	andboo	k EQ.	6.5.5.14		
e Capacity in xSQRT(f ₂)d _e X/2.5d _{e1} +2-n ,Y) ^{0.25} /0.6d _{e1}	side e $s_{11}^{1.33} d_{o}^{(1)}$ $s_{sides} =$ +1.5 =	dge fail ^{0.75} = 1.533 0.617	ure: 68.0	k				PCI H PCI H	anđboo anđboo	k EQ. k EQ.	6.5.5.14 6.5.5.16		
e Capacity in xSQRT(f_)d _e X/2.5d _e 1+2-n (Y) ^{0.25} /0.6d _e 1 1	a side e $a^{1.33} d_o^{(1)}$ sides = +1.5 =	dge fail ^{0.75} = 1.533 0.617	lure: 68.0	k				PCI H PCI H	anđboo anđboo	k EQ. k EQ.	6.5.5.14 6.5.5.16		
e Capacity in xSQRT(f_)d, X/2.5d _{e1} +2-n Y) ^{0.25} /0.6d _{e1} 1 1	side e sides = +1.5 =	dge fail $0.75 =1.5330.6170.617$	ure: 68.0	k		D =	45.6	PCI H PCI H	andboo andboo	k EQ. k EQ.	6.5.5.14 6.5.5.16		
	The the streng $\pi_n =$ alding of ang $.6F_yA_g =$ pture of angle $.6F_yA_n =$ ear of angle $g_y =$ $g_yA_{nt} + min(\phi(t))$ $g_yZ_g/e_a =$ rupture: 15.11 $g_yZ_g/e_a =$ rupture: 15.12 $g_yZ_g/e_a =$ 0.727 $.0L_etF_u =$ $.0dtF_u =$ pture: 119.0 0.75 ent Plate Lin $.5*d_o =$ ength Capacid $A_{se}f_{ut} =$	the strength of t 4.15 2.5 $w_n =$ 66.0 slding of angle: .6FyAg = .17.5 pture of angle: .6FyAn = .99.1 ear of angle: .6FyAn = .9V ear of angle: .0Fy = .0C_eff = .0AtFy = .0L_efFy = .0L_efFy = .0L_efFy = .0L_eff = .0L_eff = .0L_eff = .0L_eff = .0.725 in .0HT = .0.75 in .0.375 .0.375	the strength of the bolt 4.15 2.5 in $w_n =$ 66.0 k silding of angle: . .6FyAg = 117.5 k pture of angle: . .6FyAn = 99.1 k ear of angle: . $v_r =$ 219 k/in $v_r =$ 250 k/in $v_r =$ 241 k rupture: . $v_r =$ 247.9 k & Tearout: . 0.727 in ² Table 9 $0.0_{ct}F_u =$ 31.62 k .0dtF_u = 24.47 k ent Plate Limit States: . $.5^* d_o =$ 0.375 in ent Plate Limit States: . $.5^* d_o =$ <td< td=""><td>te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 $x_{n=}$ 66.0 k > siding of angle: 6FyAg = 117.5 k > pture of angle: 6FyAg = 99.1 k > ear of angle: . . . <math>yr = 219 k/in x . <math>yv = 250 k/in x . <math>yr = 219 k/in x . <math>yar = 250 k/in x . <math>yar = 250 k/in x . <math>ydding: <math>yzg/e_a = 241 k > . rupture: <math>yzg/e_a = 247.9 k > . $yzg/e_a = 24.47 k > . .0dtFu = 24.47 k$</math></math></math></math></math></math></math></math></td><td>te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 is $w_{n,n}$ 66.0 > P_u = elding of angle: . . Pu = .6FyAg = 117.5 > P_u = pture of angle: 6FyAn = 99.1 k > P_u = ear of angle: $y'' =$ 219 k/in x tangle = $y'' =$ 220 k/in x tangle = $y'' =$ 250 k/in x tangle = $y'' =$ 250 k/in x tangle = $y'' =$ yielding: $y'' = y'' = 241$ k > Pu = . . y'y''' = 15.1 in³ Table 15-2 0L_qtv_u = 31.62 > . . .<</td><td>te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 is Conservation Pu = 45.6 $\pi_n =$ 66.0 k > Pu = 45.6 elding of angle: 6FyAg = 117.5 k > Pu = 45.6 pture of angle: 6FyAn = 99.1 k > Pu = 45.6 .6FyAn = 219 k/in x tangle = 82.1 .w = 250 k/in x tangle = 93.8 .gAn+min(0.0.6FyAgu, ϕFyAn, v) = 99.5 k . . yielding: </td><td>te the strength of the bolt group: (1) 4.15 Table 10-10 Conservative $r_n =$ 66.0 k > $P_u =$ 45.6 k station of angle: $P_u =$ 45.6 k $P_u =$ 45.6 k $P_u =$ 45.6 k <th< th=""> <!--</td--><td>te the strength of the bolt group: Image: 100 10 10 10 10 10 10 10 10 10 10 10 10</td><td>te the strength of the bolt group: Image: 100 10 is Conservative $x_{n} =$ 66.0 k > $P_u =$ 45.6 k OK Image: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.3 k Table 10-10 is 100 is 1</td><td>te the strength of the bolt group: Image: Table 10-10 4.15 Table 10-10 is Conservative $n_n =$ 66.0 k > $P_u =$ 45.6 k OK $n_n =$ 66.0 k > $P_u =$ 45.6 k OK idling of angle: . . $P_u =$ 45.6 k OK of $gA_n =$ 99.1 k > $P_u =$ 45.6 k OK pure of angle: . . . $P_u =$ 45.6 k OK $colspA_n =$ 99.1 k > $P_u =$ 45.6 k OK . ear of angle: . . $P_u =$ 45.6 k OK . $p' =$ 219<kin< th=""> kin x $t_{angla} =$ 82.1 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'' =$ 230<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'''''''''''''''''''''''''''''$</kin<></kin<></kin<></kin<></td><td>the strength of the bolt group: Image: Table 10-10 Image: Table 10-10 is Conservative $x_{n_{n}}$ 66.0 k > P_{u} 45.6 k OK Image: Table 10-10 is Image:</td><td>is the strength of the bolt group: Image: 100 10 is Conservative 2.5 in Table 10-10 is Conservative Image: 100 10 is Image: 100 is <t< td=""><td>the strength of the bolt group: 4.15 Table 10-10 Conservative 2.5 in Table 10-10 is Conservative wn = 66.0 k > Pu = 45.6 k OK Idling of angle: </td></t<></td></th<></td></td<>	te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 $x_{n=}$ 66.0 k > siding of angle: 6FyAg = 117.5 k > pture of angle: 6FyAg = 99.1 k > ear of angle: . . . $yr = 219 k/in x . yv = 250 k/in x . yr = 219 k/in x . yar = 250 k/in x . yar = 250 k/in x . ydding: yzg/e_a = 241 k > . rupture: yzg/e_a = 247.9 k > . yzg/e_a = 24.47 k > . .0dtFu = 24.47 k $	te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 is $w_{n,n}$ 66.0 > P_u = elding of angle: . . Pu = .6FyAg = 117.5 > P_u = pture of angle: 6FyAn = 99.1 k > P_u = ear of angle: $y'' =$ 219 k/in x tangle = $y'' =$ 220 k/in x tangle = $y'' =$ 250 k/in x tangle = $y'' =$ 250 k/in x tangle = $y'' =$ yielding: $y'' = y'' = 241$ k > Pu = . . y'y''' = 15.1 in ³ Table 15-2 0L_qtv_u = 31.62 > . . .<	te the strength of the bolt group: 4.15 Table 10-10 2.5 in Table 10-10 is Conservation Pu = 45.6 $\pi_n =$ 66.0 k > Pu = 45.6 elding of angle: 6FyAg = 117.5 k > Pu = 45.6 pture of angle: 6FyAn = 99.1 k > Pu = 45.6 .6FyAn = 219 k/in x tangle = 82.1 .w = 250 k/in x tangle = 93.8 .gAn+min(0.0.6FyAgu, ϕ FyAn, v) = 99.5 k . . yielding:	te the strength of the bolt group: (1) 4.15 Table 10-10 Conservative $r_n =$ 66.0 k > $P_u =$ 45.6 k station of angle: $P_u =$ 45.6 k <th< th=""> <!--</td--><td>te the strength of the bolt group: Image: 100 10 10 10 10 10 10 10 10 10 10 10 10</td><td>te the strength of the bolt group: Image: 100 10 is Conservative $x_{n} =$ 66.0 k > $P_u =$ 45.6 k OK Image: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.3 k Table 10-10 is 100 is 1</td><td>te the strength of the bolt group: Image: Table 10-10 4.15 Table 10-10 is Conservative $n_n =$ 66.0 k > $P_u =$ 45.6 k OK $n_n =$ 66.0 k > $P_u =$ 45.6 k OK idling of angle: . . $P_u =$ 45.6 k OK of $gA_n =$ 99.1 k > $P_u =$ 45.6 k OK pure of angle: . . . $P_u =$ 45.6 k OK $colspA_n =$ 99.1 k > $P_u =$ 45.6 k OK . ear of angle: . . $P_u =$ 45.6 k OK . $p' =$ 219<kin< th=""> kin x $t_{angla} =$ 82.1 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'' =$ 230<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'''''''''''''''''''''''''''''$</kin<></kin<></kin<></kin<></td><td>the strength of the bolt group: Image: Table 10-10 Image: Table 10-10 is Conservative $x_{n_{n}}$ 66.0 k > P_{u} 45.6 k OK Image: Table 10-10 is Image:</td><td>is the strength of the bolt group: Image: 100 10 is Conservative 2.5 in Table 10-10 is Conservative Image: 100 10 is Image: 100 is <t< td=""><td>the strength of the bolt group: 4.15 Table 10-10 Conservative 2.5 in Table 10-10 is Conservative wn = 66.0 k > Pu = 45.6 k OK Idling of angle: </td></t<></td></th<>	te the strength of the bolt group: Image: 100 10 10 10 10 10 10 10 10 10 10 10 10	te the strength of the bolt group: Image: 100 10 is Conservative $x_{n} =$ 66.0 k > $P_u =$ 45.6 k OK Image: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.5 k > $P_u =$ 45.6 k OK offuga angle: 17.3 k Table 10-10 is 100 is 1	te the strength of the bolt group: Image: Table 10-10 4.15 Table 10-10 is Conservative $n_n =$ 66.0 k > $P_u =$ 45.6 k OK $n_n =$ 66.0 k > $P_u =$ 45.6 k OK idling of angle: . . $P_u =$ 45.6 k OK of $gA_n =$ 99.1 k > $P_u =$ 45.6 k OK pure of angle: . . . $P_u =$ 45.6 k OK $colspA_n =$ 99.1 k > $P_u =$ 45.6 k OK . ear of angle: . . $P_u =$ 45.6 k OK . $p' =$ 219 <kin< th=""> kin x $t_{angla} =$ 82.1 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $p'' =$ 220<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'' =$ 230<kin< th=""> x $t_{angla} =$ 93.8 k Table 9-3a $y'''''''''''''''''''''''''''''$</kin<></kin<></kin<></kin<>	the strength of the bolt group: Image: Table 10-10 Image: Table 10-10 is Conservative $x_{n_{n}}$ 66.0 k > P_{u} 45.6 k OK Image: Table 10-10 is Image:	is the strength of the bolt group: Image: 100 10 is Conservative 2.5 in Table 10-10 is Conservative Image: 100 10 is Image: 100 is <t< td=""><td>the strength of the bolt group: 4.15 Table 10-10 Conservative 2.5 in Table 10-10 is Conservative wn = 66.0 k > Pu = 45.6 k OK Idling of angle: </td></t<>	the strength of the bolt group: 4.15 Table 10-10 Conservative 2.5 in Table 10-10 is Conservative wn = 66.0 k > Pu = 45.6 k OK Idling of angle:

Figure 199: Concrete to Steel Connection Design

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					B	eam to Gi	rder Sh	ear Co	nnectio	n									
							Shear 7	ſab											
						D	22												
						P _{u,max} =	22	к											
					•		•	c =	4	in									
			L _{eh} =	1.5	in	• •													
		a =	3	in	•			/		PL	0.25	Х	4.5	Х	8.5	0			
			• [/											
					TI 🛛	V .													
	d =	2	in			φľ	•	- T =	1.25	in									
	u _c	-			11 !	Ϋ́	Î	Dev	1.20										
								2	at 3=	6	in	>							
											5								
					lk i 🗌	4													
						Ψĸ	\$			W14X	22								
					\square					W18X	35								
							\ \												
					ll –	\backslash			2	3/4" D	ia Δ225	-NP	olta						
			-						2	514 D	1d M343	-18 B	ons						
			<u> </u>	W18X40	-		3	/16											
				W18X60			3	/16	\succ										
				W24X68															
Material	l Propertie	s:	-			_	-												
Beam	1		F _y =	50	ksi	F _u =	65	ksi											
Shear	r Tab Plate		F _y =	36	ksi	F _u =	58	ksi											
Geometr	ric Propert	ies:																	
W142	X22		t _w =	0.230	in	d =	13.7	in		S _{net} =	7.97	in	Tab	le 9-2	1				
W182	X35		t _w =	0.300	in	d =	17.7	in		S _{net} =	18.2	in	Tab	le 9-2	:				
Bolt & P	late Limit	States	:																
Both		$\phi R_n =$	52.2	k	>	P _u =	33	k	ок		Per Ta	ble 10	0-9 in	AISC	C Man	mal			
Both	twe	eld.min =	0.13	in	<	t _{weld} =	0.19	in	ОК		Section	1J2.2	b						
Beam Li	mit States	:																	
W142	X22	φR. =	250.0	x t =	57.5	k	>	P., =	33	k	ок		Per	Table	10-1	in Al	ISC	Manı	ıal
W18	X35	φren dR =	250.0	xt =	75	1. 1-		P =	33	1. 1-	OK		Der	Table	10-1	in Al	ISCI	Man	121
		Ψ*•η	200.0	1. 60				- 0			•••			14010					
Cheels 4	ovurel	ture en	the er	nod conti															
WI 4	елиган гир хээ	AD -	0.765.0	peu secuol	06 2417	1-	~	P	22	1	OV								
W142	N22 N25	$\psi R_n =$	0.75Fu8	o _{net} /e =	80.3417	K L	2	P _u =	20	K I.	OK								
w182	A35	φκ _n =	U./5F _u 8	o _{net} /e =	197.167	к	>	P _u =	- 33	к	OK								
Checkle	cal web be	uchlin-	at the	coned soct	ion:														
W14	саг web bl Х22-	icking	at the (loped sect	юц.														
vv 142				-	2.1	0.7		017											
	c =	4	m	<	2d =	27.4	m	OK											
	d _e =	2	m	<	d/2 =	6.85	ín	OK											
	c/d =	0.292			t = 2(c/d) =	0.584													
	c/h _o =	0.342		$k = 2.2(h_o$	/c) ^{1.65} =	12.928													
	$F_{er} = 26,2$	210(t _w /h	_o) ² fk =	76.46	k														
	$\phi R_n = 0.9$	0F _{cr} S _n	_{et} /e =	182.00	k	>	P _u =	33	k	OK									
W182	X35																		
	c =	4	in	<	2d =	35.4	jn	ок											
		1	in		4/2 -	0.04	in in	OF											
	-/_1	0.226	ш		$w_2 = f_{-2}(c_1 - 1)$	0.65	m	ON											
	c/a =	0.226			1 - 2(c/a) =	0.452													
	c/h _o =	0.255		$k = 2.2(h_o$	/c)**** =	21.00													
	$F_{cr} = 26,2$	210(t _w /h	_o) ² fk =	90.84	k														
	$\varphi R_n = 0.90 F_{cr} S_{net} / e =$			182.00	k	>	P _u =	33	k	OK									

Figure 200:Beam to Girder Shear Connection

Girder to Column Flange Shear Connection Shear Tab P_{u,max} = 33 k L_{eh} = 1.5 in a = 3 in_ PL 0.31 X 4.5 X 8.50 0 - L_{ev} = 1.25 in L 1 2 at 3= 6 in \$ L φ 3 3/4" Dia A325-N Bolts 3 /16 3 /16 Material Properties: $F_v =$ 50 ksi $F_n =$ 65 ksi Beam Shear Tab Plate $F_y =$ 36 ksi $F_u =$ 58 ksi Geometric Properties: W14X22 0.230 in $\mathbf{t}_{\mathrm{w}} =$ W18X35 0.300 in t_w = Bolt & Plate Limit States: $\phi R_n = 63.6 \text{ k}$ Per Table 10-9 in AISC Manual > $P_n =$ 33 k ОК $t_{weld} = 0.25$ in Section J2.2b $t_{weld,min} =$ 0.19 in < ОК Beam Limit States: Per Table 10-1 in AISC Manual φR_n = 351.0 x t_w = $P_u =$ 80.73 k OK > 33 k Per Table 10-1 in AISC Manual $\phi R_n = 351.0 \quad x t_w =$ $P_u =$ ок 105.3 k 33 k >

Figure 201: Girder to Column Flange Shear Connection

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			(Girder to	Column W	eb She	ear Co	nnectio	n						
					Extended	Shear	Tab								
					$P_{u,max} =$	37	k								
					L _{ab} =	1.5	in								
					en										
	a = 0	in	1		- → →		_		DI	0.50	v	12.5	v	12.00	
	a- 9	<u></u>	•		∙ ↓	/	/		FL	0.50	Λ	15.5	л	12.00	
		-1	V/		V	/									
			1				_								
		1	1	@	→ –	ŧ	- L =	1 4	5 in						
			1		T	Ī	-ev								
			1	-	÷		3	3 at 3=	9	in	>				
				-						<					
			×		4										
				4	≻ ∯ —	ŧ									
		^													
			V			7									
						`	_	4	3/4" D	Dia A325	-NB	olts			
			3	in		_									
						5	/16	\mapsto	-						
						5	/16	\vee							
Matorial Prop	rtios:														
Cohme	aues.	F -	40	leni	F -	64	Inci								
D		ry-		KSI	r ₀ -	04	KSI L								
Beam		Fy=	50	KS1	F ₀ =	65	KS1								
Shear Tab P	late	F _y =	36	ksi	F _u =	58	ksi								
Geometric Pro	perties:														
		t _w =		in	b _f =		in								
W18X40		t _w =	0.300	in	d =	17.9	in								
Determine the	bearing st	rength o	of one bolt	on the be	am web:										
φr. =2.4F.td. =	= 26.33	k													
Determine the	shear stre	ngth of	one bolt.												
the second second	15.0	1.	one oon.												
$\phi r_n =$	15.9	к													
Determine the	strength of	f the bo	lt group:												
e =	10.5	in													
C =	2.33		Table 7-8												
$\phi R_n = C \phi r_n =$	37.05	k	>	$P_u =$	37	k	ОК								
				-											
Determine the	maximum	plate th	ickness su	ch that th	e plate wi	ll yield	before	the bo	olts she	ar:					
1.25F _{nv} =	60	ksi													
A. =	0.442	in ²													
C' =	26		Table 7-9												
~ = M = 1.25F	20 A C' -	690 -	In in												
$M_{max} = 1.25 F_{nv}$	$A_b C =$	089.5	ĸ-m			-									
$t_{max} = 6M_{max}/F_y$,d* =	0.798	in	>	t _{plate} =	0.50	in	OK							
Check flexural	strength o	f the pl	ate:												
$M_n = P_n e =$	388.5	k-in													
<u> </u>															
Cheels - h	olding of t	ho nl-t													
Check shear y	erung or ti	ie plate			-			077							
$\phi R_n = \phi 0.6 F_y A_1$; =	129.6	ĸ	>	$P_u =$	37	ĸ	OK							

Figure 202: Girder to Column Web Shear Connection

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Determin	e critical	flexura	l stress	in presen	ce of shear	stress,	fv:							
$f_v =$	6.00	ksi												
$\phi F_{cr} = SQ$	RT((¢F _y)	$^{2}-3f_{v}^{2}$	=	30.69	ksi									
$\phi \mathbf{M}_n = \phi \mathbf{H}$	F _{er} Z =	552.4	k-in	>	M _u =	388.5	k	ок						
Check fle	exural rup	ture:												
$Z_{net} = t_p d$	² /4(1-(d _b +	125)/3)) =	12.75	in									
$\phi \mathbf{M}_n = \phi \mathbf{H}$	^r _u Z _{net} =	554.6	k-in	>	M _u =	388.5	k	ОК						
Check sh	ear ruptu	re of th	e plate:	:										
$A_n = t_p(d -$	n(d _b +.125) =	4.25	in										
$\phi R_n = \phi 0$	$6F_{u}A_{n} =$	110.9	k	>	P _u =	37	k	ОК						
Check bl	ock shear	ruptur	e of the	plate:										
$\phi F_{u}A_{nt} =$		46.2	k/in	x	t _p =	23.1	k		Table	9-3a				
φ0.6F _y A _g	v =	170	k/in	x	t _p =	85.0	k		Table	9-3Ъ				
$\phi 0.6F_uA_n$	v =	194	k/in	x	t _p =	97.0	k		Table	9-3c				
$\phi R_n = \phi F$	_u A _{nt} + min(ф0.6F _у	A _{gv} ,φF _υ	$A_{nv}) =$	108.1	k	>	P _u =	37	k	ОК			
Check lo	cal bucklin	ng of th	o nlato											
F = F.	.O	ig of th	le plate											
$\lambda = h_0$	SORT(F.,)	/(10tS	ORT(4	/ 75+280(h_/	0.462	<	0.7		O =	1				
$F_{cr} = F_v$, - (- y/		buckling	g does not	control									

Figure 203: Girder to Column Web Shear Connection

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				Gird	er to Colu	mn Flange	Mome	nt Connec	tion					
				Bol	ted Flange	-Plate FK	Momen	t Connect	hon					
		2	/16						. 4	#	" Dia A	32	5-N Bolts	
		2	/16			P _{u,max} =	9.1	k /	gag	ge =	1.5	in		
			·					/_PL	3/8	Х	4.0	Х	9	
			_^ .					/ PL	1/4	Х	4.0	Х	6.50	
			-v		\ ↓		//		/		_			
							É.	ŕ						
						\leq								
								M =	21.2	ftk		3	/16	
						_	\mathbf{i}	o,max		-	-	3	/16	
					+ -						>	•		
					· +						5			
					I -¢		1	- 3	3/4	" D	ia AB2:	5-N	Bolts	
						–∢		W12x19						
								W12A1)						
						×								
							\backslash	PL	1/4	Х	4.0	Х	6.50	
			V				4	3/4	" Dia A325	-N	Bolts			
								gage =	1.5	in				
Material l	Properties	s:												
Beam			F _y =	50	ksi	F _u =	65	ksi						
Colum	n		F _y =	50	ksi	F _u =	65	ksi						
Plate			F _y =	36	ksi	F _u =	58	ksi						
Geometrie	Properti	es.												
W12X	19	d =	12.2	in	hc=	= 4.01	in	t _c =	0.35	in				
	15	t =	0.235	in .	s =	21.3	in	4-	0.55					
W14X	90	d =	14	in .	b _c =	= 14.5	in	te=	0.71	in				
		ktoring=	1.31	in	t=	= 0.44	in	T =	10	in				
		- uesign												
Beam flex	ural strer	ngth:												
$A_{fg} = b_f t_f =$	=	1.404	in ²											
$A_{fn} = A_{fr} - 1$	n(d _b +1/8) =	=	0.48475	in ²										
Fy/Fu =	0.76923	<	0.8	Y _t =	1	ı								
$F_{u}A_{fn} =$	31.5088	k												
$Y_t F_y A_{fg} =$	70.175	k												
$\phi M_n = \phi F_n$	A _{fn} S _x /A _{fg}	35.86	ftk	>	21.2	2 ftk	OK							
Design of	single pla	te web	connection	:										
Shear stre	ength of b	olts:					_	<u> </u>		<u> </u>				
$\phi \mathbf{r}_n =$	15.9	k/bolt					Per Tal	ole 7-1 in A	AISC Manu	al				
$\phi R_n =$	47.7	k	>	9.1	k	OK								
D :														
Bearing s	trength of	bolts:						 						
$\phi r_n =$	78.3	k/in/bol	t				Per Tal	ble 7-5 in A	AISC Manu	al				
$\phi R_n =$	29.36	k	>	9.1	k	ок								
Dista al														
AP = 0.64	ir yielding	72.00	1-		0.1	1-	OF							
$\psi x_n = 0.00$	pr yAg =	12.90	ĸ	,	9.1	ĸ	UK							
Plate shor	r rupture	-												
hR = 0.64	hFΔ –	62.40	Ŀ	~	0 1	te.	OF							
$\psi R_n = 0.60$	$\mu r_{u}A_{nv} =$	02.40	к	>	9.1	ĸ	OK							

Figure 204: Girder to Column Flange Moment Connection

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Block she	ar runtur	o strong	th of the n	ato.									
	ai ruptur	46.2	le/in			17.22	1-		Table 0.2a				
ψr _u rint –		40.2	K III	^	'plate —	17.55	<u>к</u>		Table 9-5a				
φ0.6F _y A _{gv}	,=	121	k/in	x	t _{plate} =	45.38	k		Table 9-3b				
$\phi 0.6F_uA_{nv}$.=	131	k/in	х	t _{plate} =	49.13	k		Table 9-3c				
$\phi R_n = \phi F_u$	$A_{nt} + \min(e_{nt})$	ф0.6F _у А	$\phi F_u A_{nv}$	=	62.7	k	>	$P_u =$	9.1	k	ОК		
Weld stre	ngth:												
$\phi R_{-} = 1.39$	- 92D1x2=	75.17	k	>	P. =	91	k	OK					
					- 0								
Shear run	ture of th	o haso i	notal·										
$\phi P = \phi 0$	(III) (III	1 -2-	22 2550	1-	~	D -	0.1	1	ov				
$\psi \mathbf{R}_n = \psi 0.0$	or _{u,plate} t _{fco}	ol ¹ weldX.Z=	33.3338	к		Pu-	9.1	ĸ	OK				
Design of	tension f	lange pl	ate and cor	nection:									
Design of b	oolts												
$P_{uf} = M_u/d$	=	20.85	kips										
Shoar stre	ngth of h	alte:											
Juear sue	ingen of b	1 4 1					р. т.		ICC M				
$\phi r_n =$	15.9	K/DOIT					Per 1a	ble /-1 m /	AISC Manu	au			
$\phi R_n =$	63.6	k	>	20.85	k	ок							
For bearing	ıg on flan	ge:											
$\phi r_n =$	49.4	k/bolt	x t _f =	17.29	kip/bolt		Per Tal	ble 7-6 in A	AISC Manua	al			
φR. =	69.16	k	>	20.85	k	ок							
						-							
For bearing	ig on plat	e:											
φr. =		k/holt	x tc=	15.4	kip/bolt		Per Tal	ble 7-6 in 1	AISC Manu	al			
φP -	61.6	le oon	ч 、	20.95	te	OK	1 - 1 10	-10 / 0 11 /					
$\varphi R_n =$	01.0	ĸ	~	20.85	r.	UK							
Flange pla	ite tensio	n yieldi	ıg:										
$\phi P_n = \phi F_y$	A _g =	32.40	kips	>	20.43	k	ок						
$P_{uf} = M_u/d$	+t _{plate} =	20.43	kips										
Flange pla	ate tensio	n ruptui	e:										
0.85A. =	0.85	in ²											
Λ -	0.56	in ²											
			•		20.42		OV						
$\varphi P_n = \varphi F_u$	A _e =	24.47	к	>	20.43	к	OK						
Flange pla	ite block	shear ri	ipture:										
$\phi F_u A_{nt} =$		35.3	k/in	х	t _{plate} =	17.65	k		Table 9-3a				
$\phi 0.6F_y A_{gv}$, =	72.9	k/in	x	t _{plate} =	36.45	k		Table 9-3b				
0.6F,A,	=	83.2	k/in	x	t _{olate} =	41.60	k		Table 9-3c				
$\phi R = \phi F$	A .+ min(h0 6Ε Α	φFA)	=	54.1	k	>	P. =	20.43	k	OK		
4-m 4-0	- nt · ······	4 0.02 yr	gv. v · u· ·nv/		51.1			- 101	-0.15		•		
Determin	e required	l size of	fillet weld:										
$D_{min} = P_{uf}$	(4.176I) =	1.223	/16	<	2	/16	ок						
Tension r	upture of	the bas	e metal:										
t _{min} = 1.86	$D/F_u =$	0.057	in	<	0.71	in	ок						
t _{min} = 3.71	$D/F_u =$	0.128	in	<	0.25	in	ок						
	-												
Design of	compress	sion flau	ige plate ar	nd connect	ion:								
K =	0.65												
1 =	2	in											
K1/r =	18.01	<	25										
$F_{cr} = F_{v}$													
$\phi P_n = \phi F_n$	A, =	32.40	k	>	P.,=	20.43	k	ОК					
Y'n Y'y	8				- ur -								
Flange be	nding of c	olumn.											
	25t ² F -	1/1 0	t-	~	D	20.42	1-	OK					
ψις _n – ψο.,	∠Jif Py =	1+1.8	r.	-	P _{uf} =	20.43	ĸ	UK					
Web	ing of - 1												
AD AT	und of col	umn:		1-		n	20.42	1-	OV				
$\varphi \kappa_n = \varphi F_y$	()K _{design} +	\mathbf{N} $\mathbf{t}_{w} =$	166.1	к	>	P _{uf} =	20.43	к	OK				
W.1 .	Kara C	 											
Web cripp	oung of co	iumn:	. 15										
$\phi R_n = \phi 0.3$	8t _w *(1+3(1	N/d)(t _w /t	_f)***)SQRT($EF_{y}t_{f}/t_{w}) =$	196.26	k	>	P _{uf} =	20.43	k	OK		
Web buck	ling of co	lumn:											
$\phi R_n = \phi 24t$	t _w ³ SQRT(Efy)/T =	221.56	k	>	$P_{uf} =$	20.43	k	OK				
]	NO STIFI	ENERS R	EQUIRE	D						

Figure 205: Girder to Column Flange Moment Connection

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				Gir	der to Colu	ımn Flango	e Mom	ent Conne	ction						
				Bo	Ited Flange	e-Plate FR	Mom	ent Connec	tion						
		4	/16						8	3/4	" Dia /	132	5 N Be	ltc	
			/16			D -	. 2	01-		- TC	Dia	من 4	J-14 DC	nus -	
		-+	/10			F _{u,max} -			1/2	age –	4.0	4 III V	10		
									1/2	A	4.0	A	12		
			<u> </u>		-			/ PL	1/2	Х	7.0	X	. 12.50		
			V		V V										
								<u>Г</u>							
						_									
								M =	150	ftk		3	/16		
					φ			0,11111		-	-	3	/16	\geq	
											>	>	V		
					i -⇔	-					5				
					l - ė	4	1	- 4	3/4	" Dia	1 A325	-N I	Bolts		
							/								
								W18x76							
						Į,		R.							
		11	^		/	•		PI.	1/2	х	7.0	Х	12.50		
			\sim	$ \frown $			8	3/4	" Dia A325	-NB	olts	-			
		4	/16					gage =	4	in					
		4	/16												
Material I	Properties	:	-			-									
Beam			Fy=	50	KS1	F _u =	6	5 KSI							
Colum	n		F _y =	50	ksi	F _u =	6	5 ksi							
Plate			F _y =	36	ksi	F _u =	5	8 ksi							
a	n (*														
Geometric	c rroperu 76	es:	10.0						0.00						
W18A	/6	d=	18.2	m	b _f =	11	m	t _f =	0.68	m					
		t _w =	0.48	in	S _x =	146	in								
W14X	99	d =	14.2	in	b _f =	14.6	m	t _f =	0.78	m					
		k _{design} =	1.38	in	t _w =	0.485	in	T =	10	in					
	• .														
Beam flex	ural strei	igth:	. 2												
$A_{fg} = b_f t_f =$	-	7.48	m	. 2											
$A_{fn} = A_{fg} - 1$	$n(d_b + 1/8)$	-	5.1	in"											
Fy/Fu =	0.76923	<	0.8	Y _t =	1										
$F_uA_{fn} =$	331.5	k													
$Y_tF_yA_{fg} =$	374	k													
$\phi M_n = \phi F_n$	$A_{fn}S_x/A_{fg}$	485.3	ftk	>	21.2	ftk	ОК								
Design of	single pla	te web	connection												
Shear stre	ength of b	olts:													
φr _n =	15.9	k/bolt					Per Ta	ible 7-1 in A	ISC Manua	d					
$\phi R_n =$	63.6	k	>	30	k	ок									
Bearing st	trength of	bolts:													
$\phi \mathbf{r}_n =$	78.3	k/in/bol	t				Per Ta	ible 7-5 in A	ISC Manua	1					
$\phi R_n =$	39.15	k	>	30	k	ок									
Plate shea	ar yielding														
$\phi R_{n} = 0.66$	•F.A. =	129.6	k	>	30	k	ОК								
	. y s														
Plate shee	r runture														
dR = 0.64	hFA -		1-	~	30	ŀ	OF								
$\psi N_n = 0.00$	$\mu_{u} A_{nv} =$	110.9	K.		50	ĸ	OL								

Figure 206: Girder to Column Flange Moment Connection

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Block she	ar ruptur	e streng	th of the p	ate:									
$\phi F_{u}A_{nt} =$		46.2	k/in	x	t _{olate} =	23.10	k		Table 9-3a				
φ0.6FA	=	170	k/in	x	t _{alata} =	85.00	k		Table 9-3b				
φ0 6FA	=	194	k/in	x	t_t_t_	97.00	k		Table 9-3c				
$\phi R = \phi F$	A .+ min(10 6F A	dFA)	=	108 1	k	>	P =	30	k	ок		
T-11 T-0		, y .	-goot - 81107					- 5					
Weld stre	ngth:												
$\phi R_n = 1.39$	92Dlx2=	100.2	k	>	P _u =	30	k	ок					
Shear rup	ture of th	e base r	netal:										
$\phi R_n = \phi 0.6$	6F _{u,plate} t _{fcc}	hl _{weld} x2=	48.9	k	>	P _u =	30	k	ок				
Design of	tension f	ange pl	ate and cor	nection:									
Design of b	oolts												
$P_{uf} = M_u/d$	=	98.9	kips										
~													
Shear stre	ength of b	olts:											
$\phi r_n =$	15.9	k/bolt					Per Tal	ble 7-1 in A	AISC Manua	ป			
$\phi R_n =$	127.2	k	>	98.90	k	ок							
Forboarin	a on flore												
de -	16 01 Hall	50. le/b-14		22 502	Isia /b - h		Der T 1	 	ISC M				
ψI _n ≕ φP –	49.4	K/DOII	x u _f ≓	33.392	kip/DOIt	OK	rer 1a	ue /-0 m /	ALOC IVIANUA	u			
ψ κ _n =	208.736	к	>	98.90	ĸ	UK							
For bearin	ig on plat	e:											
φr., =	44	k/bolt	x t _f =	29.92	kip/bolt		Per Tal	ble 7-6 in A	AISC Manua	ป			
$\phi R_n =$	239.36	k	>	98.90	k	ок							
Flange pla	te tensio	n yieldii	ng:										
$\phi P_n = \phi F_y$	A _g =	113.4	kips	>	96.26	k	ок						
$P_{uf} = M_u/d$	+t _{plate} =	96.26	kips										
Flange pla	te tensio	n ruptur	re:										
0.85A _g =	2.98	in ²											
A _n =	2.63	in ²											
$\phi P_n = \phi F_u$	A _e =	114.2	k	>	96.26	k	ОК						
Flange pla	te block	shear ru	ipture:										
$\phi F_u A_{nt} =$		46.2	k/in	х	t _{plate} =	46.20	k		Table 9-3a				
φ0.6F _y A _{gv}	.=	170	k/in	x	t _{plate} =	170.00	k		Table 9-3b				
$\phi 0.6F_uA_{nv}$	=	194	k/in	x	t _{plate} =	194.00	k		Table 9-3c				
$\phi R_n = \phi F_u$	$A_{nt} + \min(e_{nt})$	¢0.6F _y A	$A_{gv}, \phi F_{u}A_{nv})$	=	216.2	k	>	P _{uf} =	96.26	k	ок		
Determine	e required	l size of	fillet weld:										
$D_{min} = P_{uf}$	(4.176l) =	3.29	/16	<	4	/16	ОК						
Tension ru	upture of	the base	e metal:		0.70		ov						
t _{min} = 1.80	$D/F_u =$	0.114	111	<	0.78		OK						
$t_{min} = 5.71$	$D/F_u =$	0.250	m	<	0.50	m	UK						
Design of	compress	sion flan	ige plate ai	d connect	ion:								
K =	0.65												
1=	2	in											
K1/r =	9.01	<	25										
$F_{cr} = F_y$													
$\phi P_n = \phi F_y$	A _g =	113.4	k	>	P _{uf} =	96.26	k	ок					
Flange h-	nding of -	olumn											
dR = d6	$25t_c^2 F =$	171.1	k	~	D	96.26	k	OK					
Ψ1 ψ0.2	.54 ry-	1/1.1		-	r uf -	50.20	~	UR.					
Web yield	ing of col	umn:											
$\phi R_n = \phi F_v$	- (5k _{design} +]	N)t _w =	191.575	k	>	P _{uf} =	96.26	k	ОК				
Web cripp	ling of co	lumn:											
$\phi R_n = \phi 0.8$	8t _w ² (1+3(1	N/d)(t _w /t	e)1.5)SQRT($EF_{y}t_{f}/t_{w}) =$	237.85	k	>	P _{uf} =	96.26	k	OK		
web buck	ang of co	iumn:	000 50				06.25		OV				
φκ _n =φ24t	t _w `SQRT(I	±ry)/T =	296.73	к	>	P _{uf} =	96.26	к	UK				
				NO STIF	ENERS P	FOURFI	D						
					THER I	-vonci	-						

Figure 207: Girder to Column Flange Moment Connection

7.3 Lighting/Electrical

					LUMINAIRE	SCHEDULE							
FIXTURE	DESCRIPTION	HOUSING/TRIM/	VOLTAGE	TOTAL	MANUFACTURE	CATALOG	LA	MPS	BALLAST/	MOUNTING	MAXIMUM	GENERAL	REMARKS
TAG		COLOR/HOUSING		FIXTURE WATTAGE	SEE NOTE 1		N 0	ТҮРЕ	XMFR/TYPE	ТҮРЕ	FIXTURE DEPTH	LOCATION	
R1	FOUR FOOT 28 WATT T5 LUMINAIRE WITH DALI BALLAST, CONTINUOUSLY EXTRUDED METAL HOUSING WITH SATINE LENS.	WHITE	277V	32.6W	SELUX	M1B0-1T5-SD- SG-004-WH- 277-TB-DMA	1	F28T5	ECOSYSTEM	RECESSED	6"	OPEN OFFICE	-
R2	8" SQUARE WALL WASHER, WITH METAL HALIDE LAMPING AND POWDER COATED STEEL HOUSING	SILVER	277V	48W	ZUMTOBEL	2LS1W- 1H39T45G85- U-FF-SRM	1	39WT4	DALI	RECESSED	7"	CIRCULATIO N SPACE	-
R2E	8" SQUARE WALL WASHER, WITH METAL HALIDE LAMPING, QUARTZ RESTRIKE AND POWDER COATED STEEL HOUSING	SILVER	277V	48W	ZUMTOBEL	2LS1W- 1H39T45G85- U-FF-SRM-Q	1	39WT4	DALI	RECESSED	7"	CIRCULATIO N SPACE	-
R3	8" SQUARE DOWNLIGHT, WITH METAL HALIDE LAMPING AND POWDER COATED STEEL HOUSING	SILVER	277V	48W	ZUMTOBEL	2LS1D- 1H39T45G85- U-FF-SRM	1	39WT4	DALI	RECESSED	7"	CIRCULATIO N SPACE	-
R3E	8" SQUARE DOWNLIGHT, WITH METAL HALIDE LAMPING, QUARTZ RESTRIKE AND POWDER COATED STEEL HOUSING	SILVER	277V	48W	ZUMTOBEL	2LS1D- 1H39T45G85- U-FF-SRM-Q	1	39WT4	DALI	RECESSED	7"	CIRCULATIO N SPACE	-
Τ1	6 WATT LED TASK LIGHT, LOW PROFILE ALUMINUM FIXTURE WITH DESK MOUNTING AND LINE SWITCH ACCESSORIES	SILVER	120V	21W/3UNITS 60W/10UNIT S	FINELITE	DL-6W-S	LE	D 3500K	PS-21W	UNDER CABINET	.8"	TASK LIGHT	-
B1	EXTERIOR IN GROUND LED UPLIGHT WITH CORROSION-RESISTANT CAST ALUMINUM, DOUBLE POWDER- COATED, REPLACEABLE LED MODULE	SILVER	277V	32W	ERCO	33665000	LE	D 5500K	INTEGRAL DRIVER	-	-	BUILDING MOUNTED	-

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Table 79: Luminaire Schedule

	LUMINAIRE SCHEDULE CONTINUED											
FIXTURE TAG	DESCRIPTION	HOUSING/TRIM/ COLOR/HOUSING	VOLTAGE	TOTAL FIXTURE	MANUFACTURE SEE NOTE 1	CATALOG	LAMPS	BALLAST/ XMFR/TYPE	MOUNTING TYPE	MAXIMUM FIXTURE	GENERAL LOCATION	
		COLONNOCDING		WATTAGE	SELITOTET		NO. TYPE			DEPTH		
B2	EXTERIOR SPOT CORROSION- RESISTANT CAST ALUMINUM, DOUBLE POWDER- COATED, LED LUMINAIRE WITH STEEL MOUNTING BRACKET FOR +-90 DEGREE TILT, REPLACEABLE LED MODULE	SILVER	277V	51W	ERCO	34249000	LED 5500K	INTEGRAL DRIVER	-	-	BUILDING MOUNTED	
В3	EXTERIOR WIDE FLOOD CORROSION- RESISTANT CAST ALUMINUM, DOUBLE POWDER- COATED, LED LUMINAIRE WITH STEEL MOUNTING BRACKET FOR +-90 DEGREE TILT, REPLACEABLE LED MODULE	SILVER	277V	51W	ERCO	34253000	LED 5500K	INTEGRAL DRIVER		_	BUILDING MOUNTED	
B4	EXTERIOR FLOOD CORROSION- RESISTANT CAST ALUMINUM, DOUBLE POWDER- COATED, LED LUMINAIRE WITH STEEL MOUNTING BRACKET FOR +-90 DEGREE TILT, REPLACEABLE LED MODULE	SILVER	277V	51W	ERCO	34251000	LED 5500K	INTEGRAL DRIVER	-	-	BUILDING MOUNTED	
B5	EXTERIOR AREA CAST ALUMINUM LED LUMINAIRE WITH POWDER COAT FINISH RESISTANT TO CORROSION, CUSTOM MOUNTING	SILVER	277V	50W	BETALED	ARE-EDG-2SB- DA-02-C-UL-SV- 60K	LED 4300K	INTEGRAL DRIVER	-	-	BUILDING MOUNTED	

Table 80: Luminaire Schedule Continued



Figure 208: South Open Office Reflected Ceiling Plan

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Figure 209: South Open Office Task Lighting

Define Luminaire	
New Photometric File: 🙀 Instabase 🍃 Collection 🝃 Select 🕌 Find 🗉 Internet 🖌 Smart Symbols	
Defined Luminaires - Drag-and-drop here! Use Alt+Arrows keys to reorder list	Close
Label Description	
DATUM_DAT_14_128T5_LTL16 Mark Architectural TZ62-D-1-FT5HD-SBI Linear Lighting Acquire Lens	Help
BASYS_SQ_4IN_WW_1200LM_3 Wall Washer	Belabel
BASYS_SQ_4IN_DL_1400LM_3 Square Downlight	
T24972t 3 Wat Under Cabinet	Delete
39 Watt Downlight 60810986	
	Add/Redenine
Label SLOTLIGHT 3000LM 3500K V Defaults	rendant Mounted
Description Catal 2000 Langer Varian	C. Attach to Z=
Static: L	_ength =
Definition Arrangement Symbols	
Comers Per Camp 1.1 Number of Camps 1 SINGLE BOX RECESSED	Render Mode
Total Watts 63.4 EPA 0 © Sq.Ft. © Sq.M.	Housing
Total LLF = LLD 1 × LDD 1 × BF 0.85 = 0.85	Luminous
X Y Z	
Luminous Box: LLHC -1.88 -0.105 -0.01 Arm Length 0 BOX RECESSED	Model Mode
UBHC 199 0105 0	Line Width/Color
	Pixel
Photometric File	
Classification LCS	dela C LCS
Filename: B:\Team 1 Working Files\Craig\Dffice Lighting\Se	
[TEST] LightTools Version 6_1_0	
[[ISSOEDATE]01-20-2010 16_27_03	
	XAX I
Rotate Photometry To Conform To IES Standards (applied when Adding or Redefining)	More

Figure 210: Example Luminaire Detail for Interior Calculation

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Figure 211: Exterior Lighting Plan



Figure 212: Entrance Lighting Plan



Figure 213: Exterior Lighting Elevation E-301



Figure 214: Exterior Lighting Elevation E-302

Define Luminaire		X
New Photometric File: 🌸 Instabase 🏾 Collection 😂 Select 🚜 Find 🐔 Internet	✓ Smart Symbols	
Defined Luminaires - Drag-and-drop here! Use Alt+Arrows keys to reorder list		Close
Label Description		Halp
ERC0_33665000_V01_1xLED_ Column Oplight		
ERC0_34247000_V02_1xLED_ 28_Wide Flood		Relabel
ERC0_34253000_V02_1xLED_ 20_Flood		Delete
BETALED ARE-EDG-2M12-C-UL BXAL1212C-UV BEDALED Small ABE-EDG-2S12-CJUL-BK or BXAL1212C	√ (350mA) UT (350mA)	Delete
ERC0_34251000_V02_1xLED_ 42_Flood	61 (330mM)	Add/Redefine
General	Pole or Pendant Mounted	
Label RC0_33665000_V01_1xLED _ Defaults	Dynamic: Attach to Z=	
Description Column Uplight	C Static: Length =	
Definition		
Lumens Per Lamp 2160 Number Of Lamps 1 SINGLE	Symbols BOX RECESSED UP Box Render Mode	
Total Watts 22 EPA 0 © Sg.Ft. O Sg.M.		
TotalLLF = LLD 1 × LDD 1 × BF 0.7 = 0.7	Luminous	
Arm Length	BOX RECESSED UP Model Mode	
	+ Line Width/Color	
URHC 0.236 0.236 0	Pixel	
	,	
Filename: B:\Team 1 Working Files\Craig\Facade Fixtures\2		
[ISSUEDATE] 04-09-2009		
[LUMCAT] 33665000_V01		
[LUMINAIRE] Tesis In-ground luminaire		
[LAMP] LED 28W daylight white		
[BALLAST]		
Rotate Photometry To Conform To IES Standards (applied when Adding or Redefining)		

Figure 215: Example Luminaire Details in AGI for Exterior Calculation





SELUX Corp. © 2006	possible, we reserve the right to change, without
PO Box 1060, 5 Lumen Lane / Highland, NY 12528	notice, specifications or materials that in our
TEL: (845) 691-7723 / FAX: (845) 691-6749	opinion will not alter the function of the product.
E-mail: selux is@selux.com / Web Site: www.selux.com/usa	Specification sheets found at www.selux.com/usa
M1B0_SG-02_(02/06)	ate the most recent versions and supercede all
W120_00 02 (0200)	63

Figure 217: Luminaire R1 Specification Sheet Continued

BARBEN | CASEY | DUBOWSKI | MILLER

	2LIGHT Recessed		Square	Non-IC	8"	
	Downlight	Horizontal	39W	G8.5	U	
	Type: R2 R2E Wa	Ceramic Metal Halide	online Find it Fast 420			

2LS1D 1H	39T45G85	U	FF	SRM	Q (For E fixtures)
FIXTURE		BALLAST/VOLTAGE	REFLECTOR	FINISH		OPTIONS
2LIGHT Recessed Square 8" Aperture Non-IC Standard Wet Location Downlight Horizontal, 39W G8.5 Base	U Univ. \$3 347v	ersal 120V/277V ! Electronic ballast	FF Faceted	SRM Titan Frame WHM White Frame	MDLSBL Mellow Do MDLSGR Mellow Do MDLSGR Mellow Do Q Quartz Res CP Chicago PI F Fusing 9930 Set of two 9952 Set of two 9956 Set of two mounting	wnlight Filter - Blue wnlight Filter - Yellow wnlight Filter - Green trike enum 27° C-Channel mounting bars. 52° C-Channel mounting bars. 28° 10 ga. one-piece universal bars.
VIEWS		MECHANICAL		ELECTRICAL		OPTICAL SYSTEM
7 5/8° 16 1/2° 9 1/8° Square 16 1/2° 9 1/8° Square 16 1/2° 17 5/8° 0 1/8° Square 16 1/2° 0 1/8° Square 16 1/2° 0 1/8° Square 16 1/2° 0 1/8° Square 16 1/2° 0 1/8° 16 1/2° 0 1/8° 17 5/8° 16 1/2° 0 1/8° 16 1/2° 0 1/8° 16 1/2° 0 1/8° 16 1/2° 0 1/8° 16 1/2° 0 1/8° 17 5/8° 0 1/8° 0 1/8		Mounting Frame 16-gauge galvanized steel accessible or inaccessible mounting brackets provide 5/8° ment from side of mountin accommodate 1½° C-Char	plate suitable for ceiling types. Rigid e 4* vertical adjust- ng frame. Brackets nel, ½* EMT, ¾*	Junction Box Integral 16-guage galvanized steel junction box provided on mounting frame. UL Listed for thru wiring (4 in 4 out at 90° C). Flexible electrical whip with quick connect is provided for field connection to the junction box of the		Upper Reflector Stippled, highly specular, non-iridescent, upper reflector with innovative swing-out lampholder and built-in scattering disc provides convenient relamping.
		lathing channel, Caddy 51 C-Channels for flexibility in ing bars ordered as an opt Optical Housing	lathing channel, Caddy 517A, B, and C-Channels for flexibility in mounting. (mount- ing bars ordered as an optional accessory). Optical Housing , welded corners, post- painted white powder cata paint is light-tight, completely enclosed, exceeding IP44 require- ments. Optical housing is installed from below with swing-out mounting arms for vertical		ound wire is supplied. age (120v/277v), 39W- Ily protected metal halide	Round lower reflector is injection-molded of high-grade recyclable polycarbonate with diamond-shaped mirror-like facets in high specular silver; free of iridescence due to a
		Square steel housing, well painted white powder coat completely enclosed, exce ments. Optical housing is with swing-out mounting a			l to junction box. lide lamp, 2-pin: G8.5 l by others.	surface of high purity aluminum applied by sputtering, and coated with a transparent hard silicone finish for durability and easy cleaning A standard opal lens on outside of reflector provides diffuse lighting.
		adjustment in ceilings up t	to 1 3/8" thick.	Code Compliance / I	isting	Optional colored filters can be used in place of

Code Compliance / Listing UL Isted for Wet Location. Covered Ceiling Mount Only. Approved for thru wiring. Above ceiling access not required.



Ceiling cutout 8 7/16"	x 8 7/16"						
COMPANION DOWNLIGH	ITS USING SAME SOCKET/W	TTAGE		РНОТОМ	ETRICS		
ТҮРЕ	CATALOG NUMBER	FIF	# SPEC SHE	ET PAGE FINISH/	REFLECTOR REPOR	T # %EFF	NOTES
Wallwasher	2LS1W1H39T45G8	5 426	2LS- 1	14 Faceted	Proratio	on 60.0%	LTL #12882, Sheet 2LS-6
Cardanic	2LS1C1A39T45G85	5 430	2LS- 2	20			
Zumtobel Lighting Ir 3300 Route 9W Highland, NY 12528 1/25/10	nc. ©2010 -2630	TEL (845) 691- (800) 932-063 FAX (845) 691- www.zumtobel	6262 3 6289 .us	In a continu we reserve specificatio sheets that most recen that exist in	ing effort to offer the best produc the right to change, without n sor materials. Technical specifi appear on www.zumtobelus. a version and supersede all othe any other printed or electronic	t possible trice, cation re the r versions ; form.	ZUMTOBEL

Figure 218: Luminaires R2, R2E, R3, and R3E Specification Sheet

surface of high purity aluminum applied by sputtering, and coated with a transparent hard silicone finish for durability and easy cleaning. A standard opal lens on outside of reflector provides diffuse lighting.

Optional colored filters can be used in place of opal diffuser for a subtle introduction of color without affecting the quality of light. Weight - 10.0 lbs.



Door Frame/Trim



Figure 219: Luminaire T1 Specification Sheet

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THE SYSTEM

Personalize the system to fit the work area using multiple Desk Lamps, multiple Undercabinet units, or combinations of Desk Lamps and Undercabinet units in groupings of up to 60 watts total power.



Figure 220: Luminaire T1 Specification Sheet Continued



Figure 221: Luminaire T1 Specification Sheet Continued

BARBEN | CASEY | DUBOWSKI | MILLER



Figure 222: Luminaire T1 Specification Sheet Continued



Figure 223: Luminaire B1 Specification Sheet



Figure 224: Luminaire B1 Specification Sheet Continued



Figure 225: Luminiare B1 Specification Sheet Continued
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Figure 226: Luminaire B4 Specification Sheet

ERCO	Powercast P	rojector	
Cleaning (a) 1 Ambient conditions P C LMF 0.96 0. RSMF 0.96 0.	2 N D P C N D 4 090 0.86 0.93 0.91 0.86 0 2 0.87 0.81 0.96 0.92 0.87 0	3 P C N D 81 0.92 0.90 0.84 0.79 81 0.96 0.92 0.87 0.81	
Hours of operation (h) 1000 30 LLMF 1.00 0. LSF 1 1	000 10000 50000 0 0.90 0.70 1 1		
LLMF 1.00 0. LSF 1.01 1. MF LMFxRSMExLLMFxLSF MF Maintainance Factor LMF Lumiaire Maintenance Fac RSMF Room Surface Maintenanc LIMF Lamp Lumers Maintenanc LSF Lamp Survival factor P Room pure C Room clean N Room normal D Room dirty	or 1 1 Factor		
		Powercast Projector 34251.000	2/3

Figure 227: Luminaire B4 Specification Sheet Continued



Figure 228: Luminaire B4 Specification Sheet Continued

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Figure 229: Luminaire B2 Specification Sheet

BARBEN | CASEY | DUBOWSKI | MILLER

ER	CO			Po	we	erc	as	t I	Pro	oje	ct	or		
				Plan	ning d	ata								
Cleanin Ambien LMF RSMF	g (a) t conditions	1 P 0.96 0.96	C 0.94 0.92	N 0.90 0.87	D 0.86 0.81	2 P 0.93 0.96	C 0.91 0.92	N 0.86 0.87	D 0.81 0.81	3 P 0.92 0.96	C 0.90 0.92	N 0.84 0.87	D 0.79 0.81	
Hours o LLMF LSF	f operation (h)	1000 1.00 1	30000 0.80 1	10000 0.90 1	50000 0.70 1									
MF MF RSMF LLMF P C C N D	LMExRSMFxLL Maintainance Lumiatre Main Room Surface Lamp Lummers Lamp Surviva Room normal Room normal Room dirty	MFxLSF Factor Mainten Mainten Factor	Factor nance Fact	tor										
									n		et Denie	where		

Figure 230: Luminaire B2 Specification Sheet Continued



Figure 231: Luminaire B2 Specification Sheet Continued

BARBEN | CASEY | DUBOWSKI | MILLER



Figure 232: Luminaire B3 Specification Sheet

BARBEN | CASEY | DUBOWSKI | MILLER

ERCO Powercast Projector

Cleanin Ambier LMF RSMF	ng (a) nt conditions	1 P 0.96 0.96	C 0.94 0.92	N 0.90 0.87	D 0.86 0.81	2 P 0.93 0.96	C 0.91 0.92	N 0.86 0.87	D 0.81 0.81	3 P 0.92 0.96	C 0.90 0.92	N 0.84 0.87	D 0.79 0.81
Hours LLMF LSF	of operation (h)	1000 1.00 1	30000 0.80 1	10000 0.90 1	50000 0.70 1								
MF MF LMF RSMF LLMF LSF P C N D	LMFxRSMFxLLM Maintainance F Lumiaire Maint Room Surface I Lamp Lumens N Lamp Survival I Room pure Room clean Room normal Room dirty	AFxLSF iactor enance Mainten Mainten Factor	Factor Iance Fact ance Fact	tor or									

Powercast Projector 34253.000 2/3

Figure 233: Luminaire B3 Specification Sheet Continued



Figure 234: Luminaire B3 Specification Sheet Continued



Figure 235: Luminaire B5 Specification Sheet

ARE-EDG-2S-DA THE EDGE™ LED Area Light – Type II Short Rev. Date: 12/11/09

General Description

Stm, buy prolifie design minimizes wind load requirements. Exture sides are rugged cast aluminum with integral, weather-light LED driver compartments and high performance aluminum heatsinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3 – 6° square or round pole. Fixfure is secured by two (2) 5/16-18 UNC bolts spaced on 2° centers. includes leaf/debris guard. Five year limited warranty on fixture.

Electrical

Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full tixture), minimum 70 CRI, long life LED sources. 120-277V 50/60 Hz, Class 1 LED drivers are standard. 347-480V 50/60 Hz driver is optional. LED drivers have power factor >40% and THD <20% of full load. Units provided with integral 9KV surge suppression protection standard. Integral weather-tight electrical box with terminal strip for easy power hook-up. Surge protection tested in accordance with IEEE C82.41.2 and ANSI standard 62.41.2.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations. Consult factory for CE Certified products. RoHS compliant. International Dark-Sky Association approved.

Finish

Exclusive Coloritast DeltaGuard* finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviciet degradation and abrasicn. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty

Exture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents

U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

Field-Installed Accessories

Bird Solkes XA-BRDSPK

Photometrics



Independent Testing Laboratorias cartified test. Report No. ITL 63655. Candiepower trace of 6000K, 40 LED Type II Sh streadight luminaire with 5,225 initial delivered lumens operating at 525m. All petitisked lamitaine photometric testing performed to IEBNA LN-79-08 standards.

201 40' 100' 80' CÚRB LÌN

PRELIMINARY Candlepower tr control.



Single 180° 90* 90 909

THE EDGE⁼ EPA & Weight Calculations

Approximate Weight

10 1

LEDs 120-277V

1.06 1.68 2.16 160 41.4 lbs. 1.20 1.12 1.72 2.24 0.60180 42.1 lbs 0.60 1.20 n/a² n/a² n/a² 200 43.3 lbs 1.21 n/a² n/a² 0.61 n/a^z 220 46.6 lbs 0.65 1.29 n/a² n/a² n/a² 240 47.8 lbs. 0.69 1.38 n/a² n/a² n/a² 1. Add 5 lbs. for transformer in 347-480V fbt For applications requiring 180 or more LEDs at 90 degrees refer to the DL mount version of our spec sheet.

20 20

30 40



ec Vertical pl

er trace of Type II Short LED luminaire with backligi

ne the

Figure 236: Luminaire B5 Specification Sheet Continued



Figure 237: Metal Halide Ballast for Luminaires R2, R2E, R3, and R3E

 EcoSystem Multiple Control Input Ballasts Digital electronic dimming ballasts maximize the benefits of a lighting management system. <i>EcoSystem</i> Ballasts offer 100% to 10% dimming; ideal for use where saving energy, increasing flexibility, and maximizing productivity are the goals of the lighting design. Features Continuous, flicker-free dimming from 100% to 10% Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation) Communicates status and sensor inputs over the <i>EcoSystem</i> Bus Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness Low harmonic distortion throughout the entire dimming range Frequency of operation ensures that ballast does not 	 Coordinational consistent light output for linear language to the series of a lighting management system. EcoSystem Balasts offer 100% to 10% dimming; ideal for users where saving energy, increasing flexibility, and maximizing productivity are the goals of the lighting design. Continuous, flicker-free dimming from 100% to 10%. Provides power for and responds to one occupandy infinite dimering and cycling Communicates status and sensor inputs over the EcoSystem Bus. Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness. Low harmonic distortion throughout the entre dimering and cycling Uitra-quiet operation ensures that balast does not nitherize with infrared devices. End-flamp-life protection circuity ensures safe operation throughout entire lamp life withing learning same relative output. Nonotalite memory restores all balast settings after power failure. Bialasts maintain consistent light output for linear lamp lengths (i.e. 4.1, 3.1, 2.1, thave same relative output). Noto% performance tested at factory 	ECOSYSTEM®	Five Control	Input	EcoSystem Balaster 1 110
 Digital electronic dimming ballasts maximize the benefits of a lighting management system. <i>EcoSystem</i> Ballasts offer 100% to 10% dimming; ideal for use where saving energy, increasing flexibility, and maximizing productivity are the goals of the lighting design. Features Continuous, flicker-free dimming from 100% to 10% Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation) Communicates status and sensor inputs over the <i>EcoSystem</i> Bus Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness Low harmonic distortion throughout the entire dimming range Frequency of operation ensures that ballast does not 	 Digital electronic dimming balasts maximize the benefits of a lighting management system. EcoSystem Bals offer 100% to 10% dimming; ideal for use where saving perceyr, increasing flexibility, and maximizing perceyr, increasing flexibility, and maximizing perceyr. Increasing flexibility, and maximizing productivity are the goals of the lighting cesire. Pertures Continuous, flicker-free dimming from 100% to 10%. Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation) Communicates status and sensor inputs over the <i>EcoSystem</i> Bus Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness Low harmonic distortion throughout the entire dimming range Frequency of operation ensures that balast does not interfere with infrared devices End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life Uitra-quiet operation Norwolatile memory restores all ballast settings after power failure Balasts maintain consistent light output for linear lamp lengths (i.e. 4 ft., 3 ft., 2 ft. have same relative output). 100% performance tested at factory 	<i>EcoSystem</i> Multiple Ballasts	Control Input		LLLLL yunan LLLLLL II II.
 Features Continuous, flicker-free dimming from 100% to 10% Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation) Communicates status and sensor inputs over the <i>EcoSystem</i> Bus Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness Low harmonic distortion throughout the entire dimming range Frequency of operation ensures that ballast does not 	 Features Continuous, flicker-free dimming from 100% to 10% Provides power for and responds to one occupancy sensor, one photo sensor, and one personal control input (infrared receiver or wallstation) Communicates status and sensor inputs over the <i>EcoSystem</i> Bus Programmed rapid start design ensures full rated lamp life while dimming and cycling Lamps turn on to any dimmed level without flashing to full brightness Low harmonic distortion throughout the entire dimming range Frequency of operation ensures that ballast does not interfere with infrared devices End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life Ultra-quiet operation Nonvolatile memory restores all ballast settings after power failure Ballasts maintain consistent light output for linear lamp lengths (i.e. 4 ft., 3 ft., 2 ft. have same relative output) 100% performance tested at factory 	Digital electronic dimming b benefits of a lighting manage Ballasts offer 100% to 10% where saving energy, increa maximizing productivity are design.	allasts maximize the ement system. <i>EcoSystem</i> dimming; ideal for use sing flexibility, and the goals of the lighting	EcoSystem case type G	
 interfere with infrared devices End-of-lamp-life protection circuitry ensures safe operation throughout entire lamp life Ultra-quiet operation Nonvolatile memory restores all ballast settings after power failure Ballasts maintain consistent light output for linear lamp lengths (i.e. 4 ft., 3 ft., 2 ft. have same relative output) 100% performance tested at factory 		 Features Continuous, flicker-free dimits Provides power for and responsers, one photo sensor, and input (infrared receiver or wate) Communicates status and start destances that and the secosystem Bus Programmed rapid start destand the secosystem on the secosystem of the second o	ning from 100% to 10% onds to one occupancy nd one personal control illstation) iensor inputs over the sign ensures full rated cycling ed level without flashing to bughout the entire ures that ballast does not is circuitry ensures safe lamp life is all ballast settings after light output for linear 2 ft. have same relative t factory	EcoSystem case type J	
CLUTRON. SPECIFICATION SUBMITTAL Page 1			Mandal Musehana		8-
OLUTRON. SPECIFICATION SUBMITTAL Page 1 Job Name: Model Numbers: 1	Job Name: Model Numbers:	Job Name:	Model Numbers:		
OLUTRON. SPECIFICATION SUBMITTAL Page 1 Job Name: Model Numbers:	Job Name: Model Numbers:	Job Name:	Model Numbers:		

Figure 238: Ballast Specification Sheet for Luminaire R1

EcoSystem®	Five Control Input	Digital Dimming Ballas
		EcoSystem Ballasts 2 11.0
Specifications	Environme	nt
Specifications Standards California Energy Commission Liste UL Listed (evaluated to the requiren CSA certified (evaluated to the requiren CSA certified (evaluated to the requiren C22.2 No. 74) NOM Listed for 32 W T8 Ballasts S Mark Certified Class P thermally protected Meets ANSI C82.11 High Frequency Meets FCC Part 18 Non-Consumer EMI/RFI emissions Meets ANSI C62.41 Category A sur standards up to and including 4 kV Manufacturing facilities employ ESE practices that comply with the requ ANSI/ESD S20.20 Lutron Quality Systems registered t Performance Operating Voltage: 120, 220/240, 2 60 Hz Grounding: ballast and fixture must proper dimming Dimming Range: 100% to 10% mea light output Lamp Starting: programmed rapid : Lamp Current Crest Factor: less this Light Output Variation: Constant ±2 line voltage variations of ±10%	d • Minimum late ents of UL935) • Maximum bite irements of • Maximum bite Ballast of UL935) • Maximum bite Ballast Standard • Maximum bite requirements for • Ballast is grading ge protection • Class 2 sen only on oreduction • Only one wite reduction • Only one wite oreduction • Wiring from exceed 7 ft. wite guitere and • Wiring from exceed 3 ft. <t< td=""><td>nt mp starting temperature: 50 °F (10 °C nidity: less than 90% non-condensing ng: inaudible in a 27 dB ambient vallast case temperature: 75 °C (167 °F ing & Mounting ounded by a mounting screw to the bocks on the ballast accept the followin a: ng, Lamp Wiring, and <i>EcoSystem</i> Bus ne #18 AWG solid per terminal sors: ne #22 AWG solid per terminal re per terminal sor wiring must be separated from all Class 1 wiring, consult all applicable ational codes nts using two screws (or sheet metal one screw) within a fluorescent fixture the ballast to lamp sockets shall not for T8, T5, and T5HO lamps the ballast to lamps sockets shall not for T5 Twin Tube lamps soning ap manufacturer for lamp seasoning ts prior to dimming</td></t<>	nt mp starting temperature: 50 °F (10 °C nidity: less than 90% non-condensing ng: inaudible in a 27 dB ambient vallast case temperature: 75 °C (167 °F ing & Mounting ounded by a mounting screw to the bocks on the ballast accept the followin a: ng, Lamp Wiring, and <i>EcoSystem</i> Bus ne #18 AWG solid per terminal sors: ne #22 AWG solid per terminal re per terminal sor wiring must be separated from all Class 1 wiring, consult all applicable ational codes nts using two screws (or sheet metal one screw) within a fluorescent fixture the ballast to lamp sockets shall not for T8, T5, and T5HO lamps the ballast to lamps sockets shall not for T5 Twin Tube lamps soning ap manufacturer for lamp seasoning ts prior to dimming
specified lamp ratings Power Factor: 0.95 minimum Total Harmonic Distortion (THD): Le Inaudible in a 27 dBA ambient Maximum Inrush Current: 3 A per b 7A per ballast at 120 V~ Class 2 Output: +20 V—, 50mA mad daylight sensor, one keypad and or sensor can be connected)	ss than 20% allast at 277 V~, iximum (one e occupancy	
CLUTRON. SPECIFICATION	SUBMITTAL	Page 2
	Indel Numbers:	1 490
lob Namo:	ioder Numbers:	
Job Name: N		
Job Name:		
Job Name:		

Figure 239: Ballast Specification Sheet for Luminaire R1 Continued

EcoSystem_®

Five Control Input

Digital Dimming Ballasts EcoSystem Balasts 4 11.03.08

EcoSystem Ballasts for linear T5 Lamps

Lamp	No. of	Model	Case Size	Input Voltage (VAC)	Input Current (A)	Input Power (W)	Ballast Factor (BF)	System Lumens (Im)	System Efficacy (Im/W)	Ballast Efficacy Factor	Relative Efficacy (RSE)
F35T5 (57.1 in.)	1	EC5 T535 J UNV 1	J	277 240 120	0.15 0.18 0.35	42.0 42.3 42.2	1.0 1.0 1.0	3650 3650 3650	87 87 87	2.38 2.38 2.38	0.83 0.83 0.83
F28T5 (45.2 in.)	2	EC5 T528 J UNV 2	J	277 240 120	0.23 0.27 0.54	64.5 65.0 65.2	1.0 1.0 1.0	5800 5800 5800	90 89 89	1.55 1.54 1.53	0.87 0.86 0.86
	1	EC5 T528 J UNV 1	J	277 240 120	0.12 0.14 0.27	32.6 32.9 32.9	1.0 1.0 1.0	2900 2900 2900	89 88 88	3.07 3.04 3.04	0.86 0.85 0.85
F21T5 (33.4 in.)	2	EC5 T521 J UNV 2	J	277 240 120	0.17 0.20 0.39	46.0 47.2 47.2	1.0 1.0 1.0	4200 4200 4200	91 89 89	2.17 2.12 2.12	0.91 0.89 0.89
	1	EC5 T521 J UNV 1	J	277 240 120	0.09 0.11 0.22	25.8 25.8 25.8	1.0 1.0 1.0	2100 2100 2100	81 81 81	3.88 3.88 3.88	0.81 0.81 0.81
F14T5 (21.6 in.)	2	EC5 T514 J UNV 2	J	277 240 120	0.12 0.14 0.28	32.8 33.3 33.3	1.0 1.0 1.0	2700 2700 2700	82 81 81	3.05 3.00 3.00	0.85 0.85 0.85
×3	1	EC5 T514 J UNV 1	J	277 240 120	0.07 0.08 0.16	19.0 19.2 19.2	1.0 1.0 1.0	1350 1350 1350	71 70 70	5.26 5.21 5.21	0.74 0.74 0.74

CLUTRON. SPECIFICATIO	N SUBMITTAL	Page 4
Job Name:	Model Numbers:	
Job Number:		
Job Number:		

Figure 240: Ballast Specification Sheet for Luminaire R1 Continued

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High Intensity Discharge 121–148

Solid State Lighting 149-156

Specialty 157–177

Additional Information 178-189

FLUORESCENT LAMPS SILHOUETTE" T5, Colored Linear Fluorescent Lamps

Watts	Product Number	Symbols, Footnotes	Ordering Code	Pkg. Qty4	Description	Nom. Length (In.)	Rated Aw 3 Hr. Start (202	<u>erage Life</u> 12 Hr.) Start (241)	Approx. Initial Lumens (203,204)	Design Lumens (208)	CRI
	TTE" LONG	LIFETS LAM	PS(2FT-5 FT)								
T5 Miniati	ure Bipin; Pro	grammed Star	t								
14	23077-1	\$ •	F14T5/830/ALTO	40	TL 830, 3000K	22	25,000	35,000	1350	1275	85
	23079-7	\$ •	F14T5/835/ALTO	40	TL 835, 3500K	22	25,000	35,000	1350	1275	85
	23080-5	\$ •	F14T5/841/ALTO	40	TL 841, 4100K	22	25,000	35,000	1350	1275	85
21	23081-3	\$ •	F21T5/830/ALTO	40	TL 830, 3000K	34	25,000	35,000	2100	2000	85
	23082-1	\$ •	F21T5/835/ALTO	40	TL 835, 3500K	34	25,000	35,000	2100	2000	85
	23083-9	\$ •	F21T5/841/ALTO	40	TL 841, 4100K	34	25,000	35,000	2100	2000	85
28	23064-7	\$•0	F28T5/830/ALTO	40	TL 830, 3000K	46	25,000	35,000	2900	2750	85
	23085-4	\$•0	F28T5/835/ALTO	40	TL 835, 3500K	46	25,000	35,000	2900	2750	85
	23086-2	\$•0	F28T5/841/ALTO	40	TL 841, 4100K	46	25,000	35,000	2900	2750	85
35	23068-8	\$ •	F35T5/830/ALTO	40	TL 830, 3000K	58	25,000	35,000	3650	3450	85
	23091-2	\$ •	F35T5/835/ALTO	40	TL 835, 3500K	58	25,000	35,000	3650	3450	85
	23095-3	\$ •	F3ST5/841/ALTO	40	TL 841, 4100K	58	25,000	35,000	3650	3450	85

Watts	Product Number	Symbols, Footnotes	Ordering Code	Pkg. Qty4 Description	Nom. Length (In.)	Rated Avg, Life (Hrs.) (202)	Approx. Initial Lumens (203,204)	Design Lumens (208)	CRI
		FUIORESCEN	T LAMPS-TS LICU OUTP	п					

24	14637-3	\$ F24T5/RED/HO	15	TL5HO Colored Pro 24W/150 Red	22	12,000	1400	1330	N/A
	14638-1	\$ F24T5/GREEN/HO	15	TL5HO Colored Pro 24W/170 Green	22	12,000	2750	2475	N/A
	14639-9	\$ F24T5/BLUE/HO	15	TL5HO Colored Pro 24W/180 Blue	22	12,000	550	440	N/A
54	14640-7	\$ F54T5/RED/HO	15	TL5HO Colored Pro 54W/150 Red	46	12,000	3450	3280	N/A
	14641-5	\$ F54T5/GREEN/HO	15	TL5HO Colored Pro 54W/170 Green	46	12,000	6900	6210	N/A
	14642-3	\$ F54T5/BLUE/HO	15	TL5HO Colored Pro 54W/180 Blue	46	12,000	1500	1200	N/A

For the most current product information, go to the e-catalog on www.philips. Ruomacent symbols and footnotes located on page 120

T5 LUMENS AT 35°C AND 25°C

щ	Lamp Туре	Approx. Initial Lumens at 35° C (203, 204)	Approx. Inittal Lumens at 25°C (203, 204)
	FI4T5	1350	1200
	F21T5	2100	1900
	F28T5	2900	2600
	F35T5	3650	3300
	F24T5/HO	2000	1800
	F39T5/HO	3500	3150
	F54T5/HO	5000	4500
	F80T5/HO	7000	6300
TS Miniature Bipin			

Philips Lighting Company SAG100 2008-2009 91

Figure 241: Lamp Specification Sheet for Luminaire R1

	WERB h CRI,	ALL® CE Pulse St	RAMIC art, UV	METALARC® TUE Stop – Enclosed F	BULAR	SINC	ile-e	NDED	_	Ava	_		_	_	_
Watt	s Bulb	Base	Produc Numbe	t r Ordering Abbreviation	ANSI Code	Pl	g Lamp y Finish	Operating Position	Req	Rated Life (hrs)	Approx (initiai)	(mean)	CRI	CCT (K)	Symbol Footnot
20	T4.5	G8.5	64882	MC20TC/U/G8.5/830PB	M156	/E 12	Clear	Universal	E	12000	1700	1275	83	3000	* 💽 24,25,30,4
39	T4.5	G8.5	64791	MC39TC/U/G8.5/830PB	M130	/E 12	Clear	Universal	E	12000	3400	2720	82	3000	25,30,48
	T6	G12	64363	MC39T6/L/G12/830PB	M130	/E 12	Clear	Universal	E	12000	3400	2720	82	3000	25,30,48
			64325	MC39T6/L/G12/940PB	M130	/E 12	Clear	Universal	E	12000	3300	2640	90	4200	* 🔤 24,25,25,3
70	T4.5	G8.5	64825	MC70TC/U/G8.5/930PB	M139 M98/5	VE, 12	Clear	Universal	E	12000	6300	5040	95	3000	* C
	T6	G12	64361	MC70T6/L/G12/830PB	M139 M98/8	VE, 12	Clear	Universal	E	12000	7000	5600	87	3000	25,26,30,4
			64200	MC70T6/U/G12/930PB	M139 M98/8	VE, 12	Clear	Universal	E	12000	6400	5120	95	3000	* C
			64338	MC70T6/L/G12/940PB	M139 M98/8	VE, 12	Clear	Universal	E	12000	6700	5360	93	4200	25,25,30,4
150	T7.5	G12	64359	MC150T7.5/U/G12/830	M102 M142	/E, 12 /E	Clear	Universal	E	12000	15500	12400	89	3000	30,31,48
			64337	MC150T7.5/U/G12/940PB	M102 M142	/E, 12 /E	Clear	Universal	E	12000	14500	11600	95	4200	30,31,48
250	T9	G22	64167	MC250T9/U/G22,830PB	MBQ/E	= 10	Clear	Universal	E	12000	24500	19600	86	3000	.1824.30
Watt	s Rulh	Raso	Produc	t Contering Abbreviation	ANSI	P	g Lamp	Operating Position	FIX	Avg Rated	Approx	Lumens	CBI	CCT	Symbo
Watt 70	s Bulb Tô	Base RX7s RSC	Produc Numbe 64793	t Ordering Abbreviation MC70T6/DE/830PB	ANSI Code M139 M85/8 M98/8	P) 01 /E, 12	g Lamp Y Finish ? Clear	Operating Position HOR ± 45) Fix Req 5° E	Avg Rated Life (hrs) 12000	Approx (initiai) 6900	(mean) 5520	CRI 88	ССТ (К) 3000	Symbo Footno
Watt 70 150	s Bulb T6 T7.5	RX7s RSC RX7s RSC	Produc Numbe 64793 64794	t r Ordering Abbreviation MC70T6/0E;830PB MC150T7.5;0E;830PB	ANSI Code M139 M85/E M96/E M102 M142 M142	P) Q1 VE, 12 , VE, 12 VE, 12 VE, 12	g Lamp Finish Clear Clear	Operating Position HOR ± 45 HOR ± 45) Fix Req 5° E	Avg Rated Life (hrs) 12000 12000	Approx (Initial) 6900 14800	Lumens (mean) 5520 11840	CRI 88 91	CCT (K) 3000	Symbo Footno 25,30,25,4) 1011,418 25,30,25,4
Watt 70 150 PO Hig	TE T7.5 WERB h CRI,	RX75 RSC RX75 RSC RX75 RSC ALL® CE Pulse St	64793 64794 RAMIC art, UV	t r Ordering Abbreviation MC70T6/DE/830P8 MC150T7.5/DE/830P8 METALARC® PAF Stop – Open or En	ANSI Code M139 M857 M987 M192 M142 M81/6 Closed	PK Qf (F, 12 (F, 12 (F, 12 (F, 12) (Fixtu	g Lamp Rnish Clear Clear Clear	Operating Position HOR ± 45 HOR ± 45) Fix Req 6° E	Avg Rated Life (hrs) 12000	Approx (Initial) 6900 14800	(mean) 5520 11840	CRI 88 91	CCT (K) 3000	Symbo Footno 25,30,35,4 0 11,418 37,48
watt 70 150 PO Hig	s Bulb T6 T7.5 WERB h CRI, s Bulb	RX75 RSC RX75 RSC RX75 RSC ALL® CE Puise St B259	Produc Numbe 64793 64794 RAMIC art, UV Product Number C	t r ordering Abbreviation MC70T6/0E/830P8 MC150T7.5/0E/830P8 METALARC® PAF Stop – Open or En Drdering Abbreviation	ANSI Code M139 M856 M986 M102 M142 M81/6 Code Code	PY Cd VE, 12 	g Lamp Phish Clear Clear Clear res	Operating Position HOR ± 45 HOR ± 45 Operating Position) Fix Req)° E)° E) Fix Req	Avg Rated Life (hrs) 12000 12000 Avg Rated Life (hrs)	Approx (Initial) 6900 14800 MBCP	Approx (Intern)	CRI 88 91 CRI	ССТ (К) 3000 3000	Symbol Footno
Watta 70 150 PO Hig 20	s Buid T6 T7.5 WERB h CRI, s Buid PAR30L	B359 RX75 RSC RX75 RSC ALL® CE Puise St B359 N E26 Med	Product Number 64793 64794 RAMIC Product Number C 64879	t r Ordering Abbreviation MC70T6/06/830P8 MC150T7.5/06/830P8 METALARC® PAF Stop – Open or En Ordering Abbreviation MCP20PAR30LNU(830/59/6C0F8	ANSI Code M139 M987 M987 M102 M142 M817 Code M15670 C	PY Of P(E, 12 F, 12 F, 12 Fixtu P(Kg) Beau P(Kg) Beau S SP	g Lamp Finish Clear Clear Clear Clear Clear Clear 10°	Operating Position HOR ± 45 HOR ± 45 Operating Position) Fix Req 9° E 9° E 9° E 1 Fix Req 0	Avg Rated Life (hrs) 12000 12000 Avg Rated Life (hrs) 12000	Approx (Initian) 6900 14800 <u>MBCP</u> 24000	Approx (initial)	CRI 88 91 CRI 82	CCT (K) 3000 3000 CCT (K) 3100	Symbol Footno
Watti 70 150 PO Hig Watti 20	s Build T6 T7.5 WERB h CRI, s Build PAR30L	RX75 RSC RX75 RSC RX75 RSC ALL® CE Puise St B359 N E26 Med	Product Number 64793 64794 RAMIC art, UV Product Number C 64879 N 64878 N	t r Ordering Abbreviation MC70T6/06/830P8 MC150T7.5/06/830P8 METALARC® PAF Stop – Open or En ordering Abbreviation MCP20PAR30LINU(830/FL/ECOPB	ANSI Code M138 M856 M986 M102 M142 M142 M142 M146 Code M1560 C	PY ME, 12 ME, 12 ME, 12 Fixtu Pkg Bear Pkg Bear S SP S FL	g Lamp Finish Clear Clear Clear Clear Clear I Clear Clear Clear Clear Clear Clear Clear	Operating Position HOR ± 45 HOR ± 45 Operating Position Universal) Fix Req) Fix Req 0 0	Avg Rated Life (firs) 12000 12000 Avg Rated Life (firs) 12000 12000	Approx (initial) 6900 14800 <u>MBCP</u> 24000 4000	Approx (initial) 1200	CRI 88 91 CRI 82	CCT 3000 3000 3000 3000 3100 3100	Symbol Footno 25,30,564 37,48 Symbol Footnot 1,42,1224 1,42,1224
Watti 70 150 PO Hig Watti 20	BUID T6 T7.5 WERB h CRI, BUID PAR30L	E339 RX75 RSC RX75 RSC ALL® CE Puise St E339 N E26 Med	Product Number C 64793 64794 RAMIC Number C 64879 N 64879 N 64878 N	t r Ordering Abbreviation MC70T6/06/830P8 MC150T7.5/06/830P8 METALARC® PAF Stop - Open or En Ordering Abbreviation MCP20PAR30LINU(830/SP/ECOPB MCP20PAR30LINU(830/SP/ECOPB MCP39PAR20/U830/SP/B	ANSI Code M139 M855 M985 M192 M142 M816 Closed M1560 (M1560 (M1560 (M1300)	Pig Gi VE, 12 VE, 12 VE	g Lamp y Finish Clear Clear Clear Clear Clear Clear 10° 30° 10°	Operating Position HOR ± 45 HOR ± 45 Operating Position Universal Universal) Fix Req) Fix Req 0 Fix Req 0 0	Avg Rated Life (hrs) 12000 12000 Avg Rated Life (hrs) 12000 12000 12000	Approx (initial) 6900 14800 <u>MBCP</u> 24000 4000	Approx (mean) 5520 11840 Approx (initial) 1200 2000	CRI 88 91 CRI 82 82 82	CCT (K) 3000 3000 3000 3100 3100 3000	Symbol Footbo 23,00,35,4 57,48 Symbol Footbot 0,0,1724 0,0,1744 0,0,1744 0,0,1744 0,0,1744 0,0,1744 0,
Watti 70 150 Hig 20 39	Build T6 T7.5 WERB h CRI, PAR30L PAR30L	RX75 RSC RX75 RSC RX75 RSC ALL® CE Puise St B359 N E26 Med	Product 64793 64794 RAMIC art, UV Product O 64879 M 64878 M 64878 M 64826 M	t r ordering Abbreviation MC70T6/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB	ANSI Code M139 M857 M987 M102 M1987 M102 M1987 M102 M1987 M102 M102 M102 M102 M102 M102 M102 M102	P(0) (1) (1) (1) (1) (1) (1) (1) (1	g Lamp y Finish Finish Clear C	Operating Position HOR ± 45 HOR ± 45 Operating Position Universal Universal	Fix Req Fix Req Fix Req O O O O	Avg Rabd Life (hrs) 12000 12000 12000 12000 12000 12000	Approv (inita) 6900 14800 24000 4000 20000 5000	Lumens (mean) 5520 11840 Abprox (intial) 1200 2000 2000	CRI 88 91 CRI 82 82 87 87	CCT (K) 3000 3000 CCT (K) 3100 3000 3000	Symbol Footnot 37,45 Symbol Footnot 1,431,724 Symbol Footnot 1,42,722 Symbol Footnot 1,42,722 Symbol Symbol Footnot 1,42,722 Symbol Sym
Watti 70 150 PO Hig 20 39	Build T6 T7.5 WERB h CRI, PAR30L PAR30L PAR30L	RX75 RSC RX75 RSC RX75 RSC ALL® CE Puise St RSS R E26 Med R E26 Med	Product Number 64793 64794 RAMIC Number C 64879 M 64879 M 64878 M 64824 M 64826 M	t Ordering Abbreviation MC70TB/06/830PB MC150T7.5/06/830PB MC150T7.5/06/830PB METALARC® PAF Stop — Open or En Ordering Abbreviation MCP20PAR30LNU/830/SP/ECOPB MCP39PAR20/U/830/SP/ECOPB MCP39PAR20/U/830/SP/ECOPB	ANSI Code M139 M855 M965 M162 M1965 M1660 M1560 M1560 M1560 M1560 M1500 M1000	Pic VE 12 VE 12 Pkg Baaa 2017 Typx Pkg Baaa 12 SP 12 SP 12 SP 12 SP 12 SP 12 SP	g Lamp y Finish (Lamp y Finish (Lamp) (Lamp	Operating Position HOR ± 45 HOR ± 45 Operating Position Universal Universal Universal	Fix Req 0° E 1° E	Avg Rated Life (hrs) 12000 12000 Avg Rated Life (hrs) 12000 12000 12000 12000	Approv (initiai) 6900 14800 24000 20000 5000 39600	Lumens (maan) 5520 11840 Approx Lumens (initial) 1200 2000 2000 2300	CRI 88 91 CRI 82 82 87 87 85	CCT (K) 3000 3000 3000 3100 3000 3000	Symbol Footnot Statistics Symbol Footnot 1,42,1724 Symbol 1,42,1724 Symbol 1,42,1724 Symbol 1,42,1724 Symbol 1,42,1724 Symbol 1,42,1724 Symbol

Figure 242: Lamp Specification Sheet for Luminaires R2, R2E, R3, and R3E

BARBEN | CASEY | DUBOWSKI | MILLER

13.85714286	2	-	4	5	-	7	8	-	10	11	-	13	14	-	16
	Length/#	Mat Cost a	nd Labor	Length/#	Mat Cost	and Labor	Length/#	Mat Cost a	and Labor	Length/#	Mat Cost	and Labor	Length/#	Mat Cost a	ind Labor
Conduit	350.8571429	\$53.	30	434	\$53	.30	517.1429	\$53	.30	600.2857	\$53	8.30	683.4286	\$53.	.30
Conductor	1403.428571	\$21.4	45	1736	\$21	.45	2068.571	\$21	.45	2401.143	\$21	.45	2733.714	\$21.	.45
	Total	\$48,804.23	\$0.00) Total	\$60,369.40	\$0.00	Total	\$71,934.57	\$0.00	Total	\$83,499.74	\$0.00	Total	\$95,064.91	\$0.00
	G Total	\$48,80	4.23	G Total	\$60,3	69.40	G Total	\$71,93	34.57	G Total	\$83,4	99.74	G Total	\$95,06	54.91
	Total Cost	\$855,584.23													
				17	-	19	20	-	22	23	-	25	26	-	28
				Length/#	Cost and La	bor	Length/#	t Cost and La	bor	Length/#	t Cost and La	abor	Length/#	Mat Cost a	ind Labor
				766.5714	\$53.30		849.7143	\$53.30		932.8571	\$53.30		1016	\$53.	.30
				3066.286	\$21.45		3398.857	\$21.45		3731.429	\$21.45		4064	\$21.	.45
	Lighting	Mechanical		Total	##########	\$0.00	Total	\$118,195.26	\$0.00	Total	\$129,760.43	\$0.00	Total	\$141,325.60	\$0.00
	\$855,584.23	\$344,292.37		G Total	##########		G Total	\$118,195.26		G Total	\$129,760.43		G Total	\$141,3	25.60
Total Cost	\$1,199	,876.60													

Figure 243: Existing Conduit Cost Spread Sheet for Electrical Room Feeders

BARBEN | CASEY | DUBOWSKI | MILLER

13.85714286	2	-	5	6	-	9	10	-	13	14	-	17
	Length/#	Mat Cost a	and Labor	Length/#	Mat Cost	and Labor	Length/#	Mat Cost	and Labor	Length/#	Mat Cost	and Labor
Conduit	189.2857143	\$53.	.30	244.7143	\$53	.30	300.1429	\$53	3.30	355.5714	\$53	.30
Conductor	757.1428571	\$21	.45	978.8571	\$21	.45	1200.571	\$21	.45	1422.286	\$21	.45
	Total	\$26,329.64	\$0.00	Total	\$34,039.76	\$0.00	Total	\$41,749.87	\$0.00	Total	\$49,459.99	\$0.00
	G Total	\$26,32	29.64	G Total	\$34,0	39.76	G Total	\$41,7	49.87	G Total	\$49,4	59.99
	Total Cost	\$344,292.37										
				18	-	21	22	-	25	26	-	28
				Length/#	Mat Cost	and Labor	Length/#	Mat Cost	and Labor	Length/#	Mat Cost	and Labor
				411	\$53	.30	466.4286	\$53	3.30	508	\$53	.30
				1644	\$21	.45	1865.714	\$21	.45	2032	\$21	.45
				Total	\$57,170.10	\$0.00	Total	\$64,880.21	\$0.00	Total	\$70,662.80	\$0.00
				G Total	\$57,1	70.10	G Total	\$64,8	80.21	G Total	\$70,6	62.80

Figure 244: Existing Conduit Cost Spead Sheet for Mechancail Rooms

		ΡA	NEL	B O A	R	0	S C H	EDL	I L E		
VOLTAGE: 480Y/27	77V,3PF	H,4W		PANEL T	ΰ	I →	8 (OLD)		MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 100A			PAN	EL LOCATI	NO	AST	ELECTRICA	L ROOM	OPTIONS:		
SIZE/TYPE MAIN: 100A/3F	P C/B		PANE	IT MOUNTI	ÿ	SURF	ACE				
DESCRIPTION LOCA	TION	LOAD (WATTS)	C/B SIZE	POS. NO.	∢		C POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
		0	20A/1P	-	*		2	20A/1P	0		
		0	20A/1P	3		*	4	20A/1P	0		
		0	20A/1P	2		* 	9	20A/1P	0		
		0	20A/1P	7	*		œ	20A/1P	0		
		0	20A/1P	6		*	10	20A/1P	0		
		0	20A/1P	4		*	12	20A/1P	0		
		0	20A/1P	13	*		14	20A/1P	0		
		0	20A/1P	15		*	16	20A/1P	0		
		0	20A/1P	17		*	18	20A/1P	0		
		0	20A/1P	19	*		20	20A/1P	0		
		0	20A/1P	21		*	22	20A/1P	0		
		0	20A/1P	23			* 24	20A/1P	0		
		0	20A/1P	25	*		26	20A/1P	1300	9TH FLOOR	Emerg. LTG. 9th floor
0 0		0	20A/1P	27		*	28	20A/1P	1200	9TH FLOOR	Emerg. LTG. 9th floor
0 0	(0	20A/1P	29		•	30	20A/1P	1300	8TH FLOOR	Emerg. LTG. 8th floor
0 0	(0	20A/1P	31	*		32	20A/1P	1200	8TH FLOOR	Emerg. LTG. 8th floor
		0	20A/1P	33		*	34	20A/1P	1100	7TH FLOOR	Emerg. LTG. 7th floor
		0	20A/1P	35		*	* 36	20A/1P	1400	7TH FLOOR	Emerg. LTG. 7th floor
		0	20A/1P	37	*		38	20A/1P	0		
		0	20A/1P	39		*	40	20A/1P	0		
		0	20A/1P	41		* _	* 42	20A/1P	0		
CONNECTED LOAD (KW) -	A Ph.	2.50							TOTAL DESIGN	LOAD (KW)	00.6
CONNECTED LOAD (KW) -	B Ph.	2.30							POWER FACTO	Я	0.80
CONNECTED LOAD (KW) -	C Ph.	2.70							TOTAL DESIGN	LOAD (AMPS)	14

Figure 245: Panelboard EHV-8 (Existing)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG V	ORK	SHEET	-		
	P	anel Tag		>	HV-8 (OL	Pa	anel Loc	ation:	EAST E	LECTRIC	AL ROOM
N	omir	nal Phase to Neutral	Volt	age>	277		Phase	e:	3		
N	omir	al Phase to Phase	Volta	ge>	480	Ļ	Wires	s:	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α				0	W		0	0		
2	A				0	W		0	0		
3	В				0	W		0	0		
4	В				0	W		0	0		
6	0				0	W		0	0		
7	A				0	w		0	0		
8	A				0	w		0	0		
9	В				0	w		0	0		
10	В				0	w		0	0		
11	С				0	w		0	0		
12	С				0	W		0	0		
13	A				0	W		0	0		
14	A				0	W		0	0		
10					0	W		0	0		
17	C				0	W		0	0		
18	c				0	w		0	0		
19	A				0	W		0	0		
20	Α				0	W		0	0		
21	В				0	W		0	0		
22	В				0	W		0	0		
23	C				0	W		0	0		
24	C				0	W		0	0		
20	A	mera LTG 0th floo	2		12	W		1200	1625		
20	R	inerg. ETO. surnou		BITTLOOP	1.5	kw		0	0		
28	B	mera, LTG, 9th floo	3	9TH FLOOF	1.2	kw		1200	1500		
29	С					kw		0	0		
30	С	merg. LTG. 8th floo	3	STH FLOOF	1.3	kw		1300	1625		
31	Α					kw		0	0		
32	A	merg. LTG. 8th floo	3	8TH FLOOF	1.2	kw		1200	1500		
33	В	mora LTC 7th floa	2		0	KW		1100	1275		
35	0	inerg. LTG. Autiliou	3		0	kw		0	1375		
36	c	mera LTG 7th floo	3	7TH FLOOF	14	kw		1400	1750		
37	A				0	W		0	0		
38	Α				0	W		0	0		
39	В				0	W		0	0		
40	40 B				0	W		0	0		
41	C				0	W		0	0		
42					0	W		7.5	0	A	44.0
PAN	IEL	IUTAL						7.5	9.4	Amps-	11.3
PHA	SE	LOADING						kW	kVA	%	Amps
	P	HASE TOTAL	A					2.5	3.1	33%	11.3
			B					2.3	2.9	31%	10.4
-				-		1	_	2.1	3.4	30%	12.2
LOA	DC	ATAGORIES		Conne	ected		Der	mand	DE		Ver. 1.04
4		recontacion		KVV	KVA 0.0		KVV 0.0	KVA 0.0	PF		
2		computers	-	0.0	0.0		0.0	0.0			
3	fli	uorescent lighting		7.5	9.4		7.5	9.4	0.80		
4		HID lighting		0.0	0.0		0.0	0.0			
5	inc	andescent lighting		0.0	0.0		0.0	0.0			
6		HVAC fans		0.0	0.0		0.0	0.0			
7		heating		0.0	0.0		0.0	0.0			
8	k	tchen equipment		0.0	0.0		0.0	0.0			
9	Lot-	unassigned		0.0	0.0		0.0	0.0			
	r utal	Demanu Loads	-	20%			1.5	9.4			
	Tota	I Design Loads	-	2070	1		9.0	11.3	0.80	Amps=	13.5
_	. 010						0.0	11.0	5.00	- sups-	70.0
Defa	ult F	Power Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 246: Panelboard Worksheet EHV-8 (Existing)

		ΡA	N E	B 0				S C H	EDU	Ш		
VOLTAGE: 2	08Y/120V.3P	H,4W		PANEL T	ÄG	EH	/-8 ((EW)		MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 1	00A		PAN	EL LOCAT	NO	EĂ	UI II	LECTRICA	L ROOM	OPTIONS:		
SIZE/TYPE MAIN: 1	00A/3P C/B		PANE	EL MOUNT	Ö	SUF	RAC	щ				
DESCRIPTION	LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	۲	B	U	POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
		0	20A/1P	-	*		\top	2	20A/1P	0		
		0	20A/1P	e		*		4	20A/1P	0		
		0	20A/1P	9			*	9	20A/1P	0		
		0	20A/1P	7	*			~	20A/1P	0		
		0	20A/1P	6		*		10	20A/1P	0		
		0	20A/1P	11			*	12	20A/1P	0		
		0	20A/1P	13	*			14	20A/1P	0		
		0	20A/1P	15		*		16	20A/1P	0		
		0	20A/1P	17			*	18	20A/1P	0		
		0	20A/1P	19	*		\vdash	20	20A/1P	0		
		0	20A/1P	21		*		22	20A/1P	0		
		0	20A/1P	23			*	24	20A/1P	0		
		0	20A/1P	25	*			26	20A/1P	1300	9TH FLOOR	Emerg. LTG. 9th floor
0	0	0	20A/1P	27		*		28	20A/1P	1200	9TH FLOOR	Emerg. LTG. 9th floor
0	0	0	20A/1P	29			*	30	20A/1P	816	8TH FLOOR	Emerg. LTG. 8th floor
0	0	0	20A/1P	31	*			32	20A/1P	978	8TH FLOOR	Emerg. LTG. 8th floor
		0	20A/1P	33		*		34	20A/1P	1100	7TH FLOOR	Emerg. LTG. 7th floor
		0	20A/1P	<u> 35</u>			*	36	20A/1P	1400	7TH FLOOR	Emerg. LTG. 7th floor
		0	20A/1P	37	*			38	20A/1P	0		
		0	20A/1P	<u>68</u>		*		40	20A/1P	0		
		0	20A/1P	41			*	42	20A/1P	0		
CONNECTED LOAD	(KW) - A Ph.	2.28								TOTAL DESIGN	I LOAD (KW)	8.15
CONNECTED LOAD	(KW) - B Ph.	2.30								POWER FACT(DR .	0.80
CONNECTED LOAD	(KW) - C Ph.	2.22								TOTAL DESIGN	I LOAD (AMPS)	12

Figure 247: Panelboard EHV-8 (New)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG W	ORK	SHEET	•		
	Pa	anel Tag		>	HV-8 (NEV	Pa	anel Loc	ation:	EAST E	LECTRIC	AL ROOM
N	lomir	al Phase to Neutral	Volta	age>	277		Phase	9:	3		
N	omin	al Phase to Phase	Volta	ge>	480		Wires		4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α				0	W		0	0		
2	Α				0	W		0	0		
3	В				0	W		0	0		
4	В				0	W		0	0		
5	С				0	W		0	0		
6	C				0	W		0	0		
- 1	A				0	W		0	0		
9	R				0	W		0	0		
10	В				0	w		0	0		
11	C				0	W		0	0		
12	С				0	W		0	0		
13	Α				0	W		0	0		
14	Α				0	W		0	0		
15	В				0	W		0	0		
16	B				0	W		0	0		
1/					0	W		0	0		
10	Δ				0	W		0	0		
20	A				0	W		0	0		
21	B				0	w		Ő	0		
22	В				0	W		0	0		
23	С				0	W		0	0		
24	С				0	W		0	0		
25	Α				0	W		0	0		
26	A	merg. LTG. 9th floo	3	9TH FLOOF	1.3	kw		1300	1625		
21	В	mora LTC 0th floa	2		1.0	KW		1200	1500		
20	C	inerg. LTO. surnou	5	BINFLOOP	1.2	kw		0	0		
30	c	mera ITG 8th floo	3	8TH ELOOF	0.816	kw		816	1020	17 SQ	UARES
31	A	g				kw		0	0		
32	Α	merg. LTG. 8th floo	3	8TH FLOOF	0.978	kw		978	1223	30 R1 F	IXTURES
33	В				0	kw		0	0		
34	B	merg. LTG. 7th floo	3	7TH FLOOF	1.1	kw		1100	1375		
35	C		0		0	kw		0	0		
30		merg. LTG. 7th lloo	3	THELOUR	0	KW		1400	1/50		
38	A				0	w		0	0		
39	B				0	w		0	0		
40	39 B 40 B				0	W		0	0		
41	С				0	W		0	0		
42	С				0	W		0	0		
PAN	IEL 1	TOTAL						6.8	8.5	Amps=	10.2
PHA	SE I	LOADING						kW	kVA	%	Amps
	Pł	HASE TOTAL	Α					2.3	2.8	34%	10.3
	PH	HASE TOTAL	В					2.3	2.9	34%	10.4
	P	HASE TOTAL	С					2.2	2.8	33%	10.0
LOA	DC	ATAGORIES		Conne	ected		Der	mand			Ver. 1.04
				kW	kVA	DF	kW	kVA	PF		
1		receptacles		0.0	0.0		0.0	0.0			
2	£1-	computers		0.0	0.0		0.0	0.0	0.00		
4		HID lighting		0.0	0.0		0.0	0.0	0.00		
5	inc	andescent lighting		0.0	0.0		0.0	0.0			
6		HVAC fans		0.0	0.0		0.0	0.0			
7		heating		0.0	0.0		0.0	0.0			
8	ki	tchen equipment		0.0	0.0		0.0	0.0			
9		unassigned		0.0	0.0		0.0	0.0			
	Iotal	Demand Loads		0004			6.8	8.5			
	Sp	are Capacity		20%			1.4	1.7	0.90	America	12.2
	rota	i Design Loads					0.2	10.2	0.80	Amps-	12.3
Defe	ult P	ower Factor =	0.80								
Defa	ault D	emand Factor =	100	%							

Figure 248: Panelboard Worksheet EHV-8 (New)

	ΡA	NEL	BOA	R		SCH	E D (I L E		
VOLTAGE: 208Y/120V.3F	PH.4W		PANEL T/	۲ Ö	ģ	8-1-(C) (OL	0	MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 125A		PAN	EL LOCATIO	N: V	VES ⁻	T ELECTRIC/	AL ROOM	OPTIONS:		
SIZE/TYPE MAIN: 125A/3P C/B		PANE	EL MOUNTIN	Ö	URF	ACE				
DESCRIPTION LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	<	F	C POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
COPIER RECEP	1500	20A/1P	-	*	-	2	20A/1P	1500		LED TV (5)
SPARE	0	20A/1P	÷		*	4	20A/1P	1500		LED TV (5)
SPARE	0	20A/1P	9		*	9	20A/1P	500		NDERCOUNTER RE
DED. RECEPT	1000	20A/1P	7	*		~	20A/1P	1500		ERCOUNTER ICEM/
COFFEE MAKER	1200	20A/1P	6		*	10	20A/1P	1500		MICROWAVE
PC RECEPT	300	20A/1P	11		•	12	20A/1P	720		CONV. RECEPT
SPARE	0	20A/1P	13	*		14	20A/1P	0		SPARE
MOTORIZED SHADE	1350	20A/1P	15		*	16	20A/1P	1500		COPIER RECEP
MOTORIZED SHADE	1350	20A/1P	17		• •	18	20A/1P	1000		DED. RECEPT
AOTORIZED SHADE	1350	20A/1P	19	*		20	20A/1P	1080		CONV. RECEPT
PC RECEPT	1200	20A/1P	21		*	22	20A/1P	1090		CONV. RECEPT
PC RECEPT.	1200	20A/1P	23		•	* 24	20A/1P	1300		PRINTER RECEPT
SPARE	0	20A/1P	25	*		26	20A/1P	1300		PRINTER RECEPT
	0	20A/1P	27		*	28	20A/1P	0		
	0	20A/1P	29		*	30	20A/1P	0		
	0	20A/1P	31	*		32	20A/1P	0		
	0	20A/1P	33		*	34	20A/1P	0		
	0	20A/1P	35		*	36	20A/1P	0		
	0	20A/1P	37	*	_	38	20A/1P	0		
	0	20A/1P	39		*	40	20A/1P	0		
	0	20A/1P	41		-	* 42	20A/1P	0		
CONNECTED LOAD (KW) - A Ph.	9.23							TOTAL DESIGN	LOAD (KW)	29.93
CONNECTED LOAD (KW) - B Ph.	9.34							POWER FACTO	Я	0.80
CONNECTED LOAD (KW) - C Ph.	. 6.37							TOTAL DESIGN	LOAD (AMPS)	104

Figure 249: Panelboard L-PP-8-1-(C) (Existing)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG V	ORK	SHEET	•		
	Pa	anel Tag		>	-8-1-(C) (Pa	anel Loc	ation:	WEST E	LECTRIC	AL ROOM
N	omir	nal Phase to Neutral	Volta	age>	120		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	208		Wires	s:	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	COPIER RECEP			1.5	KW		1500	1875		
2	Α	LED TV (5)			1.5	KW		1500	1875		
3	В	SPARE			0	KW		0	0		
4	В	LED TV (5)			1.5	KW		1500	1875		
5	С	SPARE			0	KW		0	0		
6	С	IDERCOUNTER R			0.5	KW		500	625		
7	Α	DED. RECEPT			1	KW		1000	1250		
8	A	RCOUNTER ICEM			1.5	KW		1500	1875		
9	В	COFFEE MAKER			1.2	KW		1200	1500		
10	В				1.5	KW		1500	18/5		
12					0.3	KW		300	3/5		
12		SPARE			0.72	KW		120	900		
14	Δ	SPARE			0	KW		0	0		
15	B	IOTORIZED SHAD			1.35	KW		1350	1688		
16	B	COPIER RECEP			1.5	KW		1500	1875		
17	C	IOTORIZED SHAD			1.35	KW		1350	1688		
18	С	DED. RECEPT			1	KW		1000	1250		
19	Α	IOTORIZED SHAD			1.35	KW		1350	1688		
20	Α	CONV. RECEPT			1.08	KW		1080	1350		
21	В	PC RECEPT			1.2	KW		1200	1500		
22	В	CONV. RECEPT			1.09	KW		1090	1363		
23	С	PC RECEPT.			1.2	KW		1200	1500		
24	С	PRINTER RECEPT			1.3	KW		1300	1625		
25	Α	SPARE			0	KW		0	0		
26	A	PRINTER RECEPT			1.3	KW		1300	1625		
27	B				0	W		0	0		
28	B				0	W		0	0		
29	C				0	W		0	0		
30					0	W		0	0		
32	A				0	W		0	0		
32	R				0	W		0	0		
34	B				0	w		0	0		
35	c				0	w		0	0		
36	C				0	w		0	0		
37	Α				0	W		0	0		
38	Α				0	W		0	0		
39	В				0	W		0	0		
40	40 B				0	W		0	0		
41	С				0	W		0	0		
42	С				0	W		0	0		
PAN	IEL 1	TOTAL						24.9	31.2	Amps=	86.6
PHA	SFI							kW	kVA	%	Amps
	PH	ASE TOTAL	Α					9.2	11.5	37%	96.1
	P	ASE TOTAL	B					9.3	11.7	37%	97.3
	PH	ASE TOTAL	С					6.4	8.0	26%	66.4
10/				Copp	ected		De	mand			V 404
LOF	00	ATAOUNILS	-	kW/	k\/Δ	DE	k\//	k\/Δ	PF		ver. 1.04
1		receptacles		0.0	0.0		0.0	0.0			
2		computers		0.0	0.0		0.0	0.0			
3	flı	Jorescent lighting		0.0	0.0		0.0	0.0			
4		HID lighting		0.0	0.0		0.0	0.0			
5	inc	andescent lighting		0.0	0.0		0.0	0.0			
6		HVAC fans		0.0	0.0		0.0	0.0			
7		heating		0.0	0.0		0.0	0.0			
8	ki	tchen equipment		0.0	0.0		0.0	0.0			
9		unassigned		24.9	31.2		24.9	31.2	0.80		
	Total	Demand Loads					24.9	31.2			
	_ Sp	are Capacity		20%			5.0	6.2		.	
	Tota	I Design Loads					29.9	37.4	0.80	Amps=	103.9
Defa	ult P	ower Factor =	0.80	0/							
u Jeta	IIIT ()	emand Factor =	100	7/0							

Figure 250: Panelboard Worksheet L-PP-8-1-(C) (Existing)

	ΡA	NE	B 0 /			0	CH	EDU	ГЕ		
VOLTAGE: 208Y/120V.	3PH.4W		PANEL T	ğ	ļ	-8-1-(C) (NEV	5	MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 125A		PAN	EL LOCATI	NO	Ň	STELI	ECTRICA	L ROOM	OPTIONS:		
SIZE/TYPE MAIN: 125A/3P C/	Ð	PANE	EL MOUNTI	Ö	SUF	FACE					
DESCRIPTION LOCATIO	N LOAD (WATTS)	C/B SIZE	POS. NO.	۲	Ξ	C P(OS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
COPIER RECEP	1500	20A/1P	-	*	\top	-	2	20A/1P	1500		LED TV (5)
SPARE	0	20A/1P	e		*		4	20A/1P	1500		LED TV (5)
SPARE	0	20A/1P	9			*	9	20A/1P	500		NDERCOUNTER REF
DED. RECEPT	1000	20A/1P	7	*				20A/1P	1500		ERCOUNTER ICEMA
COFFEE MAKER	1200	20A/1P	6		*		10	20A/1P	1500		MICROWAVE
PC RECEPT	300	20A/1P	11			*	12	20A/1P	720		CONV. RECEPT
SPARE	0	20A/1P	13	*			14	20A/1P	0		SPARE
10TORIZED SHADE	1350	20A/1P	15		*		16	20A/1P	1500		COPIER RECEP
10TORIZED SHADE	1350	20A/1P	17			*	18	20A/1P	1000		DED. RECEPT
10TORIZED SHADE	1350	20A/1P	19	*			20	20A/1P	1080		CONV. RECEPT
PC RECEPT	1200	20A/1P	21		*		22	20A/1P	1090		CONV. RECEPT
PC RECEPT.	1200	20A/1P	23			*	24	20A/1P	1300		PRINTER RECEPT
TASK LIGHTS N/W	408	20A/1P	25	*			26	20A/1P	1300		PRINTER RECEPT
TASK LIGHTS S/E	408	20A/1P	27		*		28	20A/1P	0		
	0	20A/1P	29			*	30	20A/1P	0		
	0	20A/1P	31	*			32	20A/1P	0		
	0	20A/1P	<u>83</u>		*		34	20A/1P	0		
	0	20A/1P	<u> 35</u>			*	36	20A/1P	0		
	0	20A/1P	37	*			38	20A/1P	0		
	0	20A/1P	39		*		40	20A/1P	0		
	0	20A/1P	41			*	42	20A/1P	0		
CONNECTED LOAD (KW) - A F	ъh. 9.64								TOTAL DESIGN	LOAD (KW)	30.91
CONNECTED LOAD (KW) - B F	oh. 9.75								POWER FACTO	¥	0.80
CONNECTED LOAD (KW) - C F	oh. 6.37								TOTAL DESIGN	LOAD (AMPS)	107

Figure 251: Panelboard L-PP-8-1-(C) (New)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG V	VORK	SHEET	•		
	Pa	anel Tag		>	-8-1-(C) (Pa	anel Loc	ation:	WEST E	LECTRIC	AL ROOM
N	omir	nal Phase to Neutral	Volta	age>	120		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	208		Wires	81	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	COPIER RECEP			1.5	KW		1500	1875	L	
2	A	LED IV (5)			1.5	KW		1500	1875		
3	B	SPARE			1.5	KW		1500	1975		
5	C	SPARE			0	KW		0	0		
6	C	DERCOUNTER R			0.5	KW		500	625		
7	Α	DED. RECEPT			1	KW		1000	1250		
8	Α	RCOUNTER ICEM			1.5	KW		1500	1875		
9	B	COFFEE MAKER			1.2	KW		1200	1500		
10	В				1.5	KW		1500	18/5		
12					0.3	KW		720	900		
13	A	SPARE			0.12	KW		0	0		
14	A	SPARE			0	KW		0	0		
15	В	IOTORIZED SHAD			1.35	KW		1350	1688		
16	В	COPIER RECEP			1.5	KW		1500	1875		
17	C	IOTORIZED SHAD			1.35	KW		1350	1688	<u> </u>	
18	C	DED. RECEPT	-		1	KW		1000	1250		
20	A				1.35	KW		1350	1088		
21	B	PC RECEPT			1.00	KW		1200	1500	+	
22	B	CONV. RECEPT			1.09	KW		1090	1363	<u> </u>	
23	С	PC RECEPT.			1.2	KW		1200	1500		
24	С	PRINTER RECEPT			1.3	KW		1300	1625		
25	Α	TASK LIGHTS	9	N/W	0.408	KW		408	510	(4) 60W	, (8) 21W
26	A	PRINTER RECEPT		0.15	1.3	KW		1300	1625		
27	B	TASK LIGHTS	9	S/E	0.408	KW		408	510	(4) 6000	, (8) 2100
20					0	W		0	0		
30	c				0	w		0	0		
31	A				0	w		0	0		
32	Α				0	W		0	0		
33	В				0	W		0	0		
34	B				0	W		0	0		
35	C				0	W		0	0	-	
30	Δ				0	W		0	0		
38	A				0	w		0	0		
39	39 B 40 B				0	W		0	0		
40	39 B 40 B				0	W		0	0		
41	С				0	W		0	0		
42	С				0	W		0	0		00.4
PAN	IEL							25.8	32.2	Amps=	89.4
PHA	SE I	LOADING						kW	kVA	%	Amps
	P	HASE TOTAL	A					9.6	12.0	37%	100.4
-	P		B					9.7	12.2	38%	101.5
	PH	HASE TUTAL						0.4	ö.U	20%	00.4
LOA	D C	ATAGORIES	_	Conn	ected		Der	mand		\vdash	Ver. 1.04
4		recontecio-		KW 0.0	kVA	DF	KVV	KVA	PF	$\left \right $	
2		computers		0.0	0.0		0.0	0.0		+	
2	fli	Jorescent lighting		0.0	0.0		0.0	0.0		+ +	
4		HID lighting		0.0	0.0		0.0	0.0			
5	inc	andescent lighting		0.0	0.0		0.0	0.0			
6		HVAC fans		0.0	0.0		0.0	0.0			
7		heating		0.0	0.0		0.0	0.0			
8	ki	tchen equipment	-	0.0	0.0		0.0	0.0	0.00	\vdash	
9	Total	unassigned	-	25.8	32.2		25.8	32.2	0.80	+	
<u> </u>	Sr	pare Capacity	-	20%			52	64			
-	Tota	I Design Loads		2070			30.9	38.6	0.80	Amps=	107.3
_		· · · · · ·									
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 252: Panelboard Worksheet L-PP-8-1-(C) (New)

		ΡA	N E	BOA	2		S C H	ED	Е		
VOLTAGE: 480Y/277	V,3PH,4W			PANEL 12	ö	-8-1	(OLD)		MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 100A			PAN	EL LOCATIC	ž	VES	T ELECTRICA	NL ROOM	OPTIONS:		
SIZE/TYPE MAIN: 100A/3P (C/B		PANE	EL MOUNTIN	ö	U.R.	FACE				
DESCRIPTION LOCATI	ON LOAI	D (WATTS)	C/B SIZE	POS. NO.	V		C POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
DL-08-01 N1, N	2	1520	20A/1P	-	*	\vdash	2	20A/1P	1120	N2	DL-08-02
DL-08-03 W1		1200	20A/1P	æ		*	4	20A/1P	1840	W2	DL-08-04
DL-08-05 VV3		1760	20A/1P	9			9	20A/1P	1840	W4	DL-08-06
DL-08-07 VV5		1160	20A/1P	7	*		œ	20A/1P	1080	N1	DL-08-08
PERIMETER COVE NORT	H	480	20A/1P	6		*	10	20A/1P	560	WEST	PERIMETER COVE
PERIMETER COVE WES	F	560	20A/1P	1			* 12	20A/1P	2100	CORE	
STAIR COVE W1		250	20A/1P	13	*		14	20A/1P	250	W5	STAIR COVE
		0	20A/1P	15		*	16	20A/1P	0		
		0	20A/1P	17			*	20A/1P	0		
		0	20A/1P	19	*		20	20A/1P	0		
		0	20A/1P	21		*	22	20A/1P	0		
		0	20A/1P	23			* 24	20A/1P	0		
		0	20A/1P	25	*		26	20A/1P	0		
		0	20A/1P	27		*	28	20A/1P	0		
		0	20A/1P	29			* 30	20A/1P	0		
		0	20A/1P	31	*		32	20A/1P	0		
		0	20A/1P	33		*	34	20A/1P	0		
		0	20A/1P	35		-	* 36	20A/1P	0		
		0	20A/1P	37	*		38	20A/1P	0		
		0	20A/1P	39		*	40	20A/1P	0		
		0	20A/1P	41		-	* 42	20A/1P	0		
CONNECTED LOAD (KW) - A	∖ Ph.	5.38							TOTAL DESIGN	LOAD (KW)	18.86
CONNECTED LOAD (KW) - B	Ph.	4.08							POWER FACTO	R	0.8(
CONNECTED LOAD (KW) - C	. Ph.	6.26							TOTAL DESIGN	LOAD (AMPS)	28

Figure 253: Panelboard P-8-1 (Existing)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG W	ORK	SHEET	•		
	Pa	anel Tag		>	P-8-1 (OLD	Pa	anel Loc	ation:	WEST E	LECTRIC	AL ROOM
N	omir	nal Phase to Neutral	Volta	age>	277		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	480		Wires	5	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	DL-08-01	3	N1, N2	1.52	KW		1520	1900		
2	Α	DL-08-02	3	N2	1.12	KW		1120	1400		
3	B	DL-08-03	3	W1	1.2	KW		1200	1500		
4	В	DL-08-04	3	W2	1.84	KW		1840	2300		
0		DL-08-05	3	VV3	1.70	KW		1760	2200		
7	~	DL-08-07	3	W5	1.04	KW		1160	1450		
8	A	DL-08-08	3	N1	1.08	KW		1080	1350		
9	В	PERIMETER COVE	3	NORTH	0.48	KW		480	600		
10	В	PERIMETER COVE	3	WEST	0.56	KW		560	700		
11	С	PERIMETER COVE	3	WEST	0.56	KW		560	700		
12	С		3	CORE	2.1	KW		2100	2625		
13	Α	STAIR COVE	3	W1	0.25	KW		250	313		
14	A	STAIR COVE	3	W5	0.25	KW		250	313		
15	в				0	W		0	0		
10	В				0	W		0	0		
18	c				0	W		0	0		
19	Ā				0	w		0	0		
20	A				0	w		0	0		
21	В				0	W		0	0		
22	В				0	W		0	0		
23	С				0	W		0	0		
24	С				0	W		0	0		
25	A				0	W		0	0		
26	A				0	W		0	0		
27	В				0	W		0	0		
20					0	W		0	0		
30	č				0	w		0	0		
31	A				0	w		0	0		
32	Α				0	W		0	0		
33	В				0	W		0	0		
34	В				0	W		0	0		
35	С				0	W		0	0		
36	C				0	W		0	0		
37	A				0	W		0	0		
38	A				0	W		0	0		
40	B				0	W		0	0		
41	C				0	w		0	0		
42	C				0	W		0	0		
PAN	IEL 1	TOTAL						15.7	19.7	Amps=	23.6
РНЛ	SEI							k\M	k\/A	0/2	Ampe
1104	PF	ASE TOTAL	Α					54	67	34%	24.3
	PH	HASE TOTAL	B					4.1	5.1	26%	18.4
	PH	HASE TOTAL	С					6.3	7.8	40%	28.2
1.04	DC	ATAGORIES		Conn	ected		Der	mand			Ver 104
				kW	kVA	DF	kW	kVA	PF		1.511.1574
1		receptacles		0.0	0.0		0.0	0.0			
2		computers		0.0	0.0		0.0	0.0			
3	flu	uorescent lighting		15.7	19.7		15.7	19.7	0.80		
4		HID lighting		0.0	0.0		0.0	0.0			
5	inc	andescent lighting		0.0	0.0		0.0	0.0			
6		HVAC fans		0.0	0.0		0.0	0.0			
0	L.	neating		0.0	0.0		0.0	0.0			
9	K	unassigned		0.0	0.0		0.0	0.0			
	Total	Demand Loads		0.0	0.0		15.7	19.7			
	Sr	pare Capacity		20%			3.1	3.9			
	Tota	l Design Loads					18.9	23.6	0.80	Amps=	28.4
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 254: Panelboard Worksheet P-8-1 (Existing)

		ΡA	NEL	BOA	R		scł	HED(JLE		
VOLTAGE: 480 SIZE/TYPE BUS: 100/ SIZE/TYPE MAIN: 100/	<i>к/277</i> V,3Рł А 4/3Р С/В	1,4W	PAN	PANEL TA EL LOCATIO	N N N	NES NES	(NEW) T ELECTRIC -ACE	AL ROOM	MIN. C/B AIC: OPTIONS:	10K	
DESCRIPTION LC	CATION	LOAD (WATTS)	C/B SIZE	POS. NO.	∢	8	C POS. NO	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
DL-08-01	N1, N2	652	20A/1P	-	*	+	2	20A/1P	480	NORTH	NORTH CORRIDOR
DL-08-03	W1	228	20A/1P	3		*	4	20A/1P	196	W2	DL-08-04
DL-08-05	W3	293	20A/1P	5		-	9	20A/1P	196	W4	DL-08-06
DL-08-07	W5	261	20A/1P	7	*		8	20A/1P	768	WEST	WEST CORRIDOR
PERIMETER COVE N	VORTH	480	20A/1P	6		*	10	20A/1P	560	WEST	PERIMETER COVE
PERIMETER COVE	WEST	560	20A/1P	11			* 12	20A/1P	2100	CORE	
STAIR COVE	W1	250	20A/1P	13	*	\vdash	14	20A/1P	250	5M	STAIR COVE
ELEVATOR LOBBY	CORE	864	20A/1P	15		*	16	20A/1P	0		
		0	20A/1P	17			*	20A/1P	0		
		0	20A/1P	19	*	\vdash	20	20A/1P	0		
		0	20A/1P	21		*	22	20A/1P	0		
		0	20A/1P	23			* 24	20A/1P	0		
		0	20A/1P	25	*	\vdash	26	20A/1P	0		
		0	20A/1P	27		*	28	20A/1P	0		
		0	20A/1P	29			30	20A/1P	0		
		0	20A/1P	31	*		32	20A/1P	0		
		0	20A/1P	33		*	34	20A/1P	0		
		0	20A/1P	35		-	* 36	20A/1P	0		
		0	20A/1P	37	*		38	20A/1P	0		
		0	20A/1P	39		*	40	20A/1P	0		
		0	20A/1P	41		\square	* 42	20A/1P	0		
CONNECTED LOAD (KV	V) - A Ph.	2.66							TOTAL DESIGN	LOAD (KW)	9.77
CONNECTED LOAD (KV	V) - B Ph.	2.33							POWER FACTO	Я	0.80
CONNECTED LOAD (KV	V) - C Ph.	3.15							TOTAL DESIGN	LOAD (AMPS)	16

Figure 255: Panelboard P-8-1 (New)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG W	ORK	SHEET	•		
	Pa	anel Tag		>	9-8-1 (NEW	Pa	anel Loc	ation:	WEST E	ELECTRIC	AL ROOM
N	omir	al Phase to Neutral	Volta	age>	277		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	480		Wires	5	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Rer	narks
2	A		3	N1, NZ	0.652	KW		490	815	(20) R11	
3	B	DI -08-03	3	W1	0.48	KW		228	285	(7) R1 F	IXTURES
4	В	DL-08-04	3	W2	0.1956	KW		196	245	(6) R1 F	IXTURES
5	С	DL-08-05	3	W3	0.2934	KW		293	367	(9) R1 F	IXTURES
6	С	DL-08-06	3	W4	0.1956	KW		196	245	(6) R1 F	IXTURES
7	A	DL-08-07	3	W5	0.2608	KW		261	326	(8) R1 F	IXTURES
8	A	WEST CORRIDOR	4	WEST	0.768	KW		768	960	(16) SC	QUARES
10	B	PERIMETER COVE	3	WEST	0.46	KW		460 560	700		
11	C	PERIMETER COVE	3	WEST	0.56	KW		560	700		
12	C		3	CORE	2.1	KW		2100	2625		
13	А	STAIR COVE	3	W1	0.25	KW		250	313		
14	Α	STAIR COVE	3	W5	0.25	KW		250	313		
15	B	ELEVATOR LOBBY	4	CORE	0.864	KW		864	1080	(18) SC	QUARES
16	В				0	W		0	0		
18	0				0	W		0	0		
19	A				0	w		0	0		
20	A				0	W		0	0		
21	В				0	W		0	0		
22	В				0	W		0	0		
23	C				0	W		0	0		
24	C				0	W		0	0		
20	A A				0	W		0	0		
27	B				0	w		0	0		
28	В				0	W		0	0		
29	С				0	W		0	0		
30	С				0	W		0	0		
31	A				0	W		0	0		
32	A				0	W		0	0		
34	B				0	W		0	0		
35	C				0	w		0	0		
36	C				0	W		0	0		
37	Α				0	W		0	0		
38	Α				0	W		0	0		
39	B				0	W		0	0		
40	В				0	W		0	0		
41	c				0	W		0	0		
PAN	IFI 1				v			81	10.2	Amps=	12.2
	05				1				11/0		
PHA			Δ					2.7	xvA 2.2	7/0	Amps 12.0
	PF	ASE TOTAL	B					2.1	2.9	29%	10.5
	PH	HASE TOTAL	C					3.1	3.9	39%	14.2
	DC	ATAGORIES		Conn	ected		Der	mand			Ver 104
LOA				kW	kVA	DF	kW	kVA	PF		ver. 1.04
1		receptacles		0.0	0.0		0.0	0.0			
2		computers		0.0	0.0		0.0	0.0			
3	flu	uorescent lighting		6.0	7.5		6.0	7.5	0.80		
4	1	HID lighting		2.1	2.6		2.1	2.6	0.80		
5	INC	HVAC fanc		0.0	0.0		0.0	0.0			
7		heating		0.0	0.0		0.0	0.0			
8	ki	tchen equipment		0.0	0.0		0.0	0.0			
9		unassigned		0.0	0.0		0.0	0.0			
	Total	Demand Loads					8.1	10.2			
	Sp	pare Capacity		20%			1.6	2.0			
	Tota	I Design Loads					9.8	12.2	0.80	Amps=	14.7
D (anna E. A	0.00								
Defa	uit P ault D	ower Factor =	0.80	%							

Figure 256: Panelboard Worksheet P-8-1 (New)

		ΡA	N E	BOA	2		S C H	E D U	LE		
VOLTAGE: 480	Y/277V,3P	H,4W		PANEL TA	Ö	-8-2	(OLD)		MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 100 SIZE/TYPE MAIN: 100	A A/3P C/B		PANE	el locatic	z o	N ASI		L ROOM	OPTIONS		
DESCRIPTION LC	DCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	◄		C POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
DL-08-09	S1,S2	1520	20A/1P	-	*	-	2	20A/1P	1080	S2	DL-08-10
DL-08-11	ш	1480	20A/1P	e		*	4	20A/1P	1840	E2	DL-08-12
DL-08-13	ш	1800	20A/1P	5			9	20A/1P	1800	E4	DL-08-14
DL-08-15	E5	1520	20A/1P	7	*		8	20A/1P	1120	S1	DL-08-16
PERIMETER COVE	SOUTH	480	20A/1P	6		*	10	20A/1P	560	EAST	PERIMETER COVE
PERIMETER COVE	EAST	560	20A/1P	1			* 12	20A/1P	400	CORE	
	0	0	20A/1P	13	*		14	20A/1P	0	0	
		0	20A/1P	15		*	16	20A/1P	0		
		0	20A/1P	17			*	20A/1P	0		
		0	20A/1P	19	*		20	20A/1P	0		
		0	20A/1P	21		*	22	20A/1P	0		
		0	20A/1P	23			* 24	20A/1P	0		
		0	20A/1P	25	*		26	20A/1P	0		
		0	20A/1P	27		*	28	20A/1P	0		
		0	20A/1P	29			30	20A/1P	0		
		0	20A/1P	31	*		32	20A/1P	0		
		0	20A/1P	33		*	34	20A/1P	0		
		0	20A/1P	35		-	* 36	20A/1P	0		
		0	20A/1P	37	*		38	20A/1P	0		
		0	20A/1P	39		*	40	20A/1P	0		
		0	20A/1P	41	Η	-	* 42	20A/1P	0		
CONNECTED LOAD (KI	N) - A Ph.	5.24							TOTAL DESIGN	LOAD (KW)	36-91
CONNECTED LOAD (KI	N) - B Ph.	4.36							POWER FACTO	2	0.80
CONNECTED LOAD (KI	N) - C Ph.	4.56							TOTAL DESIGN	LOAD (AMPS)	26

Figure 257: Panelboard P-8-2 (Existing)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG W	ORK:	SHEET	•		
	Pa	anel Tag		>	P-8-2 (OLD	Pa	nel Loc	ation:	EAST E	LECTRIC/	AL ROOM
N	omin	al Phase to Neutral	Volta	age>	277		Phase	2:	3		
N	omin	al Phase to Phase	Voltag	je>	480		Wires		4		
Pos	Ph	Load Type	Cat	Location	Load	Units	I PF	Watts	VA	Ren	narks
1	Α	DI -08-09	3	S1 S2	1.52	KW		1520	1900		
2	A	DL-08-10	3	S2	1.08	KW		1080	1350		
3	В	DL-08-11	3	E1	1.48	KW		1480	1850		
4	В	DL-08-12	3	E2	1.84	KW		1840	2300		
5	С	DL-08-13	3	E3	1.8	KW		1800	2250		
6	С	DL-08-14	3	E4	1.8	KW		1800	2250		
7	Α	DL-08-15	3	E5	1.52	KW		1520	1900		
8	A	DL-08-16	3	S1	1.12	KW		1120	1400		
9	B	PERIMETER COVE	3	SOUTH	0.48	KW		480	600		
10	В	PERIMETER COVE	3	EAST	0.56	KW		560	700		
11	0	PERIMETER COVE	3	CORE	0.56	KW		400	700		
12	~		3	CORE	0.4	r\vv		400	500		
14	Δ				0	W		0	0		
15	B				0	W		0	0		
16	B				0	w		0	0		
17	C				0	w		0	0		
18	С				0	W		0	0		
19	Α				0	W		0	0		
20	Α				0	W		0	0		
21	В				0	W		0	0		
22	В				0	W		0	0		
23	С				0	W		0	0		
24	С				0	W		0	0		
25	A				0	W		0	0		
26	A				0	W		0	0		
27	В				0	W		0	0		
28	8				0	W		0	0		
29	<u>c</u>				0	W		0	0		
31	Δ				0	W		0	0		
32	A				0	w		0	0		
33	B				0	w		0	0		
34	B				0	W		0	0		
35	С				0	W		0	0		
36	С				0	W		0	0		
37	Α				0	W		0	0		
38	Α				0	W		0	0		
39	В				0	W		0	0		
40	B				0	W		0	0		
41	C				0	W		0	0		
42	C	OTAL			0	W		0	0	•	04.0
PAN	EL I	UTAL						14.Z	11.1	Amps=	21.3
PHA	SE I	OADING						kW	kVA	%	Amps
	PH	ASE TOTAL	Α					5.2	6.6	37%	23.6
	PH	ASE TOTAL	В					4.4	5.5	31%	19.7
	PF	ASE TOTAL	С					4.6	5.7	32%	20.6
LOA	DC	ATAGORIES		Conn	ected		Der	mand			Ver. 1.04
				kW	kVA	DF	kW	kVA	PF		
1		receptacles		0.0	0.0		0.0	0.0			
2		computers		0.0	0.0		0.0	0.0			
3	flu	orescent lighting		14.2	17.7		14.2	17.7	0.80	$ \downarrow \downarrow$	
4		HID lighting		0.0	0.0		0.0	0.0		\vdash	
5	inc	andescent lighting		0.0	0.0		0.0	0.0		──┤	
6		HVAC fans		0.0	0.0		0.0	0.0		├	
	1.2	neating		0.0	0.0		0.0	0.0		├	
ð	KI	upaccianed		0.0	0.0		0.0	0.0		\vdash	
9	Fotol	Demand Loads		0.0	0.0		14.2	17.7		├	
-	Cr	periodiu Ludus		20%			2.8	3.5			
<u> </u>	Tota	Design Loads		2070			17.0	21.2	0.80	Amps=	25.6
		. Doolgn Louus						-1.4	0.00		20.0
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 258: Panelboard Worksheet P-8-2 (Existing)

	ΡA	NEL	BOA			s c	H		Е		
VOLTAGE: 480Y/277V	/.3PH.4W		PANEL TA	Ö	8-0	(NEW)			MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 100A		PAN	EL LOCATIC	ż	AS	LECTR	RICAL RI	MOC	OPTIONS:		
SIZE/TYPE MAIN: 100A/3P C	S/B	PANE	EL MOUNTIN	Ö	SUR	ACE					
DESCRIPTION LOCATIC	DN LOAD (WATTS)	C/B SIZE	POS. NO.	۲	m	C POS.	NO. C/	B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
DL-08-09 S1,S2	652	20A/1P	-	*		2	2	0A/1P	528	SOUTH	SOUTH CORRIDOR
DL-08-11 E1	261	20A/1P	e		*	4	2	0A/1P	196	E2	DL-08-12
DL-08-13 E3	228	20A/1P	9			9	2	0A/1P	196	E4	DL-08-14
DL-08-15 E5	261	20A/1P	7	*		~	2	0A/1P	768	EAST	EAST CORRIDOR
PERIMETER COVE SOUTH	H 480	20A/1P	6		*	10	2	0A/1P	560	EAST	PERIMETER COVE
PERIMETER COVE EAST	560	20A/1P	11		\vdash	* 12	2	0A/1P	400	CORE	
0	0	20A/1P	13	*		14	2	0A/1P	0	0	
	0	20A/1P	15		*	16	2	0A/1P	0		
	0	20A/1P	17			*	2	0A/1P	0		
	0	20A/1P	19	*		20	2	0A/1P	0		
	0	20A/1P	21		*	22	2	0A/1P	0		
	0	20A/1P	23		\vdash	* 24	2	0A/1P	0		
	0	20A/1P	25	*		26	2	0A/1P	0		
	0	20A/1P	27		*	28	2	0A/1P	0		
	0	20A/1P	29			30	2	0A/1P	0		
	0	20A/1P	31	*		32	2	0A/1P	0		
	0	20A/1P	33		*	34	2	0A/1P	0		
	0	20A/1P	35		_	* 36	2	0A/1P	0		
	0	20A/1P	37	*		38	2	0A/1P	0		
	0	20A/1P	39		*	40	2	0A/1P	0		
	0	20A/1P	41			* 42	2	0A/1P	0		
CONNECTED LOAD (KW) - A	Ph. 2.21								TOTAL DESIGN	LOAD (KW)	6.11
CONNECTED LOAD (KW) - B	Ph. 1.50								POWER FACTO	R	0.8(
CONNECTED LOAD (KW) - C	Ph. 1.38								TOTAL DESIGN	LOAD (AMPS)	0,

Figure 259: Panelboard P-8-2 (New)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG W	ORK	SHEET	•		
	Pa	anel Tag		>	9-8-2 (NEW	Pa	anel Loc	ation:	EAST E	LECTRIC	AL ROOM
N	omir	nal Phase to Neutral	Volta	age>	277		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	480		Wires	81	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	DL-08-09	3	S1,S2	0.652	KW		652	815	(20) R1 F	IXTURES
2	Α	SOUTH CORRIDO	4	SOUTH	0.528	KW		528	660	(11) SC	UARES
3	В	DL-08-11	3	E1	0.2608	KW		261	326	(8) R1 F	IXTURES
4	В	DL-08-12	3	E2	0.1956	KW		196	245	(6) R1 F	IXTURES
5	С	DL-08-13	3	E3	0.2282	KW		228	285	(7) R1 F	IXTURES
6	С	DL-08-14	3	E4	0.1956	KW		196	245	(6) R1 F	IXTURES
7	A	DL-08-15	3	E5	0.2608	KW		261	326	(8) R1 F	IXTURES
8	A	EAST CORRIDOR	4	EAST	0.768	KW		768	960	(16) SC	UARES
9	В	PERIMETER COVE	3	SOUTH	0.48	KW		480	500		
11	Б		3	EAST	0.50	KW		560	700		
12	c		- C	CORE	0.30	KW		400	500		
13	Ă		· ·	OORL	0	w		0	0		
14	A				0	w		0	0		
15	В				0	W		0	0		
16	В				0	W		0	0		
17	С				0	W		0	0		
18	С				0	W		0	0		
19	Α				0	W		0	0		
20	Α				0	W		0	0		
21	В				0	W		0	0		
22	B				0	W		0	0		
23	C				0	W		0	0		
24	C				0	W		0	0		
25	A				0	W		0	0		
20	A				0	W		0	0		
28	B				0	W		0	0		
29	C				0	W		0	0		
30	č				0	w		0	0		
31	Ā				0	w		0	0		
32	Α				0	W		0	0		
33	В				0	W		0	0		
34	В				0	W		0	0		
35	С				0	W		0	0		
36	С				0	W		0	0		
37	Α				0	W		0	0	L	
38	A				0	W		0	0		
39	В				0	W		0	0		
40	В				0	W		0	0		
41					0	W		0	0		
PAN					U	vv		51	64	Amps-	77
								0.1	0.4	-compa-	1.1
PHA	SE I	LOADING						kW	kVA	%	Amps
	PH	ASE TOTAL	Α					2.2	2.8	43%	10.0
	PH	HASE TOTAL	B					1.5	1.9	29%	6.8
	PH	HASE TUTAL	U					1.4	1.7	21%	0.2
LOA	DC	ATAGORIES		Conn	ected		Der	mand			Ver. 1.04
				kW	kVA	DF	kW	kVA	PF		
1		receptacles		0.0	0.0		0.0	0.0		└───┤	
2		computers		0.0	0.0		0.0	0.0	0.07	↓	
3	flu	uorescent lighting		3.8	4.7		3.8	4.7	0.80		
4	ie.	HID lighting		1.3	1.6		1.3	1.6	0.80		
5	INC	Andescent lighting		0.0	0.0		0.0	0.0			
0		hoating		0.0	0.0		0.0	0.0		┝──┤	
/ 0	L.i	tchen equipment		0.0	0.0		0.0	0.0		├	
9	N	unassigned		0.0	0.0		0.0	0.0		<u>├</u>	
	Total	Demand Loads		0.0	0.0		5.0	6.0			
<u> </u>	Sr	are Capacity		20%			1.0	1.3			
	Tota	I Design Loads		2070			6.1	7.6	0.80	Amps=	9.2
										1 -	
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 260: Panelboard Worksheet P-8-2 (New)

	ΡA	NE	BOA	R		S	۲ ر	С С С	Ш		
				Ċ						4017	
SIZE/TYPE BUS: 100A	П,4VV	PAN	EL LOCATIO	j z		-1 (NEV	v) ECTRIC I	MOOF	OPTIONS:	NN	
SIZE/TYPE MAIN: 100A/3P C/B		PANE	EL MOUNTIN	Ö	SUR	FACE					
DESCRIPTION LOCATION	LOAD (WATTS)	C/B SIZE	POS. NO.	∢	8	C PO	S. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
EXTERIOR FIXT. ENTRANCE	802	20A/1P	-	*			2	20A/1P	954	ENTRANCE	EXTERIOR FIXT.
	0	20A/1P	e		*		4	20A/1P	0		
	0	20A/1P	2			*	9	20A/1P	0		
	0	20A/1P	7	*				20A/1P	0		
	0	20A/1P	6		*		10	20A/1P	0		
	0	20A/1P	11			*	12	20A/1P	0		
	0	20A/1P	13	*			14	20A/1P	0		
	0	20A/1P	15		*		16	20A/1P	0		
	0	20A/1P	17			*	10	20A/1P	0		
	0	20A/1P	19	*			20	20A/1P	0		
	0	20A/1P	21		*		22	20A/1P	0		
	0	20A/1P	23			*	24	20A/1P	0		
	0	20A/1P	25	*			26	20A/1P	0		
	0	20A/1P	27		*		28	20A/1P	0		
	0	20A/1P	29			*	30	20A/1P	0		
	0	20A/1P	31	*			32	20A/1P	0		
	0	20A/1P	33		*		34	20A/1P	0		
	0	20A/1P	35		_	*	36	20A/1P	0		
	0	20A/1P	37	*	_		38	20A/1P	0		
	0	20A/1P	39		*		40	20A/1P	0		
	0	20A/1P	41			*	42	20A/1P	0		
CONNECTED LOAD (KW) - A Ph.	1.76								TOTAL DESIGN	LOAD (KW)	2.1
CONNECTED LOAD (KW) - B Ph.	0.00								POWER FACTO	Я	0.8
CONNECTED LOAD (KW) - C Ph.	0.00								TOTAL DESIGN	LOAD (AMPS)	

Figure 261: Panelboard P-LE-1 (New)
BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	RD SIZI	NG V	ORK	SHEET			
	Pa	anel Tag		>	-LE-1 (NEV	Pa	anel Loc	ation:	LOBBY	ELECTR	C ROOM
N	omir	al Phase to Neutral	Volta	age>	277		Phase	e:	3		
N	omin	al Phase to Phase	Volta	ge>	480		Wires	S:	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	EXTERIOR FIXT.	9	ENTRANCE	802	W		802	1003	(3) B1, (9)	B3, (5) B5
2	Α	EXTERIOR FIXT.	9	ENTRANCE	954	W		954	1193	3) B1, (11) B3, (6) B
3	B				0	W		0	0		
4	B				0	W		0	0		
5					0	W		0	0		
7					0	w		0	0		
8	A				0	w		0	0		
9	B				0	w		0	0		
10	В				0	w		0	0		
11	С				0	W		0	0		
12	С				0	W		0	0		
13	Α				0	W		0	0		
14	Α				0	W		0	0		
15	В				0	W		0	0		
16	B				0	W		0	0		
1/	C				0	W		0	0		
10					0	W		0	0		
20	A				0	W		0	0		
20	R				0	W		0	0		
22	B				0	w		0	0		
23	c				0	W		0	0		
24	С				0	W		0	0		
25	Α				0	W		0	0		
26	Α				0	W		0	0		
27	В				0	W		0	0		
28	В				0	W		0	0		
29	С				0	W		0	0		
30	C				0	W		0	0		
31	A				0	W		0	0		
32	A				0	W		0	0		
34	B				0	w		0	0		
35	C				0	w		0	0		
36	c				0	w		0	0		
37	Α				0	W		0	0		
38	Α				0	W		0	0		
39	В				0	W		0	0		
40	В				0	W		0	0		
41	С				0	W		0	0		
42	С				0	W		0	0		
PAN	IEL]	IUTAL						1.8	2.2	Amps=	2.6
PHA	SE I	LOADING						kW	kVA	%	Amps
	P	HASE TOTAL	Α					1.8	2.2	100%	7.9
	P	HASE TOTAL	В					0.0	0.0		0.0
	PF	HASE TOTAL	С					0.0	0.0		0.0
LOA	DC	ATAGORIES		Conn	ected		Der	mand			Ver. 1.04
				kW	kVA	DF	kW	kVA	PF		
1		receptacles		0.0	0.0		0.0	0.0			
2		computers		0.0	0.0		0.0	0.0			
3	flu	uorescent lighting		0.0	0.0		0.0	0.0			
4	÷	HID lighting	-	0.0	0.0		0.0	0.0			
5	INC	andescent lighting		0.0	0.0		0.0	0.0		<u> </u>	
0		heating		0.0	0.0		0.0	0.0		+	
<u> </u> 8	ki	tchen equipment		0.0	0.0		0.0	0.0			
9	r(I	unassigned		1.8	22		1.8	22	0.80		
	Total	Demand Loads		1.0	<u> </u>		1.8	2.2	0.00		
	Sr	are Capacity		20%			0.4	0.4			
	Tota	I Design Loads					2.1	2.6	0.80	Amps=	3.2
		-									
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 262: Panelboard Worksheet P-LE-1 (New)

		ΡA	NE	BOA	2		SCH	I E D C	Е		
VOLTAGE: 480Y	//277V.3P	H.4W		PANEL TA	ö	A-P	P-1 (NEW)		MIN. C/B AIC:	10K	
SIZE/TYPE BUS: 100A			PAN	EL LOCATIC	ž	ORI	T AUTHORIT		OPTIONS:		
SIZE/TYPE MAIN: 100A	V3P C/B		PANE	IL MOUNTIN	Ö	SUR	FACE				
DESCRIPTION LO	CATION	LOAD (WATTS)	C/B SIZE	POS. NO.	◄		C POS. NO.	C/B SIZE	LOAD (WATTS)	LOCATION	DESCRIPTION
EXTERIOR FIXT. S	SOUTH	357	20A/1P	-	*	+	2	20A/1P	357	SOUTH	EXTERIOR FIXT.
EXTERIOR FIXT. S	HTUO	357	20A/1P	e		*	4	20A/1P	357	NORTH	EXTERIOR FIXT.
EXTERIOR FIXT. N	IORTH	357	20A/1P	5			9	20A/1P	357	NORTH	EXTERIOR FIXT.
		0	20A/1P	7	*		~	20A/1P	0		
		0	20A/1P	6		*	10	20A/1P	0		
		0	20A/1P	11	\vdash	<u> </u>	* 12	20A/1P	0		
		0	20A/1P	13	*	\vdash	14	20A/1P	0		
		0	20A/1P	15		*	16	20A/1P	0		
		0	20A/1P	17			* 18	20A/1P	0		
		0	20A/1P	19	*		20	20A/1P	0		
		0	20A/1P	21		*	22	20A/1P	0		
		0	20A/1P	23			* 24	20A/1P	0		
		0	20A/1P	25	*		26	20A/1P	0		
		0	20A/1P	27		*	28	20A/1P	0		
		0	20A/1P	29			30	20A/1P	0		
		0	20A/1P	31	*		32	20A/1P	0		
		0	20A/1P	33		*	34	20A/1P	0		
		0	20A/1P	35			* 36	20A/1P	0		
		0	20A/1P	37	*		38	20A/1P	0		
		0	20A/1P	39		*	40	20A/1P	0		
		0	20A/1P	41		-	* 42	20A/1P	0		
CONNECTED LOAD (KM	() - A Ph.	0.71							TOTAL DESIGN	LOAD (KW)	2.5
CONNECTED LOAD (KM	/) - B Ph.	0.71							POWER FACTO	R	0.8(
CONNECTED LOAD (KM	/) - C Ph.	0.71							TOTAL DESIGN	LOAD (AMPS)	7

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Figure 263: Panelboard PA-PP-1 (New)

BARBEN | CASEY | DUBOWSKI | MILLER

			PA	NELBOA	ARD SIZI	NG W	ORK	SHEET			
	Pa	anel Tag		>	-PP-1 (NE	Pa	anel Loc	ation:	PO	RT AUTHO	ORITY
N	lomir	al Phase to Neutra	l Volta	age>	277		Phase	e:	3		
N	omin	al Phase to Phase	Voltag	ge>	480		Wires	51	4		
Pos	Ph.	Load Type	Cat.	Location	Load	Units	I. PF	Watts	VA	Ren	narks
1	Α	EXTERIOR FIXT.	9	SOUTH	357	W		357	446	5 B2	, 2 B4
2	Α	EXTERIOR FIXT.	9	SOUTH	357	W		357	446	5 B2	, 2 B4
3	В	EXTERIOR FIXT.	9	SOUTH	357	W		357	446	3 B4	, 4 B3
4	В	EXTERIOR FIXT.	9	NORTH	357	W		357	446	5 B2	, 2 B4
5	C	EXTERIOR FIXT.	9	NORTH	357	W		357	446	5 B2	<u>, 2 B4</u>
6	C	EXTERIOR FIXT.	9	NORTH	357	W		357	446	3 84	, 4 B3
_/	A				0	W		0	0	-	
8	A				0	W		0	0		
10	B		-		0	W		0	0		
11	c				0	w		0	0		
12	c				0	w		0	0		
13	A				0	W		0	0		
14	Α				0	W		0	0		
15	В				0	W		0	0		
16	В				0	W		0	0		
17	С				0	W		0	0		
18	С		\square		0	W		0	0	L	
19	Α				0	W		0	0	<u> </u>	
20	A		-		0	W		0	0	<u> </u>	
21	B		-		0	W		0	0		
22	В				0	W		0	0		
23			-		0	W		0	0		
24					0	W		0	0		
26	Δ				0	W		0	0		
27	R				0	W		0	0		
28	B				0	w		0	0		
29	C				0	w		0	0		
30	С				0	W		0	0		
31	Α				0	W		0	0		
32	А				0	W		0	0		
33	В				0	W		0	0		
34	В				0	W		0	0		
35	С				0	W		0	0		
36	C				0	W		0	0		
37	A				0	W		0	0		
38	A				0	W		0	0		
39	B		-		0	W		0	0		
40			-		0	W		0	0	-	
42	c				0	w		0	0		
PAN	IFI 1				v			21	27	Amps=	32
			, ,		1	, ,				<u></u>	
PHA	SE I							kW	kVA	%	Amps
	P		A					0.7	0.9	33%	3.2
			В					0.7	0.9	33%	3.2
		AJE TUTAL						0.1	0.9	3370	o.Z
LOA	D C	ATAGORIES		Conn	ected		Der	mand		\vdash	Ver. 1.04
-			$\left \right $	kW	kVA	DF	kW	kVA	PF	\vdash	
1		receptacles	$\left \right $	0.0	0.0		0.0	0.0		──┤	
2	۵.	computers	$\left \right $	0.0	0.0		0.0	0.0		+	
3	TÍL	Unescent lighting		0.0	0.0		0.0	0.0		+	
4	inc	andescent lighting		0.0	0.0		0.0	0.0		+	
6	IIIC		$\left \right $	0.0	0.0		0.0	0.0		+	
7		heating		0.0	0.0		0.0	0.0		++	
8	ki	tchen equipment		0.0	0.0		0.0	0.0			
9		unassigned		2.1	2.7		2.1	2.7	0.80		
-	Total	Demand Loads					2.1	2.7			
	Sp	are Capacity		20%			0.4	0.5			
	Tota	I Design Loads					2.6	3.2	0.80	Amps=	3.9
Defa	ult P	ower Factor =	0.80								
Defa	ult D	emand Factor =	100	%							

Figure 264: Panelboard PA-PP-1 (New)

		Feeder Sizing	Worksheet			
Panelboard Tag	FHV-8	I -PP-8-1-(C)	P-8-7	P-8-1	PA-PP-1	P-I F-1
Panelboard Voltage	480Y/277	2087/120	480Y/277	480Y/277	480Y/277	480Y/277
Calculated Design Load (kw)	8.15	30.91	6.11	9.77	2.57	2.11
Resultant Power Factor	0.8	0.8	0.8	0.8	0.8	0.8
Calculated Design Load (kva)	10.2	38.6	7.6	12.2	3.2	2.6
Calculated Design Load (amps)	12.3	107	6	15	4	3.2
Feeder Sizing - Method	1 - primary	1 - secondary	1 - primary	1 - primary	1 - primary	1 - primary
Sets	Ļ	-	t	~	-	-
Wire Size						
Phase	9#	#2	9#	9#	9#	9#
Neutral	9#	#2	9#	9#	9#	9#
Ground	#10	9#	#10	#10	#10	#10
Wire Area (table 5)						
Each Phase	0.0507	0.1158	0.0507	0.0507	0.0507	0.0507
Total -Phase Conductors	0.1521	0.3474	0.1521	0.1521	0.1521	0.1521
Neutral	0.0507	0.1158	0.0507	0.0507	0.0507	0.0507
Ground	0.0211	0.0507	0.0211	0.0211	0.0211	0.0211
Total Area	0.2239	0.5139	0.2239	0.2239	0.2239	0.2239
Min. Conduit Area (above *2.5)	0.55975	1.28475	0.55975	0.55975	0.55975	0.55975
Conduit Size (Sizing Worksheet)	1.0"	1.25"	1.0"	1.0"	1.0"	1.0"
Remarks						
Based feeder sizing on:						
Copper Wire, 75 degree C, THWN,	maximum size 50(Okcmil				
IMC Conduit, minimum zie 3/4"						
Dry type transformers with primary	and seconday feed	lers exceeding 25 fe	et, 100% neutral			

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Figure 265: Feeder Sizing Worksheet

F:T•N

July 2007

Product Description

- 480Y/277 Vac maximum (125 Vdc). 3-phase 4-wire, 3-phase 3-wire, 1-phase 3-wire, 1-phase 2-wire.
- 400 ampere maximum mains.
- 100 ampere maximum branch breakers.
- Bolt-on branch breakers.
- Factory assembled.
- Refer to Page 14-5 for additional Information.



Type PRL2a

Application Description

- Lighting and appliance branch panelboard.
- Fully rated or series rated. Interrupting ratings up to 200 kA symmetrical.
- Suitable for use as Service Entrance Equipment, when specified on the order.
- See Pages 14-5 through 14-18 for additional information.

Standards and Certifications

- UL 67, UL 50.
- Federal Specification W-P-115c. Refer to Page 14-5 for additional information.

Options and Accessories

Refer to Page 14-46.

- Layout and Sizing
- Refer to Page 14-24.

		Discount Symbol CE9
CA08101001E	For more information visit: www.eaton.com	

Panelboards Pow-R-Line C Panelboards PRL2a

Product Selection

Formula Pricing: Base Price + Branch Circuits + Modifications = Total Price U.S. \$ Table 14-22. Base Prices — PRL2a

Breaker Price U.S. \$ Interrupting Rating Ampere

	240 Vac	480Y/277 Vac	125/250 Vde		3-Phase 4-Wire	1-Phase 3-Wire ®, 1-Phase 2-Wire	3-Phase 3-Wire®
Main Lug Onl	ý						
100 225 400	_						
Main Breake	r				· · · · ·		
100 100	65 18	14 14	14 10	GHB EHD			
100 100 100	65 100 200	35 65 100	10 22 22	FD HFD FDC			
225 225 225 225	65 65 100 200			ED FD HFD FDC			
250 250 250	65 100 200	35 65 100	10 22 22	JDC JDC			
400 400 400	65 100 200	35 65 100	10 22 22	KD HKD KDC			
These sys	stern volta	ges apply only	to 240 volts.			-	

Table 14-23. Branch Circuit Breakers — PRL2a

Ampere Rating	Interruptin (kA Symm	g Rating etrical)		Breaker Type	Price U.S	\$	
	240 Vac 🗵	480Y/277 Vac	125/250 Vdc	1	1-Pole	2-Pole	3-Pole
15-20 15-20 25-60 70-100 15-30 15-20 15-30	65 65 65 65 65 65 65 65	14 14 14 25 14 14		GHQ ® GHB ® GHB ® GHB ® HGHB ® GHQRSP ® GHBS ®®			
15-60 15-20	_	14 14	_	GHBGFEP 38 GHBHID 38			
Provision	-	-	-	-	L		

Interrupting ratings in this column are applicable to 120 Vac for 1-pole break
 At 480 volts, must be used on 480Y/277 volts grounded wye systems only.
 Solenoid operated breaker.
 GFP for 30 mA equipment protection. Requires 2-pole spaces. 277 Vac only.
 HID (High Intensity Discharge) rated breaker.

Figure 266: 100 Amp Panelboard Specification Sheet

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14-23

4 Pa	nelbo w-R-L	ards ine C Panel	boards							7	47•1
PRL	2a										July 20
Box Siz	zing and	Selection									
Assembl Box size number	ed Circuit and box s for all s	t Breaker Panelbo k and trim catalo standard panelbo in Table 14-24	ards De g thr bard 3. Se	termine sub-feed ough-feed lug re lect the main am	d break quirer pere r	ker or ments ating		Cabi Fron light	nets its are code- gray painte	-gauge ste ed finish.	el, ANSI-6
Instruction Instruction I. Using pan type 2. Court circo requircourt 2- or sing court cou	ons ng descri elboard, e of main int the to uit poles uired in t nt main l r 3-pole l gle-poles nt as 3 p	iption of the required. tal number of br including provision he panelboard. Distribution of br breaker poles. Co branch breaker to i. i.e., 3-pole brea oles.	see 4. Se col and ap and 5. Frr sions, 5. Fro bonot notvert 6. Re co cat ker, flu	tion from Table lect panelboard f ulumn, main breal plicable, from se d sub-feed break plicable, from the om Step #2, detei r of branch circui ad box size, box talog numbers ac the right. Specify sh mounting on	the original terms of the terms of	om fir me, if colum colum the nu colum im ce or der.	n, nn. um- n 4. ns	Boxe with 5-3/4 widt optic box Top a 5-1/2	es are code- out knockou l inches (144 h is 20 inche onal 28-inch is available. Ind Bottom G 2 inches (139	gauge gal Its. Stand 6.1 mm). 8 es (508.0 r (711.2 mi (711.2 mi (711.2 mi 9.7 mm) n	vanized ste ard depth is Standard mm). An m) wide ninimum.
Table 14-	24. PRL2a	Panelboard Sizing									
Panelboa Types	rd	Main Breaker Types & Mounting Position (H) = Horiz.	Sub-Feed Breaker Typ & Mounting Position (H) = Horiz.	es Maximum No. of Branch Circuits Including	Box D Inches	imensio 000 W	D	YS Box Catalog Number	LT Trim Catalog Number	EZ Box Catalog Number	EZ Trim Catalog Number
100 Amper	e Maximun	(V) = Vert.	(V) = Vert.	Provisions							
Main Bre	aker	BAB, QBHW (H)		15 27 39 42	36.00 48.00 48.00 60.00	20.00 20.00 20.00 20.00	5.75 5.75 5.75 5.75	YS2036 YS2048 YS2048 YS2060	LT2036S or F LT2048S or F LT2048S or F LT2060S or F	EZB2036R EZB2048R EZB2048R EZB2060R	EZT2036S or EZT2048S or EZT2048S or EZT2060S or
Main Lug Main Bre	is or aker	ehd Fd, HFd (V)		18 30 42	36.00 48.00 48.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2036 YS2048 YS2048	LT2036S or F LT2048S or F LT2048S or F	EZB2036R EZB2048R EZB2048R	EZT2036S or EZT2048S or EZT2048S or
Main Lug Breaker w Thru-Fee Sub- Fee	s or Main with 100 A d Lugs or d Breaker	EHD FD HFD (V)	EHD FD HFD (V)	18 30 42	48.00 48.00 60.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2048 YS2048 YS2060	LT2048S or F LT2048S or F LT2060S or F	EZB2048R EZB2048R EZB2060R	EZT2048S or EZT2048S or EZT2060S or
225 Amper	e Maximun	n									
Main Lug Main Bre	is or aker	EDB, EDS, ED, EDH, FD, HFD (V)		18 30 42	36.00 48.00 48.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2036 YS2048 YS2048	LT2036S or F LT2048S or F LT2048S or F	EZB2036R EZB2048R EZB2048R	EZT2036S or EZT2048S or EZT2048S or
		JD, HJD JDC (V)		18 30 42	60.00 60.00 72.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2060 YS2060 YS2072	LT2060S or F LT2060S or F LT2072S or F	EZB2060R EZB2060R EZB2072R	EZT2060S or EZT2060S or EZT2072S or
Main Lug Breaker w Thru-Fee Sub-Feed	s or Main with 225 A d Lugs or d Breaker	EHD, HD, HHD, EDB, EDS, ED, EDH (V)	EHD, FD, HFD, EDB, EDS, ED, EDH (V)	18 30 42	48.00 48.00 60.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2048 YS2048 YS2060	L12048S or F LT2048S or F LT2060S or F	EZB2048R EZB2048R EZB2060R	EZT2048S or EZT2048S or EZT2060S or
400 Amour	Maximum	JDC (V)	EDB, EDS, ED, EDH (V)	30 42	72.00	20.00 20.00	5.75 5.75 5.75	YS2000 YS2072 YS2072	LT2072S or F LT2072S or F	EZB2000R EZB2072R EZB2072R	EZT20003 or EZT2072S or EZT2072S or
Main Lug Main Bre	e maximum is or aker	DK, KD, HKD, KDC (V)		18 30 42	60.00 60.00 72.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2060 YS2060 YS2072	LT2060S or F LT2060S or F LT2072S or F	EZB2060R EZB2060R EZB2072R	EZT2060S or EZT2060S or EZT2072S or
Main Lug Breaker w Thru-Fee Sub-Fee	s or Main with 225 A d Lugs or d Breaker	DK, KD, HKD, KDC (V)	EHD, FD, HFD, EDB, EDS, ED, EDH (V)	18 30 42	60.00 72.00 72.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2060 YS2072 YS2072	LT2060S or F LT2072S or F LT2072S or F	EZB2060R EZB2072R EZB2072R	EZT2060S or EZT2072S or EZT2072S or
Main Lug Breaker w Thru-Fee Sub-Fee	s or Main vith 400 A d Lugs or d Breaker	DK, KD, HKD, KDC (V)	JD, HJD, JDC, DK, KD, HKD, KDC (V)	18 30 42	72.00 90.00 90.00	20.00 20.00 20.00	5.75 5.75 5.75	YS2072 YS2090 YS2090	LT2072S or F LT2090S or F LT2090S or F	EZB2072R EZB2090R EZB2090R	EZT2072S or EZT2090S or EZT2090S or
® Metric	box dimer	isions:									
VS Box	lumber	EZ Box	Dimensions in mr Height	Width	Depth						
YS2036 YS2048 YS2060 YS2072 YS2090		EZB2036R EZB2048R EZB2060R EZB2072R EZB2072R EZB2090R	914.4 1219.2 1524.0 1828.8 2286.0	508.0 508.0 508.0 508.0 508.0	146.1 146.1 146.1 146.1 146.1						
Smalle	er panelboa	ard box sizes are ava	ilable if required. Cor	ntact Eaton for applie	ation i	nformat	tion.				
			For m	ore information visit:	www.e	aton.co	m				CA0810100

Figure 267: 100 Amp Panelboard Specification Sheet Continued

FAT-N

July 2007

Product Description

- 240 Vac maximum.
- 3-phase 4-wire, 3-phase 3-wire, 1-phase 3-wire, 1-phase 2-wire.
 400 ampere maximum mains.
- 100 ampere maximum branch breakers.
- Bolt-on or plug-on branch breakers.
- Factory assembled.
 Refer to Page 14-5 for additional information.



Type PRL1a

Application Description

- Lighting and appliance branch panelboard.
- Fully rated or series rated.
- Interrupting ratings up to 200 kA symmetrical.
- Suitable for use as Service Entrance Equipment, when specified on the order.
- See Pages 14-5 through 14-18 for additional information.

Standards and Certifications

- UL 67, UL 50.
- Federal Specification W-P-115c.
- Refer to Page 14-5 for additional information.

Options and Accessories

Refer to Page 14-46.

- Layout and Sizing

- Refer to Page 14-22.

CA08101001E

Panelboards **Pow-R-Line C Panelboards**

PRL1a

Product Selection

Formula Pricing: Base Price + Branch Circuits + Modifications = Total Price U.S.\$ Table 14-19. Base Prices — PRL1a

Ampere	Interrupting	Breaker	Price U.S. \$		
Rating	Rating (kA Sym.) 240 Vac	Туре	3-Phase 4-Wire	1-Phase 3-Wire, 1-Phase 2-Wire	3-Phase 3-Wire
Main Lug Or	ily				
100 225 400					
Main Break	er				
100 100 100 100 100 100 100 100	10 18 22 42 65 100 100	BAB EHD OBHW EDB EDS ED FD EDH HIFD			
225 225 225 225 225	22 42 65 100	EDB EDS ED EDH			
250 250 250	65 100 200	JD HJD JDC			
400 400 400 400	65 65 100 200	DK KD HKD KDC			

Table 14-20. Branch Circuit Breakers — PRL1a

Ampere	Interrupting	Breaker	Price U.S.	.\$		
Rating	Rating (kA Sym.) 240 Vac ©	Туре	1-Pole 120 V	2-Pole 120/240 V	2-Pole 240 V ⊗	3-Pole 240 V
15-60	10	BAB HOP	l			1
70	10	BAB, HOP				
80 - 100	10	BAB, HOP				
15 - 50 🍭	10	QBGF, QPGF ®				
15-50 🏵	10	OBGFEP, OPGFEP ®				
15-20	10	QBAF ®				
15-20	10	OBAG (2)				
15-60	10	BAB-D, HOP-D ®				
15-30	10	BAB-C, HOP-B ®				
15-30	10	BABRP (9)				
15-30	10	BABRSP ®				
15-60	22	OBHW, OPHW				
70	22	QBHW, QPHW				
80 - 100	22	QBHW, QPHW				
15-30	22	QBHGF, QPHGF ®				
15-30	22	QBHGFEP , QPHGFEP ®				
15 - 20	22	QBHAF ®				
15-20	22	QBHAG Ø				
Provision	-	-				
I-pole b	reakers are rated 1	20 Vac maximum.		-		
240 volt	breakers must be	used on 3-phase, 3-wire,	240 volt d	elta systems	or on the h	igh leg of
midpoin	t delta grounded s	ystem.				
50 ampe	re devices are ava	ilable as 2-pole only.				
GFCI for	5 mA personnel p	rotection.				
GFP for	30 mA equipment	protection.				
Arc fault	circuit breaker.	-				

Are fault circuit breaker.
 Are fault circuit breaker with GFCI.
 HID (High Intensity Discharge) rated breaker.
 Switching Neutral Breaker. 1-pole device requires 2-pole space, 2-pole device requires 3-pole space.
 Solenoid operated breaker.

Discount Symbol CE9

For more information visit: www.eaton.com

Figure 268: 225 Amp Panelboard Specification Sheet

14-21

14

Ampere	Interrupting	Breaker	Price U.S.	S		
Rating	Rating (kA Sym.) 240 Vac ©	Туре	1-Pole 120 V	2-Pole 120/240 V	2-Pole 240 V ⊗	
15-60 70 80-100 15-50 % 15-50 % 15-20 15-20	10 10 10 10 10 10 10	BAB, HQP BAB, HQP BAB, HQP OBGF, QPGF ® OBGFEP, QPGFEP ® OBAF ® OBAG Ø				
15-60 15-30 15-30 15-30	10 10 10 10	BAB-D, HOP-D ® BAB-C, HOP-B ® BABRP ® BABRSP ®				Ī
15-60 70 80-100 15-30 15-30 15-20 15-20	22 22 22 22 22 22 22 22 22 22 22	OBHW, QPHW OBHW, QPHW OBHGF, QPHGF® OBHGFP, QPHGF® OBHAF® OBHAF®				
Provision	—	-				t

Pow-	I-Line C Pane	IDO	ards									
PRL1a												
Box Sizing a	and Selection											Lange of the second sec
Assembled Cir	cuit Breaker Panelb	oards		Dete	rmine sub-feed	l brea	ker or		Cabi	inets		
Box size and	box and trim catal	og		Color	ugh-feed lug re	quire	ments	3.	Fror	nts are code	-gauge ste ad finish	eel,
types are fou	nd in Table 14-21.	Juaru	1 3.	secti	on from Table	14-21			Box	es are code.	asuas asl	lva
Instructions			4.	Sele	ct panelboard t	ype f	rom fi	rst	with	out knockou	uts. Stand	lar
1. Using de	scription of the re-	quire	d	appli	icable, from se	cond	colum	in,	5-3/4 widt	4 inches (14 th is 20 inch	6.1 mm). 1 es (508.0 i	Steel, ANSI- July steel, ANSI- n. galvanized st indard depth . Standard o mm). wide f EZT20455. EZT20455. EZT20455. EZT20455. EZT20455. EZT20455. EXT20455.
type of m	nd, select the rational nain required.	g and		and annli	sub-feed break	er fra a thirc	me, if t colu	mn.	opti	onal 28-inch	n (711.2 m	
2. Count the	e total number of l	oranc	h 5.	From	n Step #2, deter	mine	the n	um-	DOX	IS available		
required	in the panelboard.	Do n	ot _	bero	of branch circui	ts in (Colum	n 4.	10p a 5-1/2	and Bottom G 2 inches (13)	auters 9.7 mm) n	
count ma	in breaker poles. (Conve	ert 6.	catal	og numbers ac	and t	rim colum	ns				
single-po	les, i.e., 3-pole bre	aker,		to th	e right. Specify	surfa	ace or					
count as	3 poles.						and to					
Papelboard	Main Breaker Time	g Sub	-Feed Breaker	Typer	Maximum No. of	Box D	imenci	0.05	YS Box	LT Trim	EZ Box	F
Types	& Mounting Positio	n & N	Iounting Positi - Horiz	on	Branch Circuits	Inche	00		Catalog	Catalog	Catalog	Č
	(V) = Vert.	(V)	= Vert.		Provisions	н	w	D				Ľ
Main Breaker	BAB. OBHW	-			15	36.00	20.00	5.75	YS2036	LT2036S or F	EZB2036R	E
	(H)	_			27	48.00	20.00	5.75	YS2048 YS2048	LT2048S or F	EZB2048R EZB2048R	Ē
		-			42	60.00	20.00	5.75	YS2060	LT2060S or F	EZB2060R	Ē
Main Lugs or Main Breaker	EHD FD, HFD	=			18 30	36.00 48.00	20.00	5.75 5.75	YS2036 YS2048	LT2036S or F LT2048S or F	EZB2036R EZB2048R	E
Main Lugs or Mr	(V)	EHI			42	48.00	20.00	5.75	YS2048 VS2048	LT2048S or F	EZB2048R	E
Breaker with 100 Thru-Feed Lugs	A FD or HED	FD			30	48.00	20.00	5.75	YS2048 YS2060	LT2048S or F LT2060S or F	EZB2048R EZB2060R	
Sub-Feed Break	er (V)	(V)	·		-							
Z25 Ampere Maxi Main Luces or	FDB FDS FD.	-			18	36.00	20.00	5.75	¥\$2036	1T2036S or F	F7B2036B	F
Main Breaker	EDH, FD, HFD	_			30	48.00 48.00	20.00	5.75	YS2048 YS2048	LT2048S or F LT2048S or F	EZB2048R EZB2048R	
	JD, HJD	-			18	60.00	20.00	5.75	YS2060	LT2060S or F	EZB2060R	E
	SDC (V)	_			30 42	60.00 72.00	20.00	5.75	YS2060 YS2072	LT2060S or F LT2072S or F	EZB2060R EZB2072R	E
Main Lugs or Main Breaker wi	EHD, FD, HFD, th EDB, EDS, ED,	EHE	D, FD, HFD, 3. EDS. ED.		18 30	48.00 48.00	20.00	5.75 5.75	YS2048 YS2048	LT2048S or F LT2048S or F	EZB2048R EZB2048R	E
225 A Thru-Feed Lugs or Sub-Fee	EDH (V)	EDH	+(V)		42	60.00	20.00	5.75	YS2060	LT2060S or F	EZB2060R	E
Breaker	JDC	EDE	3, EDS, ED,		30	72.00	20.00	5.75	YS2060	LT2060S or F LT2072S or F	EZB2060H EZB2072R	E
400 Ampere Maxi	mum	EDE	1 (V)		42	12.00	20.00	5.75	192012	L120/25 of F	EZB2072R	E
Main Lugs or Main Dreaker	DK, KD, HKD,	-			18	60.00	20.00	5.75	YS2060	LT2060S or F	EZB2060R	E
Main Breaker	(V)	_			42	72.00	20.00	5.75	YS2000	LT2072S or F	EZB2000R	Ē
Main Lugs or Main Breaker wi	DK, KD, HKD, th KDC	EHE	D, FD, HFD, B, EDS, ED,		18 30	60.00 72.00	20.00 20.00	5.75 5.75	YS2060 YS2072	LT2060S or F LT2072S or F	EZB2060R EZB2072R	E
225 A Thru-Fee Lugs or Sub-Fe	d (V) ed	EDH	4 (V)		42	72.00	20.00	5.75	YS2072	LT2072S or F	EZB2072R	E
Breaker Main Luos or	DK. KD. HKD	JD	HID JDC		18	72.00	20.00	5.75	¥\$2072	1T2072S or 5	F7820729	F
Main Breaker wi	th KDC	DK,	KD,		30	90.00	20.00	5.75	YS2090	LT2090S or F	EZB2090R	Ē
Lugs or Sub-Fee	be	(V)				50.00				L. LOUGO OF P	Locoto	
® Metric box di	mensions:				I	L						-
Catalog Number	r	1	Dimensions in	mm		_						
YS Box	EZ Box		Height		Width	Depth						
YS2036 YS2048	EZB2036R EZB2048R	1	914.4 1219.2		508.0 508.0	146.1 146.1						
YS2060	EZB2060R EZB2072R		1524.0 1828.8		508.0 508.0	146.1 146.1						
152072												

Figure 269: 225 Amp Panelboard Specification Sheet Continued



Figure 270: Exterior Lighting Contol Panelboard Specification Sheet



Figure 271: Exterior Lighting Control Panelboard Specification Sheet Continued



Figure 272: Short Circuit Analysis



Figure 273: Selective Coordination of a 20 amp, a 150 amp, and a 300 amp breaker



Figure 274: Incident Solar Radiation from Ecotect (NW Isometric)



Figure 275: Incident Solar Radiation from Ecotect (SE Isometric)







Figure 277: Daylight Autonomy Screen at 0 Lux Target Illuminance



Figure 278: Daylight Autonomy Screen at 57 Lux Target Illuminance



Figure 279: Daylight Autonomy Screen at 114 Lux Target Illuminance



Figure 280: Daylight Autonomy Screen at 171 Lux Target Illuminance



Figure 281: Daylight Autonomy Screen at 228 Lux Target Illuminance



Figure 282: Daylight Autonomy Screen at 285 Lux Target Illuminance



Figure 283: Double Skin Facade Specification Sheet 1



Pront Page: Berlaymont, Brussels

Over 22,000001 of controllable Golt Shadoglass lowves were installed onto the Haropean Commission Headquarters. There act as a high performance secondary facade. The control system was supplied by Golt and adjust the position of the lowves in response to changing classifies conditions and available of whigh:

INTRODUCTION

Excessive solar heat gain and solar glare can be a costly and unwanted hindrance for building owners. In addition, Building Regulations Approved Document L2 now requires designers to reduce heat gain, with solar shading recommended as a preventative measure unless glass areas are minimised.

Colt solar shading systems offer designers the opportunity for distinctive architectural impact, whilst reducing solar heat gains.

SOLAR RADIATION & LOUVRES

External solar shading is one of the most effective ways to control the internal conditions of a building.

Radiation from the sun is transmitted, absorbed and reflected by the louvres. As a result solar heat gain is prevented from passing into the building, minimising ventilation requirements and reducing cooling loads. If a controllable system is installed, adjustable louvres track the position of the sun, thereby reducing the numbers of days when the building overheats. Equally, in winter the louvres may be adjusted in such a way that the building benefits from the heat from the sun, and they can be closed at night reducing heat loss.

At the same time, daylight levels are enhanced, and at the same time levels of glare are reduced. COLT'S OFFER

- Calculation of sun angles and heat loads.
- Selection of the most appropriate system from a wide range of options.
- Louvre panels are available in various configurations, materials, finishes and coatings to meet the requirements of almost any project.
- Three advanced control options are available, ICS 4-Link for large or medium sized projects, Soltronic for smaller projects, and the innovative Girasol thermohydraulic system, which requires no external energy source.
- All systems are durable and reliable with low maintenance needs.



COLT'S TRACK RECORD

Colt has more than 40 years experience in designing solar shading solutions.

With operating companies located worldwide, Colt has a broad product portfolio to meet your needs.

Colt was the first to incorporate electricity generating photovoltaic cells into solar shading louvres.

Colt understands that a low energy building fails on its weakest link, so it can provide integrated solutions that cover many aspects of design including daylighting and natural ventilation solutions.

Colt is dedicated to innovation and has a comprehensive design capability, including prototyping and testing facilities. We would welcome the opportunity to develop solutions to match your unique requirements.

SOLAR SHADING SYSTEMS LEAFLET

This leaflet shows the different systems Colt can offer. Firstly, the five standard carrier systems are outlined. Then the different louvre types are shown.

2

Figure 284: Double Skin Facade Specification Sheet 2



Figure 285: Double Skin Facade Specification Sheet 3

Shadovoltaic

Shadovoltaic describes a fixed or controllable external solar shading system that incorporates glass louvres with photovoltaic cells integrated into the glass so as to generate electricity at the same time as providing shading. The louvres are available in various colours, surface finishes, patterns and coatings to meet specific design requirements.

Both monocrystalline and polycrystalline cells may be used. The photovoltaic cells may be integrated into the glass, either by attaching them onto the reverse side of the glass panels or by laminating them between two sheets of glass.

Features & benefits

- Combines the functions of solar shading with the generation of electrical power.
- Available in widths of up to 600mm.
- Available in supported spans of up to 4m (depending on windloads and other criteria).
- Wide range of colours, surface finishes, cell patterns and coatings.
- All principal support components manufactured from corrosion-resistant extruded aluminium alloy with stainless steel fixings.
- Fixed or controllable





Figure 286: Double Skin Facade Specification Sheet 4

7.4 Mechanical

Product Information

Price DF3 series displacement diffusers are designed to produce a low turbulence horizontal air supply in three directions. Typically installed against a wall pillar or free standing, the DF3 discharges air evenly across its perforated face with minimal turbulence or induction of room air. The coil supply air flows down to the floor level and gradually fills the occupied space. The superior air quality and low noise levels realized with the DF3 make it suitable for office space, restaurants, supermarkets, theatres, hotels, convention centers, schools or any application where air quality demands are high.

Features

· Optional inlet locations, bottom, top or rear.

Construction / Finish

- · Diffuser frame and equalization baffle - aluminum
- Side, top and bottom panels coated steel
- · Perforated front panel coated steel
- Finish B12 White For optional and special finishes see color matrix.
- Options
 - Base
 - Duct Covers
 - AFSD



Air Pattern



Product Selection Checklist

- 1. Select diffuser Size based on desired
 - performance characteristics.
- 2. Select mounting method.
- 3. Select Options and Accessories if required.
- 4. Select Finish.

Example: DF3 / 24 x 24 / Top / 10

Figure 287: DV Diffuser Product Selection

Displacement Accessories

Duct Covers

Price Duct Covers for Displacement Diffusers provide a consistent look from floor to ceiling. These products continue the appearance of the diffuser while concealing the duct work for an architecturally appealing installation. To ensure that the duct is completely hidden, the cover is supplied in solid sheets, but continues the other features of the unit such as extrusions and color. The duct cover is available in varying lengths and can be split into multiple sections to create a symmetric look with the diffuser. These units are perfect for top ducted diffusers where exposed duct work is not desired, such as hotel lobbies, office boardrooms, and restaurants. This product is not available for the DF1R or DF1W.

Features

- · Seamless construction
- Matches corresponding product design.
- Variable height to match look of diffuser and fit into any room height

Construction / Finish

- Face 21 Gauge steel
- Support Extrusion (where required) -Aluminum
- Finish B12 White For optional and special finishes see <u>color matrix</u>.

Sizes

- Width, Radius/Diameter, Depth are all based on diffuser ordered
- Support Extrusion (where required) Aluminum
- Finish B12 White
- For optional and special finishes see <u>color matrix</u>.

DFIC-DC - Duct Cover for DFIC





Figure 288: DV Diffuser Accessories

BARBEN | CASEY | DUBOWSKI | MILLER

LWS 45 CHAMFERED	LWS OVERLAPPING	LWST FLUSH FRAMED	LWI HIDDEN CONTROLS
Thermally broken outer frame, frameless chamfered louvres	Non thermally broken outer frame, frameless overlapping louvres	Double glazed panel, 30mm overall glass panel thickness	Double glazed panel, 28mm overall glass panel
250 - 1600mm	250 - 1600mm	250 - 1600mm	250 - 1800mm
200mm, up to any height	200mm, up to any height	200mm, up to any height	520mm, up to any height
150mm × 110mm	150mm x 110mm	150mm × 110mm	150mm × 110mm
1500mm × 300mm	1500mm x 350mm	1500mm x 350mm	1700mm × 350mm
46mm	46mm	48mm	4 6mm
0.55	0.55	tbc	0.56
10.59 m³/h/m² (Cam 2) 2.03 m³/h/m	10.46 m³/h/m² (Clam 2) 1.76 m³/h/m	7.5 m³/h/m² (Chm 3) 1.5 m²/h/m	3.23 m ³ /h/m ³ (Chat 3) 0.53 m ³ /h/m
Watertight up to 0 Pa (Clam in)	Watertight up to 100 Pa (Casa 3a)	Watertight up to 100 Pa (Chas 3a)	Watertight up to 100 Pa (Clam 3a)
5.8 W/m³/K	5.8 W/m²/K	2.3 W/m²/K	2.3 W/m/K
variable	variable	non variable	variable
84° / 75°	84° / 75°	84° / 75°	84° / 75°
 Outside frame dimension Aspect ratio of louvre he For all systems the stand A range from 1/3 inside Louvre opening angle (wi This data is indicative on with an area up to 5m²as Units up to 15m high ma 	is. For throat dimensions substract light to louvre length must be less and is 50/50 (one half of the louwn or outside to 2/3 inside or outside th motor/handle). ly Colt can guarantee the structur suming a design wind load of 1500 y be supplied to a special order su	: 100mm. than 1:10. blade is inside and the other half can be provided. al stability for a bank of windows I Pa. Above this, a structural engin bject to technical approval by Col	f is outside). eering calculation will be required. t. 7

Figure 289 : Coltlite Operable Window Specifications

7.5 Construction Management

						Fi	gure 290: Deta	iled Schedule -	Original			
ID	0	Task Name	Duration	Start	Finish	Half 2, 2001	Haif 1, 2002	Half 2, 2002	Half 1. 2003	Half 2, 2003	Half 1, 2004	Half
1	11	Owner Acquisition	657 days?	Mon 7/2/01	Tue 1/6/04	-			1)	
2	11	Documents Available	609 days?	Mon 7/2/01	Thu 10/30/03	3				<u> </u>		
3		Bid and Award	223 days?	Tue 8/19/03	Thu 6/24/04	1						
4	11	Site Mobilization/Abatement and Demo	140 days?	Mon 12/1/03	Fri 6/11/04	1 I I I I I I I I I I I I I I I I I I I						
5	1	Foundations	330 days?	Mon 12/22/03	Frl 3/25/05	5						-
6	11	Award Excavations/Foundations	6 days?	Mon 12/22/03	Mon 12/29/03	3						
7		Start Construction	0 days	Mon 4/19/04	Mon 4/19/04	1					4/19	
8	11	Excavation Foundations - East	84 days?	Mon 5/24/04	Thu 9/16/04	1					_	
9	11	Excavation Foundations - West	140 days?	Thu 8/12/04	Wed 2/23/05	5						9
10	11	Slab On Grade	44 days?	Tue 1/25/05	Frl 3/25/05	5						
11	11	Slab On Grade Complete	0 days	Frl 3/25/05	Frl 3/25/05	5						
12	1	Superstructure - Steel	677 days?	Tue 10/21/03	Wed 5/24/06	8						_
13	11	Shop Drawings	1 day?	Tue 10/21/03	Tue 10/21/03	3				I		
14	11	Mill Orders	34 days?	Tue 10/21/03	Frl 12/5/03	3						
15	11	Material Deliveries	159 days?	Thu 11/20/03	Tue 6/29/04	1				_		
16	11	Fabrication - Podlum	90 days?	Mon 6/21/04	Frl 10/22/04	1					•	
17	11	Fabrication - Tower	248 days?	Frl 7/16/04	Tue 6/28/05	5						
18	11	Mobilize Podium Steel	8 days?	Frl 11/5/04	Tue 11/16/04	s -						
19	11	Mobilize Tower Steel	1 day?	Frl 11/5/04	Frl 11/5/04	5						
20	11	Erect Podium Steel	59 days?	Wed 11/17/04	Mon 2/7/05	5						
21		Mobilize	22 days?	Wed 2/9/05	Thu 3/10/05	5						
22	11	Set Up / Mobilize Tower Cranes	0 days	Frl 2/25/05	Frl 2/25/05	5						
23	11	Tower Crane 1	15 days?	Frl 2/25/05	Thu 3/17/05	5						
24	11	Tower Crane 2	15 days?	Frl 2/25/05	Thu 3/17/05	5						
25	11	Erect Steel - Ground Floor Framing	0 days	Frl 3/18/05	Frl 3/18/05	5						
26	11	Erect Steel - 2nd Floor	8 days?	Frl 3/18/05	Tue 3/29/05	5						
27	11	Erect Steel - 3rd Floor	4 days	Wed 3/30/05	Mon 4/4/05	5						
28		Erect Steel - 4th Floor	4 days	Tue 4/5/05	Frl 4/8/05	5						
29		Erect Steel - 5th Floor	4 days	Mon 4/11/05	Thu 4/14/05	5						
30		Erect Steel - 6th Floor	4 days	Frl 4/15/05	Wed 4/20/05	5						
31		Erect Steel - 7th Floor	4 days	Thu 4/21/05	Tue 4/26/05	5						
32		Erect Steel - 8th Floor	4 days	Wed 4/27/05	Mon 5/2/05	5						
33	1	Erect Steel - 9th Floor	4.5 days	Tue 5/3/05	Mon 5/9/05	5						
34	1	Erect Steel - 10th Floor	4.5 days	Mon 5/9/05	Frl 5/13/05	5						
35		Erect Steel - 11th Floor	4.5 days	Mon 5/16/05	Frl 5/20/05	5						
36	-	Erect Steel - 12th Floor	4.5 days	Frl 5/20/05	Thu 5/26/05	5						
37		Erect Steel - 13th Floor	5 days	Frl 5/27/05	Thu 6/2/05	5						
38		Erect Steel - 14th Floor	5 days	Fri 6/3/05	Thu 6/9/05	5						
39		Erect Steel - 15th Floor	5 days	Fri 6/10/05	Thu 6/16/05	5						
									1			



ID	0	Task Name	Duration	Start	Finish	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1. 2003	Half 2, 2003	Haif 1, 2004	Half
40	-	Erect Steel - 16th Floor	5 days	Frl 6/17/05	Thu 6/23/05	JASONO						1210
41		Erect Steel - 17th Floor	5 days	Frl 6/24/05	Thu 6/30/05	8						
42		Erect Steel - 18th Floor	5 days	Frl 7/1/05	Thu 7/7/05	5						
43		Erect Steel - 19th Floor	4.5 days	Fri 7/8/05	Thu 7/14/05	8						
44		Erect Steel - 20th Floor	4.5 days	Thu 7/14/05	Wed 7/20/05							
45		Erect Steel - 21st Floor	4.5 days	Thu 7/21/05	Wed 7/27/05							
46		Erect Steel - 22nd Floor	4.5 days	Wed 7/27/05	Tue 8/2/05							
47		Erect Steel - 23rd Floor	4.5 days	Wed 8/3/05	Tue 8/9/05							
48		Erect Steel - 24th Floor	4.5 days	Tue 8/9/05	Mon 8/15/05							
49		Erect Steel - 25th Floor	4.5 days	Tue 8/16/05	Mon 8/22/05							
50		Erect Steel - 26th Floor	4.5 days	Mon 8/22/05	Fr1 8/26/05							
51		Erect Steel - 27th Floor	5 days	Mon 8/29/05	Frl 9/2/05							
52		Erect Steel - 28th Floor	10 days	Mon 9/5/05	Frl 9/16/05							
53		Erect Steel - 29th Floor	4.5 days	Mon 9/19/05	Frl 9/23/05							
54		Erect Steel - 30th Floor	4.5 days	Frl 9/23/05	Thu 9/29/05							
55		Erect Steel - 31st Floor	4.5 days	Fr1 9/30/05	Thu 10/6/05							
56		Erect Steel - 32nd Floor	4.5 days	Thu 10/6/05	Wed 10/12/05							
57		Erect Steel - 33rd Floor	4.5 days	Thu 10/13/05	Wed 10/19/05							
58	1	Erect Steel - 34th Floor	4.5 days	Wed 10/19/05	Tue 10/25/05							
59		Erect Steel - 35th Floor	4.5 days	Wed 10/26/05	Tue 11/1/05							
60	1	Erect Steel - 36th Floor	4.5 days	Tue 11/1/05	Mon 11/7/05							
61		Erect Steel - 37th Floor	4 days	Tue 11/8/05	Frl 11/11/05							
62	1	Erect Steel - 38th Floor	4 days	Mon 11/14/05	Thu 11/17/05							
63		Erect Steel - 39th Floor	4 days	Frl 11/18/05	Wed 11/23/05							
64	1	Erect Steel - 40th Floor	4 days	Thu 11/24/05	Tue 11/29/05							
65		Erect Steel - 41st Floor	4 days	Wed 11/30/05	Mon 12/5/05							
66	1	Erect Steel - 42nd Floor	4 days	Tue 12/6/05	Fri 12/9/05							
67		Erect Steel - 43rd Floor	4 days	Mon 12/12/05	Thu 12/15/05							
68		Erect Steel - 44th Floor	4 days	Frl 12/16/05	Wed 12/21/05							
69		Erect Steel - 45th Floor	4 days	Thu 12/22/05	Tue 12/27/05							
70		Erect Steel - 46th Floor	4 days	Wed 12/28/05	Mon 1/2/06							
71		Erect Steel - 47th Floor	4 days	Tue 1/3/06	Frl 1/6/06							
72		Erect Steel - 48th Floor	4 days	Mon 1/9/06	Thu 1/12/06							
73		Erect Steel - 49th Floor	4 days	Frl 1/13/06	Wed 1/18/06							
74	1	Erect Steel - 50th Floor	4 days	Thu 1/19/06	Tue 1/24/06							
75	1	Erect Steel - 51st Floor	4 days	Wed 1/25/06	Mon 1/30/06							
76		Erect Steel - 52nd Floor	9 days	Tue 1/31/06	Frl 2/10/06							
77	11	Erect Steel - Tower Roof/Top out	51 days	Mon 2/13/06	Mon 4/24/06							
78	11	Demobilize	22 days	Tue 4/25/06	Wed 5/24/06							



ID	0	Task Name	Duration	Start	Finish	Half 2, 2001	Half 1, 2002	Haif 2, 2002	Half 1, 2003	Half 2, 2003	Half 1, 2004	Hai
79	-	Superstructure - Concrete Flooring	328 days?	Tue 2/8/05	Thu 5/11/06							
80	11	Mobilize Podium	5 days?	Tue 2/8/05	Mon 2/14/05							
81		Mobilize Podium Concrete	0 days	Tue 2/8/05	Tue 2/8/05							
82	11	Pour Concrete - Podium Ground Floor	6 days	Tue 2/15/05	Tue 2/22/05							
83		Pour Concrete - Podlum 2nd Floor	5 days	Wed 2/23/05	Tue 3/1/05							
84		Pour Concrete - Podium 3rd Floor	5 days	Wed 3/2/05	Tue 3/8/05							
85	1	Pour Concrete - Podium 4th Floor	5 days	Wed 3/9/05	Tue 3/15/05							
86	11	Pour Concrete - Podium 5th Floor	8 days	Wed 3/16/05	Frl 3/25/05							
87		Mobilization - Tower	11 days?	Mon 4/11/05	Mon 4/25/05							
88	11	Mobilize Tower Concrete	0 days	Mon 4/11/05	Mon 4/11/05							
89	1	Pour Concrete - Ground Floor	10 days	Tue 4/26/05	Mon 5/9/05							
90	1	Pour Concrete - 2nd Floor	8 days	Tue 5/10/05	Thu 5/19/05							
91	1	Pour Concrete - 3rd Floor	4 days	Frl 5/20/05	Wed 5/25/05							
92	11	Pour Concrete - 4th Floor	5 days	Thu 5/26/05	Wed 6/1/05							
93	1	Pour Concrete - 5th Floor	4 days	Thu 6/2/05	Tue 6/7/05							
94		Pour Concrete - 6th Floor	4 days	Wed 6/8/05	Mon 6/13/05							
95		Pour Concrete - 7th Floor	4 days	Tue 6/14/05	Frl 6/17/05							
96		Pour Concrete - 8th Floor	4 days	Mon 6/20/05	Thu 6/23/05							
97		Pour Concrete - 9th Floor	5 days	Frl 6/24/05	Thu 6/30/05							
98		Pour Concrete - 10th Floor	5 days	Fri 7/1/05	Thu 7/7/05							
99		Pour Concrete - 11th Floor	4 days	Fri 7/8/05	Wed 7/13/05							
100		Pour Concrete - 12th Floor	5 days	Thu 7/14/05	Wed 7/20/05							
101		Pour Concrete - 13th Floor	5 days	Thu 7/21/05	Wed 7/27/05							
102		Pour Concrete - 14th Floor	5 days	Thu 7/28/05	Wed 8/3/05							
103	1	Pour Concrete - 15th Floor	5 days	Thu 8/4/05	Wed 8/10/05							
104	1	Pour Concrete - 16th Floor	5 days	Thu 8/11/05	Wed 8/17/05							
105	1	Pour Concrete - 17th Floor	5 days	Thu 8/18/05	Wed 8/24/05							
106	1	Pour Concrete - 18th Floor	5 days	Thu 8/25/05	Wed 8/31/05							
107	1	Pour Concrete - 19th Floor	5 days	Thu 9/1/05	Wed 9/7/05							
108	1	Pour Concrete - 20th Floor	5 days	Thu 9/8/05	Wed 9/14/05							
109	1	Pour Concrete - 21st Floor	4 days	Thu 9/15/05	Tue 9/20/05							
110	1	Pour Concrete - 22nd Floor	5 days	Wed 9/21/05	Tue 9/27/05							
111	1	Pour Concrete - 23rd Floor	4 days	Wed 9/28/05	Mon 10/3/05							
112	1	Pour Concrete - 24th Floor	5 days	Tue 10/4/05	Mon 10/10/05							
113	1	Pour Concrete - 25th Floor	4 days	Tue 10/11/05	Fri 10/14/05							
114	1	Pour Concrete - 26th Floor	5 days	Mon 10/17/05	Fri 10/21/05							
115	1	Pour Concrete - 27th Floor	5 days	Mon 10/24/05	Fri 10/28/05							
116	1	Pour Concrete - 28th Floor	8 days	Mon 10/31/05	Wed 11/9/05							
117	1	Pour Concrete - 29th Floor	5 days	Thu 11/10/05	Wed 11/16/05							
1	1		- I					1	1	1	1	



ID	0	Task Name	Duration	Start	Finish	Half 2, 2001	Haif 1, 2002	Haif 2, 2002	Haif 1, 2003	Half 2, 2003	Haif 1, 2004	Haľ
118	Ť	Pour Concrete - 30th Floor	5 days	Thu 11/17/05	Wed 11/23/05	IJIAISIOINID	JIFIMIAIMIJ	JIAISIOINID	JIFIMIAIMIJ	JASTOINID	JIEMIAMIJ	1.17
119		Pour Concrete - 31st Floor	5 days	Thu 11/24/05	Wed 11/30/05	5						
120		Pour Concrete - 32nd Floor	5 days	Thu 12/1/05	Wed 12/7/05	5						
121		Pour Concrete - 33rd Floor	4 days	Thu 12/8/05	Tue 12/13/05	5						
122		Pour Concrete - 34th Floor	5 days	Wed 12/14/05	Tue 12/20/05	5						
123		Pour Concrete - 35th Floor	5 days	Wed 12/21/05	Tue 12/27/05	5						
124		Pour Concrete - 36th Floor	6 days	Wed 12/28/05	Wed 1/4/06	5						
125		Pour Concrete - 37th Floor	4 days	Thu 1/5/06	Tue 1/10/06	5						
126		Pour Concrete - 38th Floor	4 days	Wed 1/11/06	Mon 1/16/06	5						
127		Pour Concrete - 39th Floor	4 days	Tue 1/17/06	Frl 1/20/06	5						
128		Pour Concrete - 40th Floor	4 days	Mon 1/23/06	Thu 1/26/06	5						
129		Pour Concrete - 41st Floor	4 days	Frl 1/27/06	Wed 2/1/06	5						
130		Pour Concrete - 42nd Floor	4 days	Thu 2/2/06	Tue 2/7/06	5						
131		Pour Concrete - 43rd Floor	4 days	Wed 2/8/06	Mon 2/13/06	5						
132		Pour Concrete - 44th Floor	4 days	Tue 2/14/06	Frl 2/17/06	5						
133		Pour Concrete - 45th Floor	4 days	Mon 2/20/06	Thu 2/23/06	5						
134		Pour Concrete - 46th Floor	4 days	Frl 2/24/06	Wed 3/1/06	5						
135		Pour Concrete - 47th Floor	4 days	Thu 3/2/06	Tue 3/7/06	5						
136	<u> </u>	Pour Concrete - 48th Floor	4 days	Wed 3/8/06	Mon 3/13/06	5						
137		Pour Concrete - 49th Floor	4 days	Tue 3/14/06	Frl 3/17/06	5						
138		Pour Concrete - 50th Floor	4 days	Mon 3/20/06	Thu 3/23/06	5						
139		Pour Concrete - 51st Floor	9 days	Frl 3/24/06	Wed 4/5/06	5						
140		Pour Concrete - 52nd Floor	4 days	Thu 4/6/06	Tue 4/11/06	5						
141		Pour Concrete - Concrete Fills / Top out	22 days	Wed 4/12/06	Thu 5/11/06	5						
142		Curtain Wall	572 days?	Tue 7/20/04	Wed 9/27/06							Ψ-
143	11	Shop Assembly	362 days?	Tue 7/20/04	Wed 12/7/05	5						
144	11	Shipping	234 days?	Mon 1/24/05	Thu 12/15/05	5						
145	11	Set Insert / Clips	183 days?	Tue 4/26/05	Thu 1/5/06	5						
146	11	Mobilize - Load Podium Units	8 days	Thu 4/28/05	Mon 5/9/05	5						
147		Curtain Wall - Floor 2 Podium	11 days	Tue 5/10/05	Tue 5/24/05	5						
148		Curtain Wall - Floor 3 Podium	12 days	Wed 5/25/05	Thu 6/9/05	5						
149	1	Curtain Wall - Floor 4 Podium	11 days	Fri 6/10/05	Fri 6/24/05	5						
150		Mobilization - Loading	225 days	Fri 7/8/05	Thu 5/18/06	5						
151	11	Curtain Wall Tower - Overhead Protection	15 days	Fri 7/8/05	Thu 7/28/05	5						
152	11	Curtain Wall Tower - Floor 2	4 days	Mon 8/8/05	Thu 8/11/05	5						
153		Curtain Wall Tower - Floor 3	5 days	Frl 8/12/05	Thu 8/18/05	5						
154	1	Curtain Wall Tower - Floor 4	4 days	Frl 8/19/05	Wed 8/24/05	5						
155		Curtain Wall Tower - Floor 5	5 days	Thu 8/25/05	Wed 8/31/05	5						
156		Curtain Wall Tower - Floor 6	4 days	Thu 9/1/05	Tue 9/6/05	5						
1	1									1		



ID	0	Task Name	Duration	Start	Finish	Half 2, 2001	Haif 1, 2002	Half 2, 2002	Haif 1, 2003	Half 2, 2003	Half 1, 2004	Half
157	-	Curtain Wall Tower - Floor 7	5 days	Wed 9/7/05	Tue 9/13/05			STATSTON D		SIAISIONID	STEW AWAY	210
158	1	Curtain Wall Tower - Floor 8	5 days	Wed 9/14/05	Tue 9/20/05	5						
159	1	Curtain Wall Tower - Floor 9	5 days	Wed 9/21/05	Tue 9/27/05	5						
160		Curtain Wall Tower - Floor 10	4 days	Wed 9/28/05	Mon 10/3/05	5						
161	1	Curtain Wall Tower - Floor 11	5 days	Tue 10/4/05	Mon 10/10/05	5						
162		Curtain Wall Tower - Floor 12	4 days	Tue 10/11/05	Fri 10/14/05							
163		Curtain Wall Tower - Floor 13	5 days	Mon 10/17/05	Fri 10/21/05							
164	1	Curtain Wall Tower - Floor 14	5 days	Mon 10/24/05	Fri 10/28/05	6						
165	1	Curtain Wall Tower - Floor 15	6 days	Mon 10/31/05	Mon 11/7/05	6						
166		Curtain Wall Tower - Floor 16	4 days	Tue 11/8/05	Fri 11/11/05							
167	1	Curtain Wall Tower - Floor 17	5 days	Mon 11/14/05	Fri 11/18/05	5						
168		Curtain Wall Tower - Floor 18	5 days	Mon 11/21/05	Frl 11/25/05							
169		Curtain Wall Tower - Floor 19	6 days	Mon 11/28/05	Mon 12/5/05							
170		Curtain Wall Tower - Floor 20	4 days	Tue 12/6/05	Frl 12/9/05							
171	1	Curtain Wall Tower - Floor 21	5 days	Mon 12/12/05	Fri 12/16/05	5						
172		Curtain Wall Tower - Floor 22	5 days	Mon 12/19/05	Frl 12/23/05							
173	1	Curtain Wall Tower - Floor 23	5 days	Mon 12/26/05	Fri 12/30/05	5						
174		Curtain Wall Tower - Floor 24	5 days	Mon 1/2/06	Frl 1/6/06							
175	1	Curtain Wall Tower - Floor 25	5 days	Mon 1/9/06	Frl 1/13/06							
176	1	Curtain Wall Tower - Floor 26	4 days	Mon 1/16/06	Thu 1/19/06	5						
177	1	Curtain Wall Tower - Floor 27	5 days	Frl 1/20/06	Thu 1/26/06							
178	1	Curtain Wall Tower - Floor 28	14 days	Frl 1/27/06	Wed 2/15/06							
179	1	Curtain Wall Tower - Floor 29	4 days	Thu 2/16/06	Tue 2/21/06	5						
180	1	Curtain Wall Tower - Floor 3D	5 days	Wed 2/22/06	Tue 2/28/06							
181	1	Curtain Wall Tower - Floor 31	4 days	Wed 3/1/06	Mon 3/6/06							
182	1	Curtain Wall Tower - Floor 32	5 days	Tue 3/7/06	Mon 3/13/06	5						
183	1	Curtain Wall Tower - Floor 33	4 days	Tue 3/14/06	Frl 3/17/06	1						
184		Curtain Wall Tower - Floor 34	5 days	Mon 3/20/06	Frl 3/24/06							
185		Curtain Wall Tower - Floor 35	4 days	Mon 3/27/06	Thu 3/30/06							
186	1	Curtain Wall Tower - Floor 36	5 days	Frl 3/31/06	Thu 4/6/06	5						
187	1	Curtain Wall Tower - Floor 37	4 days	Fri 4/7/06	Wed 4/12/06	1						
188	1	Curtain Wall Tower - Floor 38	5 days	Thu 4/13/06	Wed 4/19/06	5						
189		Curtain Wall Tower - Floor 39	4 days	Thu 4/20/06	Tue 4/25/06							
190		Curtain Wall Tower - Floor 40	5 days	Wed 4/26/06	Tue 5/2/06							
191		Curtain Wall Tower - Floor 41	4 days	Wed 5/3/06	Mon 5/8/06							
192		Curtain Wall Tower - Floor 42	5 days	Tue 5/9/06	Mon 5/15/06							
193		Curtain Wall Tower - Floor 43	5 days	Tue 5/16/06	Mon 5/22/06	5						
194		Curtain Wall Tower - Floor 44	5 days	Tue 5/23/06	Mon 5/29/06							
195		Curtain Wall Tower - Floor 45	4 days	Tue 5/30/06	Fri 6/2/06							



ID	•	Task Name	Duration	Start	Finish	Half 2, 2001	Haif 1, 2002	Hair 2, 2002	Half 1. 2003	Hail 2. 2003	Hair 1, 2004	Hair 2, 2004	Haif 1. 2005	Half 2, 2005	Haif 1, 2006	Haif 2, 2005
105	<u> </u>	Curtain Wall Tower - Floor 45	5 days	Mon 6/5/06	Ed 6/0/05	JIAISIOINID	JIFIMIAIMIJ	JIAISIOINID	JIFIMIAIMIJ	JIAISIOINID	J IF MIAIM J	JASIONID	JIFIMIAIMIJ	JIAISIOINID		JIJIAISIOI
130		Caltain Wait Tower - 1 tool 40	o uayo	Mon croide	1110/3/00											
197		Curtain Wall Tower - Floor 47	4 days	Mon 6/12/06	Thu 6/15/06											ř,
198		Curtain Wall Tower - Floor 48	5 days	Erl 6/16/06	Thu 6/22/05											*
130			o dayo	in cricicio	111010122100											า
199		Curtain Wall Tower - Floor 49	5 days	FrI 6/23/06	Thu 6/29/06											к
200		Curtain Wall Tower - Floor 50	5 days	Erl 6/30/06	Thu 7/6/06											*
200			o dayo	1110/06/00												า
201		Curtain Wall Tower - Floor 51	14 days	Frl 7/7/06	Wed 7/26/06											۵,
202		Curtain Wall Tower - Screen Work	45 days	Thu 7/27/06	Wed 9/27/05											*
202		Guitan Wan Tower - Screen Work	40 uays	110 1121100	wea 5/27/00											

Figure 291:	Detailed S	Schedule -	Core/Corner	and Facade	Change

ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Haif 1, 2004	Half 2, 2004
1		Owner Acquisition	657 days?	Mon 7/2/01			I STATSTON TO		3 1 1 3 1 0 1 1 0		JIAISIONI
2	11	Documents Available	609 days?	Mon 7/2/01							
3	11	Bid and Award	223 days?	Tue 8/19/03							
4	11	Site Mobilization/Abatement and Demo	140 days?	Mon 12/1/03					_		
5		Foundations	330 days?	Mon 12/22/03							
6	11	Award Excavations/Foundations	6 days?	Mon 12/22/03	1						
7	11	Start Construction	0 days	Mon 4/19/04						4/19	
8	11	Excavation Foundations - East	84 days?	Mon 5/24/04						-	
9	11	Excavation Foundations - West	112 days?	Thu 8/12/04							£
10	11	Slab On Grade	44 days?	Tue 1/25/05	5						
11	11	Slab On Grade Complete	0 days	Frl 3/25/05	5						
12		Superstructure - Concrete	294 days	Mon 1/3/05							
13	11	Mobilize	22 days	Mon 1/3/05	5						
14	11	Set Up / Mobilize Tower Cranes	0 days	Mon 1/10/05	,						
15	11	Tower Crane 1	15 days	Mon 1/10/05	,						
16	11	Tower Crane 2	15 days	Mon 1/10/05							
17	11	Concrete Core - Assemble Silp Form/Place Cella	15 days	Mon 1/10/05	i i i i i i i i i i i i i i i i i i i						
18	11	Concrete Core - Ground Floor	10 days	Mon 1/31/05							
19	11	Concrete Core - Floors 2,3	10 days	Mon 2/14/05							
20	1	Concrete Core - Floors 4,5	10 days	Mon 2/28/05							
21	1	Concrete Core - Floors 6,7	10 days	Mon 3/14/05							
22	1	Concrete Core - Floors 8,9	10 days	Mon 3/28/05	5						
23	1	Concrete Core - Floors 10,11	10 days	Mon 4/11/05	5						
24		Concrete Core - Floors 12,13	10 days	Mon 4/25/05	5						
25		Concrete Core - Floors 14,15	10 days	Mon 5/9/05	5						
26		Concrete Core - Floors 16,17	10 days	Mon 5/23/05	5						
27	1	Concrete Core - Floors 18,19	10 days	Mon 6/6/05							
28	1	Concrete Core - Floors 20,21	10 days	Mon 6/20/05							
29	1	Concrete Core - Floors 22,23	10 days	Mon 7/4/05							
30	1	Concrete Core - Floors 24,25	10 days	Mon 7/18/05							
31	1	Concrete Core - Floors 26,27	10 days	Mon 8/1/05							
32	1	Concrete Core - Floor 28	10 days	Mon 8/15/08	1						
33	1	Concrete Core - Floors 29,30	10 days	Mon 8/29/05							
34	1	Slip Form Change-over 1	1 day	Mon 9/12/08							
35	1	Concrete Core - Floors 31,32	10 days	Tue 9/13/05							
36	1	Concrete Core - Floors 33,34	10 days	Tue 9/27/05	1						
37	1	Concrete Core - Floors 35,36	10 days	Tue 10/11/05	1						
38	1	Concrete Core - Floors 37,38	10 days	Tue 10/25/05							
39	1	Concrete Core - Floors 39,40	10 days	Tue 11/8/05							


ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Half 1, 2004	Half 2, 200
40		Concrete Core - Floors 41,42	10 days	Tue 11/22/08	1						
41	1	Slip Form Change-over 2	1 day	Tue 12/6/05	5						
42	1	Concrete Core - Floors 43,44	10 days	Wed 12/7/05	5						
43	1	Concrete Core - Floors 45,45	10 days	Wed 12/21/05	5						
44	1	Concrete Core - Floors 47,48	10 days	Wed 1/4/06	5						
45	1	Concrete Core - Floors 49,50	10 days	Wed 1/18/06	5						
46	1	Concrete Core - Floor 51	10 days	Wed 2/1/06	5						
47		Demobilize/Disassemble Silp Form	2 days	Wed 2/15/06	5						
48	1	Superstructure - Steel	678 days	Mon 10/20/03					-		
49		Shop Drawings	295 days	Tue 10/21/03	8						
50		MIII Orders	182 days	Mon 10/20/03	5						
51		Material Deliveries	179 days	Tue 1/27/04	L .						
52		Fabrication - Podlum	90 days	Mon 6/21/04	L .						
53		Fabrication - Tower	248 days	Frl 7/16/04	L.						
54		Mobilize Podium Steel	8 days	Frl 11/5/04	L .						
55		Mobilize Podium Steel	0 days	Frl 11/5/04	i.						
56		Erect Podium Steel	59 days	Wed 11/17/04	L .						
57		Mobilize	22 days	Wed 2/9/05	5						
58		Erect Steel - Ground Floor Framing	0 days	Frl 3/18/05	5						
59		Erect Steel - 2nd Floor	8 days	Frl 3/18/05	5						
60		Erect Steel - 3rd Floor	5 days	Wed 3/30/05	5						
61	-	Erect Steel - 4th Floor	5 days	Wed 4/6/05	5						
62	-	Erect Steel - 5th Floor	5 days	Wed 4/13/05	5						
63	+	Erect Steel - 6th Floor	5 days	Wed 4/20/05	5						
64	+	Erect Steel - 7th Floor	5 days	Wed 4/27/05	5						
65	+	Erect Steel - 8th Floor	5 days	Wed 5/4/05	5						
66		Erect Steel - 9th Floor	5 days	Wed 5/11/05	5						
67	-	Erect Steel - 10th Floor	5 days	Wed 5/18/05	5						
68		Erect Steel - 11th Floor	5 days	Wed 5/25/05	5						
69	-	Erect Steel - 12th Floor	5 days	Wed 6/1/05	5						
70		Erect Steel - 13th Floor	5 days	Wed 6/8/05	5						
71	-	Erect Steel - 14th Floor	5 days	Wed 6/15/05	5						
72		Erect Steel - 15th Floor	5 days	Wed 6/22/05	5						
73	-	Erect Steel - 16th Floor	5 days	Wed 6/29/05	5						
74		Erect Steel - 17th Floor	5 days	Wed 7/6/05	5						
75	-	Erect Steel - 18th Floor	5 days	Wed 7/13/05	5						
76		Erect Steel - 19th Floor	5 days	Wed 7/20/05	5						
77		Erect Steel - 20th Floor	5 days	Wed 7/27/05	5						
78		Erect Steel - 21st Floor	5 davs	Wed 8/3/05	5						



ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Haif 1, 2004	Half 2, 20
79	-	Erect Steel - 22nd Floor	5 days	Wed 8/10/05							
80		Erect Steel - 23rd Floor	5 days	Wed 8/17/05							
81		Erect Steel - 24th Floor	5 days	Wed 8/24/05							
82	1	Erect Steel - 25th Floor	5 days	Wed 8/31/05							
83		Erect Steel - 26th Floor	5 days	Wed 9/7/05							
84	1	Erect Steel - 27th Floor	5 days	Wed 9/14/05							
85		Erect Steel - 28th Floor	10 days	Wed 9/21/05							
86	1	Erect Steel - 29th Floor	5 days	Wed 10/5/05							
87		Erect Steel - 30th Floor	5 days	Wed 10/12/05							
88	1	Erect Steel - 31st Floor	4 days	Wed 10/19/05							
89		Erect Steel - 32nd Floor	4 days	Tue 10/25/05							
90		Erect Steel - 33rd Floor	4 days	Mon 10/31/05							
91		Erect Steel - 34th Floor	4 days	Frl 11/4/05							
92		Erect Steel - 35th Floor	4 days	Thu 11/10/05							
93	<u> </u>	Erect Steel - 36th Floor	4 days	Wed 11/16/05							
94		Erect Steel - 37th Floor	4 days	Tue 11/22/05							
95		Erect Steel - 38th Floor	4 days	Mon 11/28/05							
96		Erect Steel - 39th Floor	4 days	Frl 12/2/05							
97	1	Erect Steel - 40th Floor	4 days	Thu 12/8/05							
98		Erect Steel - 41st Floor	4 days	Wed 12/14/05							
99	1	Erect Steel - 42nd Floor	4 days	Tue 12/20/05							
100		Erect Steel - 43rd Floor	4 days	Mon 12/26/05							
101		Erect Steel - 44th Floor	4 days	Frl 12/30/05							
102		Erect Steel - 45th Floor	4 days	Thu 1/5/06							
103	1	Erect Steel - 46th Floor	4 days	Wed 1/11/06							
104		Erect Steel - 47th Floor	4 days	Tue 1/17/06							
105		Erect Steel - 46th Floor	4 days	Mon 1/23/06							
106		Erect Steel - 49th Floor	4 days	Frl 1/27/06							
107		Erect Steel - 50th Floor	4 days	Thu 2/2/06							
108	1	Erect Steel - 51st Floor	9 days	Wed 2/8/06							
109		Erect Steel - 52nd Floor	4 days	Tue 2/21/06							
110	11	Erect Steel - Tower Roof/Top out	4 days	Wed 4/19/06							
111	11	Demobilize	22 days	Tue 4/25/06							
112	1	Superstructure - Concrete Flooring	328 days	Tue 2/8/05							
113	11	Mobilize Podium	5 days	Tue 2/8/05							
114	11	Mobilize Podium Concrete	0 days	Tue 2/8/05							
115	11	Pour Concrete - Podlum Ground Floor	6 days	Tue 2/15/05							
116		Pour Concrete - Podlum 2nd Floor	5 days	Wed 2/23/05							
117		Pour Concrete - Podium 3rd Floor	5 days	Wed 3/2/05							



ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Half 1, 2004	Hair 2, 200
118	Ť	Pour Concrete - Podium 4th Floor	5 days	Wed 3/9/05	JASOND	I J I F IM A IM I J	JIAISIOINID	JIFIMIAMIJ	JIAISIOINID	JIFIMIAIMIJ	JIAISI
119	11	Pour Concrete - Podium 5th Floor	8 days	Wed 3/16/05							
120		Mobilization - Tower	11 days	Mon 4/11/05							
121	11	Mobilize Tower Concrete	0 days	Mon 4/11/05							
122		Pour Concrete - Ground Floor	10 days	Tue 4/26/05							
123		Pour Concrete - 2nd Floor	8 days	Tue 5/10/05							
124		Pour Concrete - 3rd Floor	4 days	Fri 5/20/05							
125		Pour Concrete - 4th Floor	5 days	Thu 5/26/05							
126		Pour Concrete - 5th Floor	4 days	Thu 6/2/05							
127	1	Pour Concrete - 6th Floor	4 days	Wed 6/8/05							
128	1	Pour Concrete - 7th Floor	4 days	Tue 6/14/05							
129	1	Pour Concrete - 8th Floor	4 days	Mon 6/20/05							
130	1	Pour Concrete - 9th Floor	5 days	Fri 6/24/05							
131	1	Pour Concrete - 10th Floor	5 days	Frl 7/1/05							
132	1	Pour Concrete - 11th Floor	4 days	Fri 7/8/05							
133	1	Pour Concrete - 12th Floor	5 days	Thu 7/14/05							
134	1	Pour Concrete - 13th Floor	5 days	Thu 7/21/05							
135	1	Pour Concrete - 14th Floor	5 days	Thu 7/28/05							
136	1	Pour Concrete - 15th Floor	5 days	Thu 8/4/05							
137	1	Pour Concrete - 16th Floor	5 days	Thu 8/11/05							
138		Pour Concrete - 17th Floor	5 days	Thu 8/18/05							
139	1	Pour Concrete - 18th Floor	5 days	Thu 8/25/05							
140		Pour Concrete - 19th Floor	5 days	Thu 9/1/05							
141		Pour Concrete - 20th Floor	5 days	Thu 9/8/05							
142	1	Pour Concrete - 21st Floor	4 days	Thu 9/15/05							
143		Pour Concrete - 22nd Floor	5 days	Wed 9/21/05							
144		Pour Concrete - 23rd Floor	4 days	Wed 9/28/05							
145		Pour Concrete - 24th Floor	5 days	Tue 10/4/05							
146		Pour Concrete - 25th Floor	4 days	Tue 10/11/05							
147		Pour Concrete - 26th Floor	5 days	Mon 10/17/05							
148		Pour Concrete - 27th Floor	5 days	Mon 10/24/05							
149		Pour Concrete - 28th Floor	8 days	Mon 10/31/05							
150		Pour Concrete - 29th Floor	5 days	Thu 11/10/05							
151		Pour Concrete - 30th Floor	5 days	Thu 11/17/05							
152	1	Pour Concrete - 31st Floor	5 days	Thu 11/24/05							
153	1	Pour Concrete - 32nd Floor	5 days	Thu 12/1/05							
154	1	Pour Concrete - 33rd Floor	4 days	Thu 12/8/05							
155	1	Pour Concrete - 34th Floor	5 days	Wed 12/14/05							
156	1	Pour Concrete - 35th Floor	5 days	Wed 12/21/05							



ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Haif 1, 2004	Hair 2, 2004
157		Pour Concrete - 36th Floor	6 days	Wed 12/28/08	1						
158	1	Pour Concrete - 37th Floor	4 days	Thu 1/5/06	5						
159		Pour Concrete - 38th Floor	4 days	Wed 1/11/06	5						
160	1	Pour Concrete - 39th Floor	4 days	Tue 1/17/06	5						
161	1	Pour Concrete - 40th Floor	4 days	Mon 1/23/06	5						
162	1	Pour Concrete - 41st Floor	4 days	Frl 1/27/06	5						
163		Pour Concrete - 42nd Floor	4 days	Thu 2/2/06	5						
164	1	Pour Concrete - 43rd Floor	4 days	Wed 2/8/06	5						
165	1	Pour Concrete - 44th Floor	4 days	Tue 2/14/06	5						
166	1	Pour Concrete - 45th Floor	4 days	Mon 2/20/06	5						
167		Pour Concrete - 46th Floor	4 days	Frl 2/24/06	5						
168	1	Pour Concrete - 47th Floor	4 days	Thu 3/2/06	5						
169		Pour Concrete - 48th Floor	4 days	Wed 3/8/06	5						
170	1	Pour Concrete - 49th Floor	4 days	Tue 3/14/06	5						
171	1	Pour Concrete - 50th Floor	4 days	Mon 3/20/06	5						
172	1	Pour Concrete - 51st Floor	9 days	Frl 3/24/06	5						
173		Pour Concrete - 52nd Floor	4 days	Thu 4/6/06	5						
174		Pour Concrete - Concrete Filis / Top out	22 days	Wed 4/12/06	5						
175		Curtain Wall	572 days	Tue 7/20/04	i i						-
176	11	Shop Assembly	362 days	Tue 7/20/04	ĩ						
177		Shipping	234 days	Mon 1/24/05	5						
178	11	Set Insert / Clips	183 days	Tue 4/26/05	5						
179		Mobilize - Load Podium Units	8 days	Thu 4/28/05	5						
180	-	Curtain Wall - Floor 2 Podium	11 days	Tue 5/10/05	5						
181		Curtain Wall - Floor 3 Podium	12 days	Wed 5/25/05	5						
182	-	Curtain Wall - Floor 4 Podium	11 days	Frl 6/10/05	5						
183		Mobilization - Loading	225 days	Frl 7/8/05	5						
184	111	Curtain Wall Tower - Overhead Protection	15 days	Frl 7/8/05	5						
185	11	Curtain Wall Tower - Floor 2	4 days	Mon 8/8/05	5						
186		Curtain Wall Tower - Floor 3	5 days	Frl 8/12/05	5						
187		Curtain Wall Tower - Floor 4	4 days	Frl 8/19/05	5						
188		Curtain Wall Tower - Floor 5	5 days	Thu 8/25/05	5						
189		Curtain Wall Tower - Floor 6	4 days	Thu 9/1/05	5						
190		Curtain Wall Tower - Floor 7	5 days	Wed 9/7/05	5						
191	-	Curtain Wall Tower - Floor 8	5 days	Wed 9/14/05	5						
192	-	Curtain Wall Tower - Floor 9	5 days	Wed 9/21/05	5						
193		Curtain Wall Tower - Floor 10	4 days	Wed 9/28/05	5						
194		Curtain Wall Tower - Floor 11	5 days	Tue 10/4/05	5						
195		Curtain Wall Tower - Floor 12	4 days	Tue 10/11/08	5						
I	1				1						1



ID	0	Task Name	Duration	Start	Half 2, 2001	Half 1, 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Half 1, 2004	Haif 2, 2004
196	-	Curtain Wall Tower - Floor 13	5 days	Mon 10/17/05	JASOND	I J I F IM I A IM I J	JIAISIONID	JIFIMIAIMIJ	JIAISICINID	JIFIMIAIMIJ	JIAISIC
197		Curtain Wall Tower - Floor 14	5 days	Mon 10/24/05							
198		Curtain Wall Tower - Floor 15	6 days	Mon 10/31/05							
199		Curtain Wall Tower - Floor 16	4 days	Tue 11/8/05							
200		Curtain Wall Tower - Floor 17	5 days	Mon 11/14/05							
201		Curtain Wall Tower - Floor 18	5 days	Mon 11/21/05							
202		Curtain Wall Tower - Floor 19	6 days	Mon 11/28/05							
203		Curtain Wall Tower - Floor 2D	4 days	Tue 12/6/05							
204		Curtain Wall Tower - Floor 21	5 days	Mon 12/12/05							
205		Curtain Wall Tower - Floor 22	5 days	Mon 12/19/05							
206		Curtain Wall Tower - Floor 23	5 days	Mon 12/26/05							
207		Curtain Wall Tower - Floor 24	5 days	Mon 1/2/06							
208		Curtain Wall Tower - Floor 25	5 days	Mon 1/9/06							
209		Curtain Wall Tower - Floor 26	4 days	Mon 1/16/06							
210		Curtain Wall Tower - Floor 27	5 days	Frl 1/20/06							
211		Curtain Wall Tower - Floor 28	14 days	Frl 1/27/06							
212		Curtain Wall Tower - Floor 29	4 days	Thu 2/16/06							
213		Curtain Wall Tower - Floor 3D	5 days	Wed 2/22/06							
214	<u> </u>	Curtain Wall Tower - Floor 31	4 days	Wed 3/1/06							
215		Curtain Wall Tower - Floor 32	5 days	Tue 3/7/06							
216	1	Curtain Wall Tower - Floor 33	4 days	Tue 3/14/06							
217	1	Curtain Wall Tower - Floor 34	5 days	Mon 3/20/06							
218	1	Curtain Wall Tower - Floor 35	4 days	Mon 3/27/06							
219	1	Curtain Wall Tower - Floor 36	5 days	Frl 3/31/06							
220		Curtain Wall Tower - Floor 37	4 days	Frl 4/7/06							
221	1	Curtain Wall Tower - Floor 38	5 days	Thu 4/13/06							
222	1	Curtain Wall Tower - Floor 39	4 days	Thu 4/20/06							
223	1	Curtain Wall Tower - Floor 40	5 days	Wed 4/26/06							
224		Curtain Wall Tower - Floor 41	4 days	Wed 5/3/06							
225	1	Curtain Wall Tower - Floor 42	5 days	Tue 5/9/06							
226	1	Curtain Wall Tower - Floor 43	5 days	Tue 5/16/06							
227	1	Curtain Wall Tower - Floor 44	5 days	Tue 5/23/06							
228	1	Curtain Wall Tower - Floor 45	4 days	Tue 5/30/06							
229		Curtain Wall Tower - Floor 46	5 days	Mon 6/5/06							
230		Curtain Wall Tower - Floor 47	4 days	Mon 6/12/06							
231	1	Curtain Wall Tower - Floor 48	5 days	Fri 6/16/06							
232	1	Curtain Wall Tower - Floor 49	5 days	Fri 6/23/06							
233	1	Curtain Wall Tower - Floor 50	5 days	Fri 6/30/06							
234	1	Curtain Wall Tower - Floor 51	14 days	Fri 7/7/06							
ID	0	Task Name	Duration	Start	Half 2, 2001	Haif 1. 2002	Half 2, 2002	Half 1, 2003	Half 2, 2003	Half 1, 2004	Half 2, 2004
235	-	Curtain Wall Tower - Screen Work	45 days	Thu 7/27/06	STRISTONID		JAISTOINID		STATSTOINTD		JIAISIO



BARBEN | CASEY | DUBOWSKI | MILLER

Figure 292: Detailed Original Core Take-off

Structural Framing Schedule			Quantity	LineNumber	Description	Crew Daily Output	: l	Labor Hours Unit	Material	Labo	or Equipmen	t Tota	I E	xt. Mat.	Ext. Labor	Ext. Equip.	Ext. To	otal	Mat. O&P La	abor O&P	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P E	xt. Equip. O&P Ext.	Fotal O&P	bor Type
Family and Type	Mark	Length Volume			STRUCTURAL STEEL MEMBERS	S																					
				,																							
TT-W-Wide Flange: W14X99	Replaced by Core	26.8 5.25	26.8	051223756100	TT14x99,	E5	1200	0.067 L.F.	S 1	68.71 \$	4.16 \$	1.72 \$	174.59 \$	4,521.43	3 \$ 111.	.49 \$ 4	5.10 \$	4,679.01 \$	186.30 \$	7.22	\$ 1.90	\$ 195.42	\$ 4,992.84	\$ 193.50	5 50.92 \$	5,237.26 STE	<u>)</u>
W-Wide Flange: W14X82	Replaced by Core	16.3 2.69	16.3	051223752380	W14x82	E2	740	0.076 L.F.	\$ 1	40.51 \$	4.67 \$	2.59 \$	147.77 \$	2,290.34	4 \$ 76.	.12 \$ 4	2.22 \$	2,408.68 \$	153.71 \$	8.00	\$ 2.85	\$ 164.56	\$ 2,505.53	\$ 130.40	5 46.46 \$	2,682.39 STL)
W-Wide Flange: W14X82	Replaced by Core	16.3 2.69	16.3	051223752380	W14x82	E2	/40	0.076 L.F.	\$ 1	40.51 \$	4.67 \$	2.59 \$	147.77 \$	2,290.34	4 \$ 76.	.12 \$ 4	2.22 \$	2,408.68 \$	153.71 \$	8.00	\$ 2.85	\$ 164.56	\$ 2,505.53	\$ 130.40	5 46.46 \$	2,682.39 SIL)
W-Wide Flange: W14X82	Replaced by Core	16.8 2.97	16.8	051223752380	W14x82	E2	740	U.U/6 L.F.	5 1	40.51 \$	4.67 \$	2.59 \$	14/.// \$	2,360.59	9 \$ 78.	.46 \$ 4	3.51 \$	2,482.56 \$	153.71 \$	8.00	\$ 2.85	\$ 164.56	\$ 2,582.39	\$ 134.40	5 47.88 \$	2,764.67 STL	<u></u>
W-Wide Flange: W14X90	Replaced by Core	16.3 2.96	10.3	051223752380	W14X90	E2	740	0.076 L.F.	8 1	54.22 \$	4.6/ 5	2.59 \$	161.48 \$	2,513.7	9 \$ 76.	.12 \$ 4	2.22 \$	2,632.12 \$	168./1 \$	8.00	\$ 2.85	\$ 1/9.56 c 470.00	\$ 2,749.97	\$ 130.40	5 46.46 \$	2,926.83 511	ן ת
W-Wide Flange: W14X90	Replaced by Core	10.3 2.90	10.3	051223752380	W14x30	E2	740	0.076 L.F.	0 I	04.22 0 64.00 0	4.0/ 0	2.09 0	101.40 0	2,010.73	9 0 10. 1 C 102	.12 0 4	2.22 0 2.00 0	2,032.12 3	100./1 3	0.00	0 2.00 C 2.00	0 1/3.00 C 170.00		\$ 130.40 G	0 40.40 0	2,920.00 010	л п
W-Wide Flange: W14X90	Replaced by Core	10.2 2.40	19.2	051223752380	W14x30	F2	740	0.076 L.F.	0 I	54.22 Ø	4.07 \$	2.05 0	161.40 0	3,352.04 2,961.01	+ 0 102. 2 C 80	66 S 1	0.50 0 0.73 C	3 100 /2 \$	168 71 9	8.00	a 2.00 s 2.85	9 175.30 S 179.66	© 3,711.02	\$ 163.60	0 02.10 g	3,000.02 OTC	n
W-Wide Flange: W14X90	Replaced by Core	19.2 3.49	19.2	051223752380	W14x90	F2	740	0.076 L.F.	s 1	54.22 V	4.07 \$	2.55 5	161.40 0	2,001.02	2 0 00.	4 2 33	2.13 S	3 100.42 \$	168.71 \$	8.00	s 2.05	\$ 179.56	© 3,233,23 © 3,239,23	\$ 153.60	54.12 S	3 M7 55 STE	<u></u>
W-Wide Flange: W14X90	Replaced by Core	26.8 4.76	26.8	051223752380	W14x90	F2	740	0.076 L.F.	S 1	54.22 \$	4.67 \$	2.55 \$	161.48 \$	4 133 1	n s 125	16 5 6	9.41 S	4 327 66 \$	168 71 \$	8.00	<u>\$ 2.05</u> \$ 2.85	\$ 179.56	\$ 4.521.43	\$ 214.40	76 38 S	4 812 21 STE	<u>,</u>
W-Wide Flange: W14X109	Replaced by Core	19.2 4.37	19.2	051223752500	W14x109	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.55 0	212.40 \$	3 934 6	6 S 92	16 S 5	1.26 \$	4,021.00 0	225.63 \$	8.21	<u>s</u> 2.03	\$ 236.77	\$ 4,321.43 \$ 4,332.10	\$ 157.63	56 26 8	4,612.21 OT	D
W-Wide Flange: W14X109	Replaced by Core	19.2 4.23	19.2	051223752500	W14x109	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	3,934,66	6 S 92	.16 \$ 5	1.26 \$	4.078.08 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 4,332.10	\$ 157.63	56.26 S	4,545.98 STD	 D
W-Wide Flange: W14X109	Replaced by Core	19.6 4.49	19.6	051223752500	W14x109	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	4.016.6	3 \$ 94	.08 \$ 5	2.33 \$	4,163.04 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 4,422.35	\$ 160.92	5 57.43 S	4.640.69 STE	D
W-Wide Flange: W14X120	Replaced by Core	27.8 6.4	27.8	051223752500	W14x120	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	5,697.0	5 \$ 133.	.44 \$ 7	1.23 S	5,904.72 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 6.272.51	\$ 228.24	6 81.45 S	6.582.21 STE	D
W-Wide Flange: W14X120	Replaced by Core	23.5 5.74	23.5	051223752500	W14x120	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	4,815.86	6 \$ 112	.80 \$ 6	2.75 \$	4,991.40 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 5,302.31	\$ 192.94	68.86 \$	5,564.10 STE	D
W-Wide Flange: W14X120	Replaced by Core	23.5 5.74	23.5	051223752500	W14x120	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	4,815.86	6 \$ 112.	.80 \$ 6	2.75 \$	4,991.40 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 5,302.31	\$ 192.94	68.86 \$	5,564.10 STE	D
W-Wide Flange: W14X120	Replaced by Core	38.2 9.11	38.2	051223752500	W14x120	E2	720	0.078 L.F.	\$ 2	04.93 \$	4.80 \$	2.67 \$	212.40 \$	7,828.33	3 \$ 183.	.36 \$ 10	1.99 S	8,113.68 \$	225.63 \$	8.21	\$ 2.93	\$ 236.77	\$ 8,619.07	\$ 313.62	s 111.93 s	9,044.61 STE	D
W-Wide Flange: W14X132	Replaced by Core	38.2 10.21	38.2	051223752500	W14x132	E2	720	0.078 L.F.	\$ 2	25.42 \$	4.80 \$	2.67 \$	232.89 \$	8,611.10	6 \$ 183.	.36 \$ 10	1.99 \$	8,896.51 \$	248.19 \$	8.21	\$ 2.93	\$ 259.33	\$ 9,480.97	\$ 313.62	§ 111.93 \$	9,906.52 STE	D
W-Wide Flange: W14X145	Replaced by Core	23.5 6.92	23.5	051223752500	W14x145	E2	720	0.078 L.F.	\$ 2	47.62 \$	4.80 \$	2.67 \$	255.09 \$	5,819.16	6 \$ 112	.80 \$ 6	2.75 \$	5,994.70 \$	272.64 \$	8.21	\$ 2.93	\$ 283.78	\$ 6,406.95	\$ 192.94	68.86 \$	6,668.74 STE	D
W-Wide Flange: W14X145	Replaced by Core	23.5 6.7	23.5	051223752500	W14x145	E2	720	0.078 L.F.	\$ 2	47.62 \$	4.80 \$	2.67 \$	255.09 \$	5,819.16	6 \$ 112.	.80 \$ 6	2.75 \$	5,994.70 \$	272.64 \$	8.21	\$ 2.93	\$ 283.78	\$ 6,406.95	\$ 192.94	68.86 \$	6,668.74 STE	D
W-Wide Flange: W14X257	Replaced by Core	22.5 11.75	22.5	051223752500	W14x257	E2	720	0.078 L.F.	S 4	38.89 \$	4.80 \$	2.67 \$	446.36 \$	9,875.06	6 \$ 108.	.00 \$ 6).08 \$ 1	10,043.14 \$	483.22 \$	8.21	\$ 2.93	\$ 494.36	\$ 10,872.55	\$ 184.73	65.93 \$	11,123.20 STE	D
W-Wide Flange: W14X283	Replaced by Core	23.1 13.26	23.1	051223752500	W14x283	E2	720	0.078 L.F.	S 4	83.29 \$	4.80 \$	2.67 \$	490.76 \$	11,164.07	7 \$ 110.	.88 \$ 6	1.68 \$ 1	11,336.63 \$	532.11 \$	8.21	\$ 2.93	\$ 543.25	\$ 12,291.76	\$ 189.65	67.68 \$	12,549.09 STE	0
W-Wide Flange: W14X283	Replaced by Core	17.3 9.96	17.3	051223752500	W14x283	E2	720	0.078 L.F.	\$ 4	83.29 \$	4.80 \$	2.67 \$	490.76 \$	8,360.97	7 \$ 83.	.04 \$ 4	5.19 \$	8,490.20 \$	532.11 \$	8.21	\$ 2.93	\$ 543.25	\$ 9,205.52	\$ 142.03	5 50.69 \$	9,398.24 STE	0
W-Wide Flange: W14X283	Replaced by Core	21.7 12.47	21.7	051223752500	W14x283	E2	720	0.078 L.F.	\$ 4	83.29 \$	4.80 \$	2.67 \$	490.76 \$	10,487.46	6 \$ 104.	.16 \$ 5	7.94 \$ 1	10,649.56 \$	532.11 \$	8.21	\$ 2.93	\$ 543.25	\$ 11,546.80	\$ 178.16	63.58 \$	11,788.54 STE	<u>ן</u>
W-Wide Flange: W14X283	Replaced by Core	17.3 9.96	17.3	051223752500	W14x283	E2	720	0.078 L.F.	\$ 4	83.29 \$	4.80 \$	2.67 \$	490.76 \$	8,360.97	7 \$ 83.	.04 \$ 4	5.19 \$	8,490.20 \$	532.11 \$	8.21	\$ 2.93	\$ 543.25	\$ 9,205.52	\$ 142.03	5 50.69 \$	9,398.24 STE)
W-Wide Flange: W14X283	Replaced by Core	21.7 12.46	21.7	051223752500	W14x283	E2	/20	0.078 L.F.	\$ 4	83.29 \$	4.80 \$	2.67 \$	490.76 \$	10,487.46	6 \$ 104.	.16 \$ 5	7.94 \$ 1	10,649.56 \$	532.11 \$	8.21	\$ 2.93	\$ 543.25	\$ 11,546.80	\$ 178.16	63.58 \$	11,788.54 SIL)
W-Wide Flange: W33X141	Replaced by Core	30 8.54	30	051223757100	W33x141	E5	1134	0.0/1 L.F.	\$ 2	41.16 \$	4.40 \$	1.82 \$	247.38 \$	7,234.8	0 \$ 132.	.00 \$ 5	1.60 \$	7,421.40 \$	264.96 \$	7.65	\$ 2.01	\$ 274.62	\$ 7,948.80	\$ 229.50	5 60.30 \$	8,238.60 STL)
W-Wide Flange: W33X141	Replaced by Core	30 8.54	30	051223757100	W33X141	Eb	1134	0.071 L.F.	\$ 2	41.16 \$	4.40 \$	1.82 \$	247.38 \$	7,234.80	0 \$ 132.	.00 \$ 5	1.60 \$	7,421.40 \$	264.96 \$	7.65	\$ 2.01	\$ 2/4.62	\$ 7,948.80	\$ 229.50	5 60.30 \$	8,238.60 STL	
W-Wide Flange: W33X141	Replaced by Core	30 8.11	20	051223757100	W33X141	E0	1134	0.071 L.F.	8 Z	41.16 5	4.40 5	1.82 \$	247.38 \$	7,234.8	U \$ 132.	00 5 5	1.60 5	7,421.40 \$	264.96 \$	7.65	\$ 2.01 c 0.01	\$ 2/4.62 c 074.c0	\$ 7,948.80 C 7.049.90	\$ ZZ9.50) 60.30 S	8,238.60 STL	ן ח
W-Wide Flange: W33X141	Replaced by Core	30 8.11	30	051223757100	W33x141	E0 F6	1134	0.071 L.F.	0 2 C 2	41.10 0 42.70 c	4.40 \$	1.02 0	247.30 0	10 212 4	U Q 132.	.00 \$ 00	1.00 Q	1,421.40 \$	204.90 3	7.00	\$ 2.01 ¢ 2.01	0 2/4.02 c 207.27		\$ 229.50 \$	00.00 0	0,230.00 OTL	
W-Wide Flange: W22V201	Replaced by Core	20 11.33	30	051223757100	W33x201	E5	1134	0.071LF	0 0 C 0	43.70 a 13.78 C	4.40 0	1.02 0	350.00 0	10,313.44	+ 0 132. 1 C 132	.00 a 3	6 00.4	10,500.04 3	377.71 0	7.65	a 2.01 s 2.01	0 307.37 C 387.37	© 11,001.27	© 220.50	¢ 00.00 ¢	11,021.07 STE	<u>,</u>
Grand total: 32	neplaced by core	755.8 225.25	Total	001220101100	1100/201	2.5	1104	0.011 2.1.	V .	43.10 0	4.40 0	1.02 V	330.00 Ø	193 532 86	\$ 35166	59 \$ 1826	02 \$ 198	8 875 51	arr.rr y	1.03	ψ 2.01	0 301.31	\$ 212 802 05	\$ 6 042 28	\$ 2007.81 \$	220 852 06	
													•	100,002.00	, o ojoron	,, , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		,					•	v ojo izlizo	-,		
Structural Column Schedule																											
Family and Type	Mark	Length Volume	Quantity	LineNumber	Description	Crew Daily Output	L	abor Hours Unit	Material	Labo	r Equipmen	Total	Ext	. Mat.	Ext. Labor	Ext. Equip.	Ext. Total	Ma	it. 0&P La	bor O&P E	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P E	xt. Equip. O&P Ext. T	otal O&P	
W-Wide Flange-Column: W23X11	68 Replaced by Core	13.75 20.5	13.75	051223758100	BU-Built Up-Column: W23X1168	E5	1035	0.077 L.F.	\$ 2,0	02.73 \$	4.83 \$	1.99 \$	2,009.55 \$	27,537.4	7 \$ 66.	41 \$ 2	7.36 \$ 2	27,631.24 \$	2,203.00 \$	8.35	\$ 2.19	\$ 2,213.54	\$ 30,291.22	\$ 114.81	5 <u>30.11</u> \$	30,436.14 STE	J
W-Wide Flange-Column: W23X11	68 Replaced by Core	13.75 20.5	13.75	051223758100	BU-Built Up-Column: W23X1168	E5	1035	0.077 L.F.	\$ 2,0	02.73 \$	4.83 \$	1.99 \$	2,009.55 \$	27,537.4	7 \$ 66.	.41 \$ 2	7.36 \$ 2	27,631.24 \$	2,203.00 \$	8.35	\$ 2.19	\$ 2,213.54	\$ 30,291.22	\$ 114.81	5 30.11 \$	30,436.14 STL)
W-Wide Flange-Column: W23X11	68 Replaced by Core	13.75 20.5	13.75	051223758100	BU-Built Up-Column: W23X1168	E5	1035	0.077 L.F.	\$ 2,0	02.73 \$	4.83 \$	1.99 \$	2,009.55 \$	27,537.4	7 \$ 66.	.41 \$ 2	7.36 \$ 2	27,631.24 \$	2,203.00 \$	8.35	\$ 2.19	\$ 2,213.54	\$ 30,291.22	\$ 114.81	<u>5 30.11 \$</u>	30,436.14 STL)
W-Wide Flange-Column: W23X11	68 Replaced by Core	13.75 20.5	13.75	051223758100	BU-Built Up-Column: W23X1168	E5	1035	0.077 L.F.	\$ 2,0	02.73 \$	4.83 \$	1.99 \$	2,009.55 \$	21,531.4	/ \$ bb.	.41 \$ 2	7.36 \$ 2	27,631.24 \$	2,203.00 \$	8.35	\$ 2.19	\$ 2,213.54	\$ 30,291.22	\$ 114.81	5 <u>30.11</u> \$	30,436.14 STL	
W-Wide Flange-Column: W29X20	63 Replaced by Core	13.75 20.5	13.75	051223750100	BU-Built Up-Column: W29X2063	E0	1035	0.077 L.F.	\$ 3,5	19.00 5	4.83 5	1.99 \$	3,525.82	48,386.25	5 5 66. r e cc	.41 S 2	(.3b 5 4	48,480.03 \$	3,870.90 \$	0.35	\$ 2.19 © 0.40	\$ 3,881.44	\$ 53,224.88 c co.oo4.00	\$ 114.81 C) 30.11 S	53,369.80 STL	ן ח
W-Wide Flange-Column: W29X20	63 Replaced by Core 63 Deplaced by Core	13.75 20.5	13.75	051223750100	BU-Built Up-Column: W29X2063	E0	1030	0.077 L.F.	\$ 3,5 C 2,5	19.00 \$	4.83 3	1.99 \$	3,525.82	48,386.2	5 5 66.	.41 8 2	(.30 5 4	48,480.03 \$	3,870.90 \$	0.J5 0.25	\$ Z.19 C 0.40	\$ 3,881.44 © 2,004.44	53,224.88 53,224 53	\$ 114.81 C) JU.11 3	53,359.60 OTL	ן ח
W-Wide Flange-Column: W29X20	63 Replaced by Core	13.75 20.5	13.75	051223750100	BU-Built Up-Column: W29X2003	E0 F6	1035	0.077 L.F.	0 0,0 C 20	19.00 \$	4.03 0	1.99 0	0,020.02 0 0,020.02 0	40,300.23	00, 60, 5 6 60	.41 0 2 .41 0 2	7.30 0 4	40,400.00 0	3,070.90 \$	0.33	a 2.19 c 2.19	\$ 3,001.44 C 2,001.44	3 33,224.00 c 53,004.00	© 114.01 0	0 JU.II 0	53,309.00 OTL	
W-Wide Flange-Column: W29X20	03 Replaced by Core 03 Replaced by Core	13.75 20.5	13.75	051223750100	BU-Built Up-Column: W29X2003	E5	1035	0.077 L.I .	0 0,0 C 17	19.00 0	4.03 Q	1.55 0	3,525.02 a	40,300.23	00, 00, 00, 00, 00, 00, 00, 00, 00, 00,	.41 0 Z	1.30 0 4 7.30 0 4	40,400.00 0 04.000.00 0	3,070.90 3	0.33	a 2.19 e 0.40	0 3,001.44		0 114.01 0 C 114.01 0	0 JU.II 0	00,003.00 OTL	л п
W Wide Flange-Column: W22X10	01 Poplaced by Core	12.75 20.5	13.75	051223750100	BU-Built Up-Column: W22X1032	E5	1035	0.077 L.T.	0 1,1 C 24	01.20 Q	4.03 0	1.55 0	2 /02 02 0	24, 133, 1,	.00 6 C	.41 0 Z	7.36 ¢ 3	24,200.50 3	1,000.40 0 0.6/1.20 0	0.JJ 8.35	a 2.15 c 2.10	0 1,540.55 C 2,651.86	Q 20,012.44	© 114.01 0	20.11 0 2 20.11 0	20,101.00 010	<u>,</u>
Grand total: 10	or replaced by COLE	137 5 20.3	Total	001220100100	porduni oproblumini wzbx1401		1033	V.VIT L.T.	<i>♥</i> 2,4	V1.20 Ø	4.03 Ø	1.33 Ø	2,400.02 3 ¢	360 904 51	00 00 00	10 \$ 273	60 \$ 361	1 842 26	2,041.JZ Q	0.33	ψ <u>2.1</u> 3	ψ 2,001.00	\$ 306 001 00	\$ 114.01 3	\$ 30110 ¢	398 444 20	
erand total. 10		207.0 204.7	, otur											000,004.01	v 004.	V V 21V		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					• ••••,•••	v 1,140.10	v vi.iv V	000,777.20	
			Total										\$	554,437.37	\$ 4.180.7	9 \$ 2.099.	62 \$ 560.7	717.77					\$ 609,797.04	\$ 7,190.38	\$ 2,308.91 \$	619,296.26	
															, .,	,							,	,	uilding Total ¢2	1 680 590 56	
																								L. L	anang iotai 25	1000,000,00	

BARBEN | CASEY | DUBOWSKI | MILLER

Figure 293: Detailed Concrete Core Take-off

		all Material Takeoff																					
Family and Type	Material: Name	Material: Area Material: W	olume Length Area Volume Function Structural Usage	Quantity	LineNumber	So Su Description	Crew Daily Output Labor Hours Unit Material Li	abor Equipment	Total	Ext. Mat.	Ext	Labor Ex	rt. Equip.	Ext. Total	Mat. O&P	Labor O&P	Equip. 0&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P	Ext. Equip. O&P	Ext. Total O&P	Labor Type Data Release Zip Code Notes
Shear Rasie Wall- Wall 18"																							
Core-shaft																							
Core-shaft: 66			52307.52																				
Basic Wall: Wall 18": 66			5287.52	lotai						\$ 25	8,108.22 \$	3,317.82 \$	873.12	\$ 2/2,2%	9.20				\$ 293,428.	2 \$ 5,180.44	\$ 8/3.1	\$ 299,482.4	2
Basic Wall: Wall 24"																							
Core-shaft																							
Core-shaft: 68 Buck Walk Well 14"- 68			65654.23 61464.33	Tetal						t 54	1 349 34 \$	4 445.50 \$	1 000 92	¢ 549.579	1 60				¢ 500 730	0 \$ 6.470.74	\$ 100.0	e ene 100 1	4
DEDIC WHEN, WHEN 24 - 00			0000	Total						1 1	0.042.04	4.146.46 F	1,000.05	4 440,010	2.9%					4 V,412.14	• 1,000	• ••••	
Basic Wall: Wall 30"																							
Core-shaft																							
Core-shart: stu Basic Wall: Wall 30": 300		2	175824.89	Total						\$ 3.38	9,989.30 \$	17,469.00 \$	4,597,04	\$ 3,412,055	5.16				\$ 3,779,004	2 \$ 27,275,82	\$ 4,597,0	\$ 3,810,877,4	0
Shear: 484		3	193066.64											-							-		
	Access the difficulty dist			Tabl (he) Comm									171 (1)	4 171 114					4 44 44		4 475 4		
	Concrete - Normal Weight - 5 ksi			Total 6ksi Concre	te					\$ 281,	513.63 5	3,317.82 \$	8/3.12	5 272,299.	20				\$ 305,165.5	7 \$ 5,180.44	5 8/3.1	5 259,482.4	
	Concrete - Normal Weight - 8 Ksi			Total 8ksi Concre	ete .					\$ 070,3	09.40 3	4,140.02 3	1,090.82	3 046,076.	02 40				\$ 028,072.9	5 5 0,4/2.14	\$ 1,090.64	\$ 000,299.14	·
	Concrete - Normai Weight - 10 ksi			TOTAL TOKSI CONCE	ete					\$ 3,009,4	H65.77 \$	17,409.00 \$	4,097.04	\$ 3,412,000.	.10				\$ 3,907,934.7	0 \$ 21,213.82	\$ 4,397.04	\$ 3,810,877.4	1
Formwork																							
Basic Wall: Wall 18"																							
Core-shaft																							
Basic Wall: Wall 18": 66				Total						\$ 33	8,064.32 \$	488,840.56 \$	7,683,28	\$ 832,588	8.16				\$ 370,194	0 \$ 755,056.88	\$ 8,381.7	\$ 1,133,633.0	4
Basic Wall: Wall 24"																							
Core-shaft: 68																							
Basic Wall: Wall 24": 68				Total						\$ 31	6,787.68 \$	456,200.44 \$	7,199.72	\$ 780,187	7.84				\$ 346,895.	0 \$ 707,538.12	\$ 7,854.2	\$ 1,062,285.5	8
Parts Mall, Mall 24																							
Core-shaft																							
Core-shaft: 300																							
Basic Wall: Wall 30": 300				Total						\$ 1,06	7,684.64 \$	1,537,554.12	24,265.56	\$ 2,629,504	122				\$ 1,169,158.	0 \$ 2,384,642.76	\$ 26,471.5	\$ 3,580,273.0	8
Formwork				Total Formwork						\$ 1,198.2	67.84 \$	1.725.604.72 \$	27,233,36	\$ 2,951,105	92				\$ 1,312,152,8	0 \$ 2,676,296,56	\$ 29,709,12	\$ 4,018,158,4	
										• 11104		dissivenis 4	21,200100	< ajrenjiven					4 ije izličeno	, t sin decourt	• •	1 101011011	
Reinforcing																							
Basic Wall: Wall 18" Consultable																							
Core-shaft: 66																							
Basic Wall: Wall 18": 66																							
Rade Wall- Wall 207																							
Core-shaft																							
Core-shaft: 68																							
Basic Wall: Wall 24": 68																							
Basic Wall: Wall 80"																							
Core-shaft																							
Core-shaft: 300				1125.2	844																		
Basic Wall: Wall 90": 900	_				_				_	_					_	_	_			_	_		
Reinforcing				Total Reinforcing						\$ 3,245,8	52.06 \$	1,525,490.69 \$		\$ 4,771,342.	98				\$ 3,575,937.7	6 \$ 2,505,484.76	ş .	\$ 6,081,421.9)
Concrete Structural St	ear Wall Total			Total						\$ 8,855,63	1.75 \$3	3.276.027.75	\$ 33,794,34	\$ 11,955,381,8	88				\$ 9,789,884,2	\$ 5.220.710.32	\$ 36,270,10	\$ 14.816.240.03	

Figure 294: Detailed Original Curtain Wall Take-off

	Origin	al Curtain	Wall Ta	ke-off		
	Floor 1					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing No Tubes	1648	59.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	4742	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	1648	59.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	4742	172.44	Exterior	N/A	\$145.00/SF
Total	Exterior: 4	12780	464.74			
	Curtain Wall: Glazing No Tubes 2	1098	39.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1098	39.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	3575	130	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1249	45.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	655	23.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.42	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	136	4,94	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	111	4.04	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	825	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	213	7 75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	137	2.40	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	102	2 7/	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	103	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing No Tubes 2	1230	2.26	Exterior		\$145.00/SF
	Curtain Wall, Glazing No Tubes 2	92	3.50	Exterior		\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	250	0.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	239	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1240	23.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1249	45.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	655	23.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	136	4.94	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	111	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	825	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	213	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	137	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	103	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1238	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	92	3.36	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	259	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	655	23.83	Exterior	N/A	\$145.00/SF
Total	Exterior: 35	17819	647.97			
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A	\$145.00/SF
Total	Garden: 4	7700	280			
	Curtain Wall: Glazing No Tubes 3	204	7.4	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	204	7.4	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 3: 2	407	14.81			
Totals	Curtain Wall	38706	1407.52			\$145.00/SF
	Ceramic Tubes	N/A	N/A			

	Floor 2					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 3	2011	130	Exterior	36 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2011	130			
	Curtain Wall: Glazing Ceramic Tubes	917	59.29	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	917	59.29	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
Total	Exterior: 4	7169	463.46			
	Curtain Wall: Glazing No Tubes 2	618	39.93	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	618	39.93	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	369	23.83	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	369	23.03	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	702	45.42	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	369	22.92	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	269	23.03	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing No Tubes 2	503	25.05	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2		3.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	/6	4.94	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	63	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	77	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	52	3.69	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	703	45.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	76	4.94	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	75	4.82	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	51	3.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	63	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7.74	Exterior	N/A	\$145.00/SF
Total	Exterior: 34	8009	518.39			
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1003	70	Garden	N/A	\$145.00/SF
Total	Garden: 4	/201	290	Jurach		91-0100/01
iotai	Curtain Wall: Glazing No Tubos 2	4001	7.4	Exterior	N/A	\$145.00/SE
	Curtain Wall: Clazing No Tubes 3	115	7.4	Exterior	N/A	\$145.00/SF
Total	Exterior 2	115	1.4	Exterior	IN/A	9140.00/3F
rotal	Cuttain Wally Shada Sutarajan	229	14.81	Extorior	55 Q 10 5	
	Curtain Wall: Shade Extension	30	10	Exterior	50 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	50 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	50 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
Total	Curtain Wall: Shade Extension: 8	237	80			-
Totals	Curtain Wall	21749	1406.66			\$145.00/SF

Total	Type Curtain Wall: East Wall 3 Exterior: 1 Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	Area 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 2011 201 309<	Length 130 59.29 172.44 59.29 172.44 463.46 39.93 39.93 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 300 7.75 2.45 5.5 3.74	Comment Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	Rods Per 36 @ 5' Each 38 @ 5' Each 38 @ 5' Each 38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A	Price \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: East Wall 3 Exterior: 1 Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain W	2011 2011 2017 2667 917 2667 7169 618 618 618 369 369 369 369 369 369 369 369 369 369	130 130 59.29 172.44 463.46 39.93 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 23.83 3.42 4.94 4.04 30 7.75 2.45 5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	36 @ 5' Each 38 @ 5' Each 38 @ 5' Each 38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Exterior: 1 Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2 Cu	2011 917 2667 917 2667 7169 618 618 369 369 369 369 369 369 369 369 369 369	130 59.29 172.44 463.46 39.93 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 300 7.75 2.45 5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	38 @ 5' Each 38 @ 5' Each 38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	917 2667 917 2667 7169 618 618 369 369 369 369 369 369 369 369 369 369	59.29 172.44 59.29 172.44 463.46 39.93 39.93 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 30 7.75 5.5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	38 @ 5' Each 38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	2667 917 2667 7169 618 618 369 369 369 369 369 369 369 369 369 369	172.44 59.29 172.44 463.46 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 30 7.75 2.45 5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	38 @ 5' Each 38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	917 2667 7169 618 618 369 369 703 369 369 369 369 369 369 369 363 464 120 38 775 58 696 52 2703	59.29 172.44 463.46 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 30 7.75 2.45 5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	38 @ 5' Each 38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No	2667 7169 618 6618 369 369 703 369 369 369 53 703 464 120 38 77 58 696 52 2703	172.44 463.46 39.93 23.83 23.83 23.83 23.83 23.83 3.42 23.83 3.42 4.94 4.04 30 7.75 2.45 5 5 3.74	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	38 @ 5' Each N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Exterior: 4 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tu	7169 618 369 369 703 369 369 369 53 76 63 464 120 38 77 58 696 52 52	463.46 39.93 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 4.5	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	618 618 369 703 369 369 369 53 76 63 464 120 38 77 58 696 52 703	39.93 39.93 23.83 23.83 23.83 23.83 23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	618 369 703 369 369 369 53 76 63 464 120 38 77 58 696 52 2703	39.93 23.83 23.83 45.42 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	369 369 703 369 369 53 76 63 464 120 38 77 58 696 52 703	23.83 23.83 45.42 23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	369 703 369 369 53 76 63 464 120 38 77 58 696 52 703	23.83 45.42 23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	703 703 369 369 53 76 63 464 120 38 77 58 696 52 703	45.42 23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	369 369 53 76 63 464 120 38 77 58 696 52 703	23.83 23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	369 53 76 63 464 120 38 77 58 696 52 703	23.83 3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	53 76 63 464 120 38 77 58 696 52 703	3.42 4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	76 63 464 120 38 77 58 696 52 703	4.94 4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior Exterior	N/A N/A N/A N/A	\$145.00/SF \$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	63 464 120 38 77 58 696 52 703	4.04 30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior Exterior	N/A N/A N/A	\$145.00/SF \$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	464 120 38 77 58 696 52 703	30 7.75 2.45 5 3.74 45	Exterior Exterior Exterior	N/A N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	120 38 77 58 696 52 703	7.75 2.45 5 3.74 45	Exterior Exterior	N/A	+=
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	38 77 58 696 52 703	2.45 5 3.74 45	Exterior		\$145.00/SE
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	77 58 696 52 703	2.45 5 3.74 45	exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	58 696 52 703	3.74 45	Exterior	N/A	\$145.00/SE
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	696 52 703	45	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	52	40	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2 Curtain Wall: Glazing No Tubes 2	703	2.69	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	///.3	45.42	Exterior		\$145.00/SF
Total	Cultain wan. Giazing No Tubes 2	52	40.42	Exterior		\$145.00/SF
Total	Curtain Wall: Clazing No Tubos 2		3.42	Exterior	N/A	\$145.00/SF
Total	Curtain Wall, Glazing No Tubes 2	70	4.54	Exterior		\$145.00/SF
Total	Curtain Wall, Glazing No Tubes 2	30	2.43	Exterior		\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	73	4.02	Exterior		\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior		\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	090	40	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	51	3.03	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	33	5.45	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	140	9.41	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	55	3.43	Exterior		\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	33	5.45	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	140	9.41	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2		3.43	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	03	4.04	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	404	30	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2	120	7.74	Exterior	N/A	\$145.00/SF
	Exterior: 34	8009	518.39	Cardon	N/A	\$145.00/S5
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	/0	Garden	N/A	\$145.00/SF
lotal	Garden: 4	4331	280			A
	Curtain Wall: Glazing No Tubes 3	115	7.4	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	115	7.4	Exterior	N/A	\$145.00/SF
Iotal	Exterior: 2	229	14.81			
	Quete in Multi Charle This is	30	1.91	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	1.91	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30	1.94	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30	1.91	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension	20	1.91	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension Curtain Wall: Shade Extension	50	1.91	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30	1.94	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30		Exterior	56 @ 10' Each	
Total	Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30 30 30 30	1.94			
rotals	Curtain Wall: Shade Extension Curtain Wall: Shade Extension	30 30 30 30 237	1.94 15.35			As an ac los
	Curtain Wall: Shade Extension Curtain Wall: Shade Extension: 8 Curtain Wall	30 30 30 30 237 21749	1.94 15.35 1406.66			\$145.00/SF

	Floor 4					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 4	1862	130	Exterior	21 @ 5' Each	\$145.00/SF
Total	Exterior: 1	1862	130			
	Curtain Wall: Glazing Ceramic Tubes	858	59.93	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	858	59.93	Exterior	38 @ 5' Each	\$145.00/SF
Total	Exterior: 2	1717	119.86			
	Curtain Wall: Glazing No Tubes 2	572	39.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	572	39.93	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	352	24.57	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	352	24.57	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	650	45.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	352	24.57	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	352	24.57	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	49	3.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	71	4.94	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	373	26.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	35	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	645	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	48	3.36	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	650	45.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	49	3.42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	71	4.94	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	373	26.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	35	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	645	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	47	3.3	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	127	8.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	127	8.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	2470	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	2470	172.44	Exterior	N/A	\$145.00/SF
Total	Exterior: 34	11986	836.84			
	Curtain Wall: Glazing No Tubes 2	1182	82.55	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1182	82.55	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1247	87.06	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1247	87.06	Garden	N/A	\$145.00/SF
Total	Garden: 4	4859	339.22			
	Curtain Wall: Glazing No Tubes 3	106	7.4	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	106	7.4	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	81	5.67	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	81	5.67	Exterior	N/A	\$145.00/SF
Total	Exterior: 4	374	26.14			
	Curtain Wall: Shade Extension	32	2.25	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	32	2.25	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	32	2.25	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	32	2.25	Exterior	56 @ 10' Each	
Total	Exterior: 4	129	9			
Totals	Curtain Wall	20798	_			\$145.00/SF
	Ceramic Tubes		Total #	1946	5' Lengths	\$20 Each

	Floors 5-27 / 29-50					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing Ceramic Tubes	815	59.29		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	1650	120		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	1650	120		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	815	59.29		33 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes: 4	4931	358.58	72		
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Full: 4	275	20			
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes: 8	3551	258.25			
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.94		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.23		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.94		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.23		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2: 12	865	62.92			
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
Total	Curtain Wall: Shade Extension: 4	106	7.65			
Totals	Curtain Wall	9622	699.75			\$145.00/SF
	Ceramic Tubes		Total #	2924	5' Lengths	\$20 Each
Tower	Totals				_	
	Curtain Wall	432990	31488.75			\$145.00/SF
	Ceramic Tubes	Typical Fl	oors Total	131580	5' Lengths	\$20 Each

	Floors 28/51	=	Twice H	leight of (Other Towe	er Floors
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing Ceramic Tubes Full	815	59.29		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	1650	120		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	1650	120		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	815	59.29		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Full: 8	5206	378.58	10412		
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	275	20		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	613	44.56		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes: 8	3551	258.25	7102		
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.94		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.23		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	62	4.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.94		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.23		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	98	7.15		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2: 12	865	62.92	1730		
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	1.91		48 @ 10' Each	
Total	Curtain Wall: Shade Extension: 4	106	7.65			
Totals	Curtain Wall	9622	699.75			\$145.00/SF
	Ceramic Tubes		Total #	3500	5' Lengths	\$20 Each
Mecha	inical Floor Totals					
	Curtain Wall	19244		38488		\$145.00/SF
	Ceramic Tubes	Both Fl	oors Total	7000	5' Lengths	\$20 Each
		то	TAIS			
	Curtain Wall	555236	Sa. Ft. =			\$ 80,509,220.00
	Ceramic Bods	755910	L.F. =	151182	5' Lengths =	\$ 3,023,640,00
					Total	\$ 83,532,860.00

Figure 295: Detailed Corner Change Curtain Wall Take-off

	Corner Cha	ange Curta	in Wall	Take-of	f	
	Floor 1					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing No Tubes	4742	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	4742	172.44	Exterior	N/A	\$145.00/SF
Total	Exterior: 2	9484	344.88			
	Curtain Wall: Glazing No Tubes 2	4400	160	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	112	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	825	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	213	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	137	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	103	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1238	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	92	3.36	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	259	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1939	70.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	112	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	825	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	213	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	137	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	103	3.74	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	1238	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	92	3.36	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	259	9.41	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	70	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	413	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1196	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	347	12 63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	413	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	9/12	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	/12	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1196	/3.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	347	12.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	/12	12.05	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	942	24.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	/15	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	45	1.05	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	40	1.05	Exterior	N/A	\$145.00/5F
	Curtain Wall: Glazing No Tubes 2	44	1.0	Exterior	N/A	\$1/5 00/5F
Total	Exterior: 20	21520	792.05	Exterior	IN/A	\$143.00/SF
rotar	Curtain Wall: Glazing No Tubor 2	1025	782.90	Garden	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	70	Garden	N/A N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1925	/0	Garden	N/A	\$145.00/SF
Total	Cordon: 4	1925	/0	Garden	N/A	\$145.00/SF
rotar	Garden: 4	//00	280	Futoring	N1/A	6145 00/05
	Curtain Wall: Glazing No Tubes 3	204	7.4	Exterior	N/A	\$145.00/SF
T-1 1	Curtain Wall: Glazing No Tubes 3	204	7.4	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 3: 2	407	14.81			hear onlar
Iotals		39120	1422.65			\$145.00/SF
	Ceramic Tubes	N/A	N/A			

	Floor 2					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 2	2166	140	Exterior	36 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2166	140		2	
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	963	70	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	963	70	Exterior	38 @ 5' Each	\$145.00/SF
Total	Exterior: 4	7260	484.88			
	Curtain Wall: Glazing No Tubes 2	155	10	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	155	10	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	63	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	77	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	52	3.69	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	75	4.82	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	51	3.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	63	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	673	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	195	12.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	673	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	196	12.64	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	23	1.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	23	1.5	Exterior	N/A	\$145.00/SF
Total	Exterior: 38	7768	502.78			
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
Total	Garden: 4	4331	280		-	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	- 56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension: 8	237	80			
Total						
Total Totals	Curtain Wall	21525	1407.66			\$145.00/SF

	Floor 3					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 3	2166	140	Exterior	36 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2166	140		_	
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	2667	172.44	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	963	70	Exterior	38 @ 5' Fach	\$145.00/SE
	Curtain Wall: Glazing Ceramic Tubes	963	70	Exterior	38 @ 5' Each	\$145.00/SE
Total	Exterior: 4	7260	181 88	Exterior	So @ S Euch	ç1-0.00/01
Total	Curtain Wall: Glazing No Tubes 2	155	10	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	155	10	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing No Tubes 2	133	10	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing No Tubes 2	05	4.00	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	404	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	77	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	52	3.69	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	75	4.82	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	51	3.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.43	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	63	4.08	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Tubes 2	/6/	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	120	7 74	Exterior	N/A	\$145.00/SE
	Curtain Wall, Glazing No Tubes 2	120	1.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	13	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	0/3	45.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	195	12.03	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	673	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	196	12.64	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	23	1.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	23	1.5	Exterior	N/A	\$145.00/SF
Total	Exterior: 38	7768	502.78			
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1083	70	Garden	N/A	\$145.00/SF
Total	Garden: 4	4331	280		-	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	30	10	Exterior	56 @ 10' Fach	
	Curtain Wall: Shade Extension	50	10	Exterior	56 @ 10' Fach	
	Curtain Wall: Shade Extension	20	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	20	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	20	10	Exterior	56 @ 10' Each	
	Curtain Wall, Shada Extension	30	10	Exterior	56 @ 10 Each	
Total	Curtain Wall: Shade Extension	30	10	exterior	ാര ര്ര IO Each	
Tetel	Curtain Wall: Shade Extension: 8	23/	08			taar oolor
rotais	Curtain Wall	21525	1407.66		FLL and th	\$145.00/SF
	Ceramic Tubes		Iotal #	5552	5" Lengths	\$20 Each

	Floor 4					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 4	2005	140	Exterior	21 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2005	140			
	Curtain Wall: Glazing Ceramic Tubes	1003	70	Exterior	38 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	1003	70	Exterior	38 @ 5' Each	\$145.00/SF
Total	Exterior: 2	2006	140			
	Curtain Wall: Glazing No Tubes 2	180	12.53	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	373	26.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	35	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	645	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	48	3.36	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	180	12.53	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	58	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	373	26.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	53	3.72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	35	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	54	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	645	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	47	3.3	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	127	8.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	127	8.83	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	43	2.97	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	2470	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	2470	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	143	10	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	143	10	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	215	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	622	43.46	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	215	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	491	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	215	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	622	43.46	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	215	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	491	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	24	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	24	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	21	1.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	21	1.5	Exterior	N/A	\$145.00/SF
Total	Exterior: 38	11719	817.92			
	Curtain Wall: Glazing No Tubes 2	1182	82.55	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1182	82.55	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1247	87.06	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	1247	87.06	Garden	N/A	\$145.00/SF
Total	Garden: 4	4858	339.22			
	Curtain Wall: Glazing No Tubes 3	81	5.67	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 3	81	5.67	Exterior	N/A	\$145.00/SF
Total	Exterior: 2	162	11.34			
	Curtain Wall: Shade Extension	32	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	32	10	Exterior	56 @ 10' Each	
	Curtain Wall: Shade Extension	32	10	Exterior	56 @ 10' Fach	
	Curtain Wall: Shade Extension	32	10	Exterior	56 @ 10' Fach	
Total	Exterior: 4	128	40		and a second	
		120	-+0			
Totale	Curtain Wall	20750				5145.00/SE

	Floors 5-27 / 29-50					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing Ceramic Tubes	1788	130		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	963	70		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	963	70		33 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes	1788	130		33 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes: 4	5502	400	72		
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Ceramic Tubes Full: 4	276	20			
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes: 12	3768	274			
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Tubes 2: 4	84	6			
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each	
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each	
Total	Curtain Wall: Shade Extension: 4	104	40			
Totals	Curtain Wall	9630	700			\$145.00/SF
	Ceramic Tubes		Total #	3188	5' Lengths	\$20 Each
Tower	Totals					
	Curtain Wall	433350	31500			\$145.00/SF
	Ceramic Tubes	Typical F	oors Total	143460	5' Lengths	\$20 Each
					0	

	Floors 28/51	=	= Twice Height of Other Tower Floors				
	Туре	Area	Length	Comment	Rods Per	Price	
	Curtain Wall: Glazing Ceramic Tubes Full	1788	130		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	963	70		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	963	70		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	1788	130		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Ceramic Tubes Full	69	5		41 @ 5' Each	\$145.00/SF	
Total	Curtain Wall: Glazing Ceramic Tubes Full: 8	5778	420	11556			
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	598	43.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	138	10		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes	598	43.5				
	Curtain Wall: Glazing No Tubes	138	10				
	Curtain Wall: Glazing No Tubes	206	15				
	Curtain Wall: Glazing No Tubes	598	43.5				
Total	Curtain Wall: Glazing No Tubes: 12	3768	274	7536			
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing No Tubes 2	21	1.5		N/A	\$145.00/SF	
Total	Curtain Wall: Glazing No Tubes 2: 4	84	6	168			
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each		
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each		
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each		
	Curtain Wall: Shade Extension	26	10		48 @ 10' Each		
Total	Curtain Wall: Shade Extension: 4	104	40				
Totals	Curtain Wall	9630	700			\$145.00/SF	
	Ceramic Tubes		Total #	3664	5' Lengths	\$20 Each	
Mecha	inical Floor Totals						
	Curtain Wall	19260		38520		\$145.00/SF	
	Ceramic Tubes	Both Fl	oors Total	7328	5' Lengths	\$20 Each	
		то	TALS				
	Curtain Wall	555530	Sq. Ft. =			\$ 80,551,850.00	
	Ceramic Rods	792200	L.F. =	158440	5' Lengths =	\$ 3,168.800.00	
					Total	\$83,720,650.00	

Figure 296: Detailed Core and Corner Change Curtain Wall with Louvers Take-offs

	Corner Chang	e Louver Cur	tain Wa	ll Take-o	ff	
	Floor 1					
	Туре	Area	Length	Comment	Louvers Per	Price
	Curtain Wall: Glazing No Frit	4742	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit	4742	172.44	Exterior	N/A	\$145.00/SF
Total	Exterior: 2	9484	344.88		,	<i>, , , , , , , , , ,</i>
	Curtain Wall: Glazing No Frit 2	4400	160	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	112	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	825	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	213	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	137	5	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	103	3.74	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	1238	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	92	3.36	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	94	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	259	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	94	3.43	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	1939	70.5	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	112	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	825	30	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	213	7.75	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing No Frit 2	67	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	137	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	103	3 74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	103	./4	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	92	2 26	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	94	3.30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	259	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	94	2 / 2	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	1025	70	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	1525	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	1196	12.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	347	12.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	/12	12.05	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	9/2	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	/13	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	1196	12.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	247	12 62	Exterior	Ν/Δ	\$145.00/SF
	Curtain Wall: Glazing No Frit 2		12.05	Exterior	N/A	\$145.00/5
	Curtain Wall: Glazing No Frit 2	415	24.25	Exterior	N/A	\$145.00/5
	Curtain Wall: Glazing No Frit 2	342	1 65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing No Frit 2	40	1.00	Exterior	N/A	\$145.00/5
	Curtain Wall: Glazing No Frit 2	43	1.05	Exterior	N/A	\$145.00/5F
	Curtain Wall: Glazing No Frit 2	44	1.0	Exterior	N/A	\$145.00/3F
Total	Exterior: 20	21520	792.06	LALEHOI	N/A	Ş145.00/31
Total	Curtain Wall: Glazing Garden No Frit	1025	702.90	Gardon	N/A	\$145.00/SE
	Curtain Wall, Glazing Garden No Frit	1925	70	Gardon	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden No Frit	1925	70	Gardon	N/A	\$145.00/SF
	Curtain Wall: Glazing Cardon No Frit	1925	70	Garden	N/A	\$145.00/SF
Total	Cardon: 4	1925	70	Garuen	N/A	9140.00/ SF
rotar	Garueri: 4 Curtain Wally Clasing No Frit 3	//00	280	Exterior	N/A	¢145.00/00
	Curtain Wall, Glazing No Frit 3	204	7.4	Exterior	N/A	\$145.00/SF
Total	Curtain Wall: Glazing No Frit 3	204	1.4	Exterior	N/A	\$143.00/SF
Totale	Curtain Wall	407	14.61			\$1/E 00/SE
rotais		29120	1422.05			91-10-00/ SF
	Louvers	N/A	N/A			

	Floor 2					
	Туре	Area	Length	Comment	Louvers Per	Price
	Curtain Wall: East Wall 2	2480	160	Exterior	8 @ 5' Each	\$145.00/SF
otal	Exterior: 1	2480	160			
	Curtain Wall: Louvers	2667	172.44	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Louvers	2667	172.44	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Louvers	963	70	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Louvers	963	70	Exterior	8 @ 5' Each	\$145.00/SF
Fotal	Exterior: 4	7260	484.88			
	Curtain Wall: Glazing Frit Only	63	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	120	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	77	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	52	3.69	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	75	4.82	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	696	45	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only	51	3 63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	53	3 43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	52	2 /2	Exterior	N/A	\$145.00/51
	Curtain Wall: Glazing Frit Only	53	2.43	Exterior	N/A	\$145.00/SE
	Curtain Wall, Glazing Frit Only	146	0.41	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing Frit Only	140	2.41	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing Frit Only	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	05	4.00	Exterior	N/A	\$145.00/SF
	Curtain Wall, Glazing Frit Only	404	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	120	1.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	6/3	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	195	12.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	673	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	196	12.64	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	23	1.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	23	1.5	Exterior	N/A	\$145.00/SF
otal	Exterior: 38	7458	482.78			
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
otal	Garden: 4	4331	280			
otals	Curtain Wall	21529	1407.66			\$145.00/SF
	Louvers		Total #	1032	5' Lengths	\$350 Each

	Floor 3					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 3	2480	160	Exterior	8 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2480	160			
	Curtain Wall: Glazing Louvers	2667	172.44	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	2667	172.44	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	963	70	Exterior	8 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	963	70	Exterior	8 @ 5' Each	\$145.00/SF
Total	Exterior: 4	7260	484.88			
	Curtain Wall: Glazing Frit Only	63	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	464	30	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	120	7.75	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	77	5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	52	3.69	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	38	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	75	4.82	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	58	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	696	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	51	3.63	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	53	3.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	146	9.41	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only	53	3 43	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only	53	3 43	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only	146	9.41	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	53	3 / 3	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	63	4.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	464	-4.00	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	120	7 74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	120	1.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	42.5	Exterior		\$145.00/SF
	Curtain Wall: Glazing Frit Only	105	45.3	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	195	12.03	Exterior	IN/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	24.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	330	34.23	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	42.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	0/3	43.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	190	12.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	232	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	530	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	25	1.65	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	23	1.5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	23	1.5	Exterior	N/A	\$145.00/SF
otal	Exterior: 38	7458	482.78	. .		Å4.45.00/
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1083	70	Garden	N/A	\$145.00/SF
Total	Garden: 4	4331	280			
Fotals	Curtain Wall	21529	1407.66			\$145.00/SF
	Louvers		Total #	1032	5' Lengths	\$350 Each

	Floor 4					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: East Wall 4	2293	160	Exterior	7.5 @ 5' Each	\$145.00/SF
Total	Exterior: 1	2293	160			
	Curtain Wall: Glazing Louvers	1003	70	Exterior	7.5 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	1003	70	Exterior	7.5 @ 5' Each	\$145.00/SF
Total	Exterior: 2	2006	140			
	Curtain Wall: Glazing Frit Only 2	180	12.53	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	58	4.04	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	373	26.08	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	53	3.72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	35	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	54	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	645	45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	48	3.36	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only 2	180	12.53	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only 2	-58	4.04	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only 2	373	26.08	Exterior	N/A	\$145.00/SE
	Curtain Wall: Glazing Frit Only 2	575	3 72	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	25	2.45	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	50	2.43	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	645	3.74	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	43	-+5	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	47	2.07	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	43	2.57	Exterior		\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	127	0.03	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	43	2.57	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	43	2.57	Exterior		\$145.00/SF
	Curtain Wall, Glazing Frit Only 2	127	0.00	Exterior		\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	43	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	2470	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	2470	172.44	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	215	13	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	022	45.40	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	215	24.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	451	54.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	215	10 42	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	022	43.40	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	215	15	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	491	34.25	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	24	1.65	Exterior	IN/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	24	1.65	Exterior	IN/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	21	1.5	Exterior	IN/A	\$145.00/SF
Tatel	Curtain Wall: Glazing Frit Only 2	21	1.5	Exterior	N/A	\$145.00/SF
Total	Exterior: 38	11433	/97.92	Candon	NI / A	6145 00/05
	Curtain Wall: Glazing Garden Frit Only	1182	82.55	Garden	IN/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1182	82.55	Garden	N/A	\$145.00/SF
	Curtain Wall: Glazing Garden Frit Only	1247	87.06	Garden	N/A	\$145.00/SF
T-4-1	Curtain wall: Glazing Garden Frit Only	1247	87.06	Garden	N/A	\$145.00/SF
Iotal	Garden: 4	4858	339.22			A
	Curtain Wall: Glazing Frit Only	81	5.67	Exterior	N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	81	5.67	Exterior	N/A	\$145.00/SF
Iotal	Exterior: 2	162	11.34			As an and r-
rotals	Curtain Wall	20752				\$145.00/SF
	Louvers		Total #	450	5' Lengths	\$350 Each

	Floors 28/51	=	Twice Height of Other Tower Floors				
	Туре	Area	Length	Comment	Rods Per	Price	
	Curtain Wall: Glazing Louvers 2	4125	150		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	1925	70		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	1925	70		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	4125	150		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	137.5	5		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	137.5	5		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	137.5	5		7 @ 5' Each	\$145.00/SF	
	Curtain Wall: Glazing Louvers 2	137.5	5		7 @ 5' Each	\$145.00/SF	
Total	Curtain Wall: Glazing Louvers 2: 8	12650	460	25300			
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only	598	43.5				
	Curtain Wall: Glazing Frit Only	206	15				
	Curtain Wall: Glazing Frit Only	598	43.5				
Total	Curtain Wall: Glazing Frit Only: 12	3216	234	6432			
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF	
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF	
Total	Curtain Wall: Glazing Frit Only 2: 4	84	6	168			
Totals	Curtain Wall	15950	700			\$145.00/SF	
	Louvers		Total #	1288	5' Lengths	\$350 Each	
Mecha	anical Floor Totals						
	Curtain Wall	31900		2576		\$145.00/SF	
	Louvers	Both F	loors Total	2576	5' Lengths	\$350/\$612.50 Each	

	Floors 5-27 / 29-50					
	Туре	Area	Length	Comment	Rods Per	Price
	Curtain Wall: Glazing Louvers	2062.5	150		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	962.5	70		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	962.5	70		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers	2062.5	150		7 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Louvers: 4	6050	440	72		
	Curtain Wall: Glazing Louvers 2	69	5		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers 2	69	5		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers 2	69	5		7 @ 5' Each	\$145.00/SF
	Curtain Wall: Glazing Louvers 2	69	5		7 @ 5' Each	\$145.00/SF
Total	Curtain Wall: Glazing Louvers 2: 4	276	20			
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	206	15		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only	598	43.5		N/A	\$145.00/SF
Total	Curtain Wall: Glazing Frit Only: 12	3216	234			
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF
	Curtain Wall: Glazing Frit Only 2	21	1.5		N/A	\$145.00/SF
Total	Curtain Wall: Glazing Frit Only 2: 4	84	6			
Totals	Curtain Wall	9626	700			\$145.00/SF
	Louvers		Total #	644	5' Lengths	\$350 Each
Tower	Totals					
	Curtain Wall	433170	31500			\$145.00/SF
	Louvers	Typical F	loors Total	28980	5' Lengths	\$350/\$612.50 Each

	Louver Area	8.75	S.F. per 5' l	ength		
	Louver Cost	\$350.00	per 5' lengt	h		
	ΤΟΤΑ	LS	_			
Curtain Wall	568000	Sq. Ft. =			\$	82,360,000.0
Louvers	165190	L.F. =	33038	5' Lengths	\$	11,563,300.0
				Total	\$	93,923,300.0
	P.V. Louver Area	8.75	S.F. per 5' l	ength		
	P.V. Louver Cost	\$612.50	per 5' lengt	h; 50% P.V. Co	verage	
	ΤΟΤΑ	LS				
Curtain Wall	568000	Sq. Ft. =	:		\$	82,360,000.0
Louvers	145290	L.F. =	29058	5' Lengths	\$	10,170,300.0
P.V. Louvers	19900	L.F. =	3980	5' Lengths	\$	2,437,750.0
				Total	\$	94,968,050.0
Operable Window Louver		5	S.F. per 5' I	ength		
Operable Window Louver Cost		\$215.00	por S E of	r giazing panel		
		Ş213.00	perstrong	siazing paner		
	ΤΟΤΑ	LS	_			
Curtain Wall	532112.5	Sq. Ft. =			\$	77,156,312.
Operable Curtian Wall	35887.5	Sq. Ft. =			\$	7,715,812.
				Total	\$	84,872,125.0
	ΤΟΤΑ	LS		1		
Curtain Wall	532112.5	Sq. Ft. =			\$	77,156,312.
Operable Curtian Wall	35887.5	Sq. Ft. =			\$	7,715,812.
Louvers	145290	L.F. =	29058	5' Lengths	\$	10,170,300.
P.V. Louvers	19900	L.F. =	3980	5' Lengths	\$	2,437,750.
				Total	\$	97,480,175.0
				Original	\$	83,532,860.0
				Difference	\$	13,947,315.0

Tenant Layout Areas and Detailed Area Schedules

Figure 297: Original Floors: 5-17



NYT 05-17 Ori	ginal A	rea Schedule	Totals				
Name	Area	Area Type	Nar	ne	Area (S.F.)	Area Type	
Dead Snace			Dear	Space	629	Not Rentable	
Structure			Flev	ator Lobby	776	Not Rentable	
Steel Framing	37	Structure	Elev	ator Shaft	2177	Not Rentable	
Steel Framing	40	Structure	Offic	e	18872	Rentable	
Steel Framing	38	Structure	Rest	room	581	Not Rentable	
Steel Framing	37	Structure	Stair	wav	435	Not Rentable	
Steel Framing	30	Structure	Sup	port	413	Rentable	
Steel Framing	216	Structure	Utili	ty Space	1366	Not Rentable	
Steel Framing	33	Structure	Tota	1	25249	SF	
Steel Framing	6	Structure					
Steel Framing	192	Structure	Rent	able Area	19285	SF	
Structure: 9	629	ou de la re	Not	Rentable Area	5964	SF	
Dead Space: 9	629		Tota		25249	SE	
Elevator Lobby				-			
Building Common Area				Average	Pental Drice (9	ner S E ner N	(onth)
Bunuing Common Area	770	Duilding Common Area	<u> </u>	Average		5 per 3.r. per N	
Elevator Lobby	7/0	Building Common Area		2007	2008	2009	AVG.
Flowates Lobbus 1	770		2 6	1 026 722 40	\$ 72.57	\$ 55.52	\$ 00.38
Elevator Lobby: 1	//0		ş	1,028,755.40	\$ 1,407,228.45	\$ 1,070,703.20	\$ 1,108,221.02
Elevator Shart							
Flowator Shaft	526	Major Vortical Dopotration					
Elevator Shaft	5/13	Major Vertical Penetration					
Elevator Shaft	554	Major Vertical Penetration					
Elevator Shaft	544	Major Vertical Penetration					
Major Vertical Penetration: 4	2177						
Elevator Shaft: 4	2177						
Rentable							
Office Area							
Office	18872	Office Area					
Office Area: 1	18872						
Rentable: 1	18872	2					
Restroom							
Building Common Area							
Men's Restroom	285	Building Common Area					
Women's Restroom	296	Building Common Area					
Building Common Area: 2	581						
Stainway	201						
Major Vertical Repetration							
Emergency Stair	222	Major Vertical Penetration					
Emergency Stair	213	Major Vertical Penetration					
Major Vertical Penetration: 2	435						
Stairway: 2	435						
Support							
Building Common Area							
Support Space	222	Building Common Area					
Support Space	191	Building Common Area					
Building Common Area: 2	413						
Support: 2	413						
Utility Space							
Mechanical Room	600	Building Common Area					
Electrical Room 1	023	Building Common Area					
A.V. Closet	16	Building Common Area					
F.B.S. Closet	19	Building Common Area					
Electrical Room 2	111	Building Common Area					
Women's Room Pipe Chase	86	Building Common Area					
Men's Room Pipe Chase	91	Building Common Area					
Building Common Area: 7	1039						
Major Vertical Penetration							
Duct Riser Space	127	Major Vertical Penetration					
Duct Riser Space	31	Major Vertical Penetration					
Riser Closet	19	Major Vertical Penetration					
Mechanical Room Exhaust	5	Major Vertical Penetration					
Bathroom Duct Riser Space	33	Major Vertical Penetration					
FURC Electrical Riser Space	46	Major Vertical Penetration					
Purchelectrical Riser Space	5/	Major Vertical Penetration					
Major Vertical Penetration: 9	327	major verticar Penetration					
Utility Space: 15	1366						
Grand total	25249						

Figure 298: Original Floors: 18-27



NYT 18-27 Core & Cor	ner Ch	ange Area Schedule	Totals				
Name	Area	Area Type	Name		Area (S.F.)	Area Type	
Dead Space			Dead Space		679	Not Rentable	
Structure			Elevator Lobb	v	795	Not Rentable	
Steel Framing	58	Structure	Elevator Shaf	t .	1688	Not Rentable	
Steel Framing	209	Structure	Office	-	18693	Rentable	
Steel Framing	52	Structure	Restroom		475	Not Rentable	
Steel Framing	37	Structure	Stairway		397	Not Rentable	
Steel Framing	25	Structure	Support		985	Rentable	
Steel Framing	37	Structure	Utility Space		1397	Not Rentable	
Stool Framing	20	Structure	Total		25109	CE CE	
Stool Framing	20	Structure	Total		20100	51	
Steel Framing	220	Structure	Dentella Ano	_	10678	сг.	
Steel Framing	C 70	Structure	Net Dentable Area	a 	19078	5F	
Structure: 9	679		NOT RENTABLE	Area	5431	SF	
Dead Space: 9	679		Iotal		25109	5F	
Elevator Lobby							
Building Common Area			Ave	rage	Rental Price (S	per S.F. per N	/lonth)
Elevator Lobby	795	Building Common Area		2007	2008	2009	AVG.
Building Common Area: 1	795		\$	53.24	\$ 72.97	\$ 55.52	\$ 60.58
Elevator Lobby: 1	795		\$ 1,047,6	56.72	\$ 1,435,903.66	\$ 1,092,522.56	\$ 1,192,027.65
Elevator Shaft							
Major Vertical Penetration							
Elevator Shaft	306	Major Vertical Penetration					
Elevator Shaft	296	Major Vertical Penetration					
Elevator Shaft	564	Major Vertical Penetration					
Elevator Shaft	522	Major Vertical Penetration					
Major Vertical Penetration: 4	1688						
Elevator Shaft: 4	1688						
Rentable							
Office Area							
Office	18693	Office Area					
Office Area: 1	18693						
Rentable: 1	18693						
Restroom							
Building Common Area							
Women's Restroom	261	Building Common Area					
Men's Restroom	214	Building Common Area					
Building Common Area: 2	4/5						
Restroom: 2	4/5						
Stairway							
Major vertical Penetration	200	Major Vortical Depotration					
Emergency Stair	200	Major Vertical Penetration					
Major Vertical Penetration: 2	307	Major Vertical Perietration					
Stainway: 2	307						
Support	357						
Building Common Area							
Support Space	82	Building Common Area					
Support Space	198	Building Common Area					
Support Space	223	Building Common Area					
Support Space	482	Building Common Area					
Building Common Area: 4	985	-					
Support: 4	985						
Utility Space							
Building Common Area							
Shared Restroom Pipe Chase	23	Building Common Area					
Shared Restroom Pipe Chase	17	Building Common Area					
Women's Room Pipe Chase	40	Building Common Area					
Electrical Room 1	99	Building Common Area					
Men's Room Pipe Chase	35	Building Common Area					
Mechanical Room	629	Building Common Area					
A.V. Closet	16	Building Common Area					
Electrical Room 2	121	Building Common Area					
F.B.S. Closet	14	Building Common Area					
Building Common Area: 9	994						
Major Vertical Penetration		Martin Manhart Martin Color					
Duct Riser Space	27	Major Vertical Penetration					
Duct Riser Space	37	Major Vertical Penetration					
Duct Riser Space	30	Major Vertical Penetration					
Duct Riser Space	28	Major Vertical Penetration					
ECRC Electrical Ricor Space	138	Major Vertical Penetration					
Riser Closet	10	Major Vertical Penetration					
Mechanical Room Exhaust	18	Major Vertical Penetration					
ECRC Electrical Ricor Space	5	Major Vertical Penetration					
Duct Riser Space	4/	Major Vertical Penetration					
Major Vertical Penetration: 10	103	major vertical Perietration					
Utility Space: 19	1307						
Grand total: 42	25100						
Granu totan 42	22103						

BARBEN | CASEY | DUBOWSKI | MILLER

Figure 299: Original Floors: 29-38



NameArea (S.F.)Area (S.F.)<	FCRC 29-38 Or	CRC 29-38 Original Area Schedule			Totals				
Dead Space isolate isolate isolate Steel Franing 145 Structure Offee 1208 Note Renable Steel Franing 20 Structure Offee 1208 Note Renable Steel Franing 22 Structure Extroom 3520 Note Renable Steel Franing 42 Structure Extroom 3520 Note Renable Steel Franing 30 Structure Extroom 3520 Note Renable Steel Franing 30 Structure Total 22338 Structure Steel Franing 30 Structure Total 22338 Structure Steel Franing 30 Structure Total 2238 Structure Dadd Space: 7 30 Total 2238 Structure Total 2238 Structure Building Common Area 1200 Aversame Aversame 2200 Aversame Evators Shaft 315 Major Vertical Prenetation 1003,452.24 \$1,103	Name	Area	Area Type		Nam	ne	Area (S.F.)	Area Type	
Sinuture Instruction Instruction Instruction Seel Fraining 20 Structure Beitvers Pahr 128 Notemale Seel Fraining 20 Structure Beitvers Pahr 128 Notemale Steel Fraining 20 Structure Beitvers 000 Not Bentable Steel Fraining 20 Structure Baitvers 000 Not Bentable Structure 300 Bentable Area 000 Not Bentable Structure 300 Bentable Area 000 Not Bentable Bentable Area 2000 Not Bentable 000 Not Bentable 000 Not Bentable Bentable Area 2000 Not Bentable 2000 Not Bentable 000 Not Bentable Bentable Area 2000 Not Bentable 2000 Not Bentable 000 Not Bentable Bentable Area 2000 Not Bentable 200 Not Bentable 000 Not Bentable Bentable Dentable	Dead Space				Dead	Space	350	Not Rentable	
Seel Framing Seel Fr	Structure				Eleva	tor Lobby	466	Not Rentable	
Steel Framing20 StructureOffice3004 BentableSteel Framing13 StructureStarvay405 Not BentableSteel Framing80 StructureUtility Space1339 Not BentableSteel Framing80 StructureUtility Space1339 Not BentableSteel Framing80 StructureUtility Space1339 Not BentableDead Space: 750Structure10142338 SpirStructure: 750Structure10182338 SpirBluiding Common AreaStructure200720082009AVGBluiding Common Area1018200720082009AVGBluiding Common Area1018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area1181018200720082009AVGBluiding Common Area11810181018101810181018Bluiding Common Area1181018101810181018Bluiding Common Area10181018101810181018Bluiding Common Area10181018<	Steel Framing	145	Structure		Eleva	tor Shaft	1298	Not Rentable	
Steel Framing22 StructureRetroom322 Not RentableSteel Framing42 StructureSupport1642 RentableSteel Framing20 StructureTotal2338 StructureSteel Framing20 StructureTotal2338 StructureBevator tabby468 Building Common Area400 Rentable Area400 StructureBevator tabby468 Building Common Area2000 Structure2008 Zo00 AVOSteat Area7239 Structure55.52 Structure5.50.2 StructureBevator tably468 Building Common Area2000 Structure2008 Zo00 StructureBevator table100 Structure2000 Structure2000 StructureBevator table21 Major Vertical Penetration5 5.14.2 Structure400 StructureBevator table123 Major Vertical Penetration100 Structure100 StructureBevator table128 Major Vertical Penetration100 Structure100 StructureB	Steel Framing	20	Structure		Offic	e	19084	Rentable	
Steel Faming15 StructureStarway403 kvt sternaleSteel Faming86 StructureUtility Space1339 kvt sternaleSteel Faming80 StructureUtility Space1339 kvt sternaleSteel Faming80 StructureImage: Structure12338 SpiceStructure: 750Structure12338 SpiceDed Space: 7130Ner Bentale Area410 SrBuilding Common Area12538 SpiceStructure12538 SpiceBuilding Common Area4661200 20 208 StructureAvidBuilding Common Area466200 20 208 StructureAvidBuilding Common Area466200 20 208 Structure5 0.0.018Building Common Area466200 20 208 Structure5 0.0.018Building Common Area466200 20 208 StructureAvidBuilding Common Area466200 20 208 Structure5 0.0.018Building Common Area135 Major Vertical Penetration123 Structure5 1.103.07.02 StructureElevator Shaft213 Major Vertical Penetration124 Structure124 StructureElevator Shaft128 Major Vertical Penetration128 Structure128 StructureElevator Shaft128 Major Vertical Penetration128 Structure128 StructureGrifice Area109 Structure128 Major Vertical Penetration128 Structure128 StructureMajor Vertical Penetration128 Structure128 Structure128 Structure128 StructureBilding Common Area129 Structure128 Structure128	Steel Framing	22	Structure		Restr	oom	552	Not Rentable	
Site I Faming See I Faming See Faming See Training See Trai	Steel Framing	15	Structure		Stair	way	405	Not Rentable	
Steel FramingØ StructureUtility Space1.33 Not Returable (2007)Structure?30ContactContactContactDed Space?30Not Rentable Area2002SFBuilding Common AreaMore Rentable Area4400 SFContactBuilding Common Area466Not Rentable Area4400 SFBuilding Common Area466Contact20032009AVGBuilding Common Area466Contact20072008AVGBuilding Common Area466Contact20072008AVGBuilding Common Area466Contact20072008AVGBuilding Common Area466Contact20072008AVGBevator Shaft210 Mjor Vertical Penetration51,503,452.245,152,876.225,150,752.35,00.38Bevator Shaft210 Mjor Vertical Penetration11111Elevator Shaft210 Mjor Vertical Penetration1111Elevator Shaft210 Mjor Vertical Penetration1111Elevator Shaft210 Mjor Vertical Penetration1111Elevator Shaft210 Mjor Vertical Penetration1111Bevator Shaft1000 Vertical Penetration11111Bevator Shaft1000 Vertical Penetration11111Bevator Shaft1000 Vertical Penetration1111<	Steel Framing	42	Structure		Supp	ort	1642	Rentable	
Stel Framing 20 Structure Total 2235 SF Pood Space: 7 30 Rentable Area 20203 SF Bilding Common Area: Nort Rentable Area 20203 SF Building Common Area: Total 2333 SF Bilding Common Area: Average Rental Price (\$ per S.F. per Month) Elevator tobby: 466 2007 2008 Average Rental Price (\$ per S.F. per Month) Elevator Shaft 466 2007 2008 Average Rental Price (\$ per S.F. per Month) Elevator Shaft 315 Major Vertical Penetration \$ 5.3.3 \$ 1,03,492.24 \$ 1,150,492.22 \$ 1,150,707.92 \$ 1,255,511.99 Elevator Shaft 211 Major Vertical Penetration Elevator Shaft 211 Major Vertical Penetration </td <td>Steel Framing</td> <td>86</td> <td>Structure</td> <td></td> <td>Utilit</td> <td>y Space</td> <td>1339</td> <td>Not Rentable</td> <td></td>	Steel Framing	86	Structure		Utilit	y Space	1339	Not Rentable	
Structure: 7 350 Image: 800 (Second Second	Steel Framing	20	Structure		Total		25136	SF	
bad space? 30 V Rerable Area 2020 S ⁻ Elevator Lobby 466 Building Common Area 466 Suilding Common Area 466 Suilding Common Area 466 Suilding Common Area 466 V Common Area 477 Suite 466 V Common Area 478 Suite 478	Structure: 7	350							
Elevator LobbyImage: mage: marked sector lobbyAdding common AreaAdding common AreaBuilding common AreaAverage Rental Price (\$ per S.F. per Month)Building common AreaAverage Rental Price (\$ per S.F. per Month)Building Common Area\$ 1,103,452.24 \$ 5,152,376.22 \$ 1,255,511.99Bevator tobby: 146Bevator tobby: 140Bevator Shaft40.Mayor Vertical PenetrationElevator Shaft40.Mayor Vertical PenetrationElevator Shaft23.Major Vertical PenetrationElevator Shaft138Coffice Area1Office Area1Office Area1Office Area1Office Area1Office Area1Office Area1Building Common Area1<	Dead Space: 7	350			Rent	able Area	20726	SF	
Building Common Area Total 23136 \$'r Building Common Area Average Rental Price (\$ pers .F. per Month) Building Common Area 2009 Average Areat Price (\$ pers .F. per Month) Elevator tobby: 1 466 2007 2008 Average Areat Price (\$ pers .F. per Month) Elevator Shaft 5 5.3.24 \$ 1,532,376.22 \$ 1,053,070.52 \$ 1,255,511.99 Elevator Shaft 4313 Major Vertical Penetration \$ 1,103,452.24 \$ 1,512,376.22 \$ 1,103,070.52 \$ 1,255,511.99 Elevator Shaft 233 Major Vertical Penetration \$ 1,103,0452.24 \$ 1,512,376.22 \$ 1,103,070.52 \$ 1,255,511.99 Elevator Shaft 238 Major Vertical Penetration \$ 1,103,0452.24 \$ 1,512,376.22 \$ 1,013,412 \$ 1,103,412	Elevator Lobby				Not I	Rentable Area	4410	SF	
Elevator tobby 4466 Numerial Market	Building Common Area				Total		25136	SF	
Building common Area:1 466 Average Rental Price (\$ per S1, per Month)) Elevator tobly: \$ 5.324 \$ 7.297 \$ 5.552 \$ 6.058 Major Vertical Penetration \$ 1,103,452.24 \$ 1,512,762.22 \$ 1,512,777.32 \$ 1,255,511.99 Elevator Shaft 231 Major Vertical Penetration Image: Common Area:1 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,255,511.99 Elevator Shaft 231 Major Vertical Penetration Image: Common Area:1 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,255,511.99 Elevator Shaft 231 Major Vertical Penetration Image: Common Area:1 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,203,452.24 \$ 1,512,776.22 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,452.24 \$ 1,203,	Elevator Lobby	466	Building Common Area						
Elevator bah? Elevator bah?46020092	Building Common Area: 1	466				Average	Rental Price (\$	per S.F. per N	/lonth)
Elevator Shaft $$ 3.24$ $$ 7.27$ $$ 5.52$ $$ 0.038$ Bevator Shaft315 Major Vertical Penetration $$ 1,03,452.24$ $$ 1,512,376.22$ $$ 1,150,707.32$ $$ 1,255,511.99$ Elevator Shaft401 Major Vertical Penetration $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Elevator Shaft231 Major Vertical Penetration $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Elevator Shaft231 Major Vertical Penetration $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Billog Vertical Penetration $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Billog Common Area $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ Rentable: $$ 1 = 0 = 0$ $$ 1 = 0 = 0$ <td>Elevator Lobby: 1</td> <td>466</td> <td></td> <td></td> <td></td> <td>2007</td> <td>2008</td> <td>2009</td> <td>AVG.</td>	Elevator Lobby: 1	466				2007	2008	2009	AVG.
Major Vertical Penetration§1,103,452.24\$1,512,376.22\$1,150,707.32\$1,255,311.99Elevator Shaft401 Major Vertical Penetration <td< td=""><td>Elevator Shaft</td><td></td><td></td><td></td><td>\$</td><td>53.24</td><td>\$ 72.97</td><td>\$ 55.52</td><td>\$ 60.58</td></td<>	Elevator Shaft				\$	53.24	\$ 72.97	\$ 55.52	\$ 60.58
levator Shaft 315 Major Vertical Penetration elevator Shaft 231 Major Vertical Penetration	Major Vertical Penetration				\$	1,103,452.24	\$1,512,376.22	\$ 1,150,707.52	\$ 1,255,511.99
Elevator Shaft401. Major Vertical PenetrationElevator Shaft231. Major Vertical PenetrationBigor Vertical Penetration:Bevator Shaft:1298Bevator Shaft:1298RentableOffice AreaOffice AreaOffice AreaOffice AreaOffice AreaOffice AreaOffice AreaBuilding Common AreaRestroom276 Building Common AreaBuilding Common Area:Building Common AreaBuilding Common Area:Building Common AreaBuilding Common Area:Building Common AreaBuilding Common Area:Building Common AreaBuilding Common AreaBuilding Common AreaBuilding Common AreaStairway223 Major Vertical PenetrationBeregency Stair122 Major Vertical PenetrationBuilding Common AreaSupport Space122 Building Common AreaSupport Space125 Building Common AreaSupport Space124 Building Common AreaBuilding Common AreaBuilding Common AreaSupport Space115 Building Com	Elevator Shaft	315	Major Vertical Penetration						
Elevator Shaft231 Major Vertical PenetrationMajor Vertical Penetration:41298Major Vertical Penetration:41298Rentable1298Pentable:11298Office Area:119084Office Area:119084Building Common Area1000Building Common Area:21000Building Common Area:21000Support Stair122Building Common Area1000Building Common Area10000Building C	Elevator Shaft	401	Major Vertical Penetration						
Bevalor Shaft 231 Major Vertical Penetration Image Ve	Elevator Shaft	291	Major Vertical Penetration						
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levation shall. 4 128 1084 0ffice Area 10984 0f	Major Vertical Penetration: 4	1298							
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Restroom Image: setting in the set in the setting in the set in the s	Rentable: 1	19084							
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Building Common Area: 2 552 Restroom: 2 552 Stairway Image of the second se	Women's Restroom	276	Building Common Area						
Restroom: 2 552 Image: Constraint of the second of th	Building Common Area: 2	552							
Starway Image in the star in the	Restroom: 2	552							
Major Vertical PenetrationImage of StairEmergency Stair223 Major Vertical PenetrationImage of StairMajor Vertical Penetration:2405Image of StairSupportImage of StairImage of StairBuilding Common AreaImage of StairImage of StairSupport Space1525 Building Common AreaImage of StairBuilding Common Area:21642Image of StairSupport:21642Image of StairBuilding Common AreaImage of StairBuilding Common Area:21642Support:21642Utility SpaceImage of StairBuilding Common AreaImage of StairElectrical Room80 Building Common AreaElectrical Room 190 Building Common AreaElectrical Room Pipe Chase15 Building Common AreaMen's Room Pipe Chase15 Building Common AreaBuilding Common AreaImage of StairBuilding Common AreaImage of StairBui	Stairway Major Vortical Bonstration								
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Support Image: Common Area Image: Common Area Image: Common Area Support Space 117 Building Common Area Image: Common Area Building Common Area: 2 1642 Image: Common Area Image: Common Area Building Common Area: 2 1642 Image: Common Area Image: Common Area Building Common Area Image: Common Area Image: Common Area Image: Common Area Building Common Area Image: Common Area Image: Common Area Image: Common Area Mechanical Room 664 Building Common Area Image: Common Area Image: Common Area Electrical Room 1 90 Building Common Area Image: Common Area Image: Common Area Electrical Room 2 115 Building Common Area Image: Common Area Image: Common Area Men's Room Pipe Chase 155 Building Common Area Image: Common Area Image: Common Area Building Common Area: 1019 Building Common Area Image: Common Area Image: Common Area Men's Room Pipe Chase 155 Building Common Area Image: Common Area<	Stairway: 2	405							
Building Common Area Instant Mathematical Penetration Support Space 117 Building Common Area: 2 117 Building Common Area: 2 1642 Support 2 1642 Support 3 1642 Building Common Area: 2 1642 Support 3 1642 Building Common Area 1643 Electricial Room 1644 Building Common Area 1644 Electricial Room 1 90 Building Common Area 1644 Building Common Area 1645 Building Common Area <t< td=""><td>Support</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Support								
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Vinity space Image: Common Area Image: Common Area Mechanical Room 664 Building Common Area Image: Common Area Electrical Room 1 90 Building Common Area Image: Common Area Telephone Room 80 Building Common Area Image: Common Area Electrical Room 2 115 Building Common Area Image: Common Area Men's Room Pipe Chase 15 Building Common Area Image: Common Area Men's Room Pipe Chase 55 Building Common Area Image: Common Area Major Vertical Penetration Image: Common Area Image: Common Area Image: Common Area Building Common Area: 1019 Image: Common Area Image: Common Area Image: Common Area Building Common Area: 1019 Image: Common Area Image: Common Area Image: Common Area Building Common Area: 1019 Image: Common Area Ima	Support: 2	1642							
Mechanical Room 664 Building Common Area Electrical Room 1 90 Building Common Area Electrical Room 2 115 Building Common Area Electrical Room Pipe Chase 115 Building Common Area Men's Room Pipe Chase 15 Building Common Area Women's Room Pipe Chase 55 Building Common Area Building Common Area 0 0 Major Vertical Penetration 0 0 Duct Riser Space 138 Major Vertical Penetration 0 Duct Riser Space 65 Major Vertical Penetration 0 Duct Riser Space 65 Major Vertical Penetration 0 FCRC Electrialc Riser Space 46 Major Vertical Penetration 0 FCRC Electrial Riser Space 46 Major Vertical Penetration 0 Utility Space: 11 1339 0 0 0 Grand total 25136 0 0 0	Building Common Area								
Electrical Room 1 90 Building Common Area Telephone Room 80 Building Common Area Electrical Room 2 115 Building Common Area Men's Room Pipe Chase 15 Building Common Area Women's Room Pipe Chase 55 Building Common Area Building Common Area 0 Mon's Room Pipe Chase 55 Building Common Area Building Common Area 0 Duct Riser Space 138 Major Vertical Penetration Duct Riser Space 40 Major Vertical Penetration FCRC Electriale Riser Space <	Mechanical Room	664	Building Common Area						
Telephone Room 80 Building Common Area Electrical Room 2 115 Building Common Area Men's Room Pipe Chase 15 Building Common Area Women's Room Pipe Chase 15 Building Common Area Building Common Area: 6 Building Common Area: 6 Major Vertical Penetration 6 Duct Riser Space 138 Major Vertical Penetration 6 Duct Riser Space 65 Major Vertical Penetration 6 Duct Riser Space 65 Major Vertical Penetration 6 Duct Riser Space 65 Major Vertical Penetration 6 Duct Riser Space 49 Major Vertical Penetration 6 Major Vertical Penetration 6 Utility Space: 11 Major Vertical Penetration: 5 Major Vertical Penetration: 6 Major Vertical Penetration 6 Utility Space: 1339 Grand total 25136	Electrical Room 1	90	Building Common Area						
Electrical Room 2 115 Building Common Area Men's Room Pipe Chase 15 Building Common Area Women's Room Pipe Chase 55 Building Common Area Building Common Area: 0 Major Vertical Penetration 0 Duct Riser Space 138 Major Vertical Penetration Duct Riser Space 65 Major Vertical Penetration Duct Riser Space 65 Major Vertical Penetration Duct Riser Space 64 Major Vertical Penetration FCRC Electrialc Riser Space 46 Major Vertical Penetration Utility Space: 11 1339 1339	Telephone Room	80	Building Common Area						
Men's Room Pipe Chase 15 Building Common Area Women's Room Pipe Chase 55 Building Common Area Building Common Area: 6 55 Building Common Area: 6 1019 Major Vertical Penetration	Electrical Room 2	115	Building Common Area						
Women's Room Pipe Chase 55 Building Common Area 55 Building Common Area 1019 0 Major Vertical Penetration 0 0 Duct Riser Space 138 Major Vertical Penetration 0 Duct Riser Space 22 Major Vertical Penetration 0 Duct Riser Space 65 Major Vertical Penetration 0 Duct Riser Space 49 Major Vertical Penetration 0 FCRC Electrialc Riser Space 46 Major Vertical Penetration 0 FCRC Electrial Riser Space 46 Major Vertical Penetration 0 Grand total 25136 0 0	Men's Room Pipe Chase	15	Building Common Area						
Building Common Area: 6 1019 Major Vertical Penetration Image: Common Area: 6 Duct Riser Space 138 Major Vertical Penetration F.B.S. Closet 22 Major Vertical Penetration Duct Riser Space 65 Major Vertical Penetration Duct Riser Space 49 Major Vertical Penetration FCRC Electrialc Riser Space 46 Major Vertical Penetration Vertical Penetration: 320 Utility Space: 11 Grand total 25136	Women's Room Pipe Chase	55	Building Common Area						
Major Vertical Penetration Major Vertical Penetration Duct Riser Space 138 Major Vertical Penetration Buct Riser Space 65 Major Vertical Penetration Duct Riser Space 49 Major Vertical Penetration Duct Riser Space 46 Major Vertical Penetration FCRC Electrialc Riser Space 46 Major Vertical Penetration Vertical Penetration: 320 Utility Space: 11 Grand total 25136	Building Common Area: 6	1019							
Duct Riser Space 138 Major Vertical Penetration F.B.S. Closet 22 Major Vertical Penetration Duct Riser Space 65 Major Vertical Penetration Duct Riser Space 49 Major Vertical Penetration FCRC Electrialc Riser Space 46 Major Vertical Penetration Major Vertical Penetration 138 Villity Space: 11 1339 Grand total 25136	Major Vertical Penetration								
r.b.s. closet 22 /major Vertical Penetration Duct Riser Space 65 /Major Vertical Penetration Duct Riser Space 49 /Major Vertical Penetration FCRC Electrialc Riser Space 46 /Major Vertical Penetration Major Vertical Penetration: 320 Utility Space: 1339 Grand total 25136	Duct Riser Space	138	Major Vertical Penetration						
Duck Riser Space 49 Major Vertical Penetration FCRC Electrialc Riser Space 46 Major Vertical Penetration Major Vertical Penetration 1339 Utility Space: 1339 Grand total 25136	Duct Riser Space	22	Major Vertical Penetration						
FCRC Electrialc Riser Space 46 Major Vertical Penetration Major Vertical Penetration: 5 320 Utility Space: 11 1339 Grand total 25136	Duct Riser Space	00 00	Major Vertical Penetration						
Major Vertical Penetration: 5 320 Utility Space: 11 1339 Grand total 25136	FCRC Electrialc Riser Space	46	Major Vertical Penetration						
Utility Space: 11 1339 Grand total 25136	Major Vertical Penetration: 5	320	,						
Grand total 25136	Utility Space: 11	1339							
	Grand total	25136							

Figure 300: Original Floors: 39-50



FCRC 39-50 Ori	ginal A	Area Schedule		Totals			
Name	Area	Area Type	N	lame	Area (S.F.)	Area Type	
Dead Space			D	ead Space	283	Not Rentable	
Structure			E	evator Lobby	449	Not Rentable	
Steel Framing	99	Structure	E	evator Shaft	586	Not Rentable	
Steel Framing	12	Structure	0	ffice	20516	Rentable	
Steel Framing	33	Structure	R	estroom	526	Not Rentable	
Steel Framing	22	Structure	S	tairway	420	Not Rentable	
Steel Framing	8	Structure	S	upport	1000	Rentable	
Steel Framing	22	Structure	U	tility Space	1356	Not Rentable	
Steel Framing	7	Structure	T	otal	25136	SF	
Steel Framing	48	Structure					
Steel Framing	16	Structure	R	entable Area	21516	SF	
Steel Framing	16	Structure	N	ot Rentable Area	3620	SF	
Structure: 10	283		1	otal	25136	SE	
Dead Space: 10	203			otai	20100	51	
Floure to blou	205			Average	Pontol Drico (6	ner C E ner N	(onth)
Elevator Lobby				Average	Kental Price (;	per S.F. per N	nonth)
Building Common Area				2007	2008	2009	AVG.
Elevator Lobby	449	Building Common Area		53.24	\$ 72.97	\$ 55.52	\$ 60.58
Building Common Area: 1	449		Ş	5 1,145,511.84	\$ 1,570,022.52	\$ 1,194,568.32	\$ 1,303,367.56
Elevator Lobby: 1	449						
Elevator Shaft							
Major Vertical Penetration	242						
Elevator Shaft	342	Major Vertical Penetration					
Elevator Shart Major Vortical Bonotration: 2	244	Major vertical Penetration					
Flovator Shaft: 2	586						
Rentable	500						
Office Area							
Office	20516	Office Area					
Office Area: 1	20516	Office Area					
Rentable: 1	20516						
Restroom	20010						
Building Common Area							
Women's Restroom	263	Building Common Area					
Men's Restroom	263	Building Common Area					
Building Common Area: 2	526						
Restroom: 2	526						
Stairway							
Major Vertical Penetration							
Emergency Stair	213	Major Vertical Penetration					
Emergency Stair	207	Major Vertical Penetration					
Major Vertical Penetration: 2	420						
Stairway: 2	420						
Support							
Building Common Area							
Support	95	Building Common Area					
Support	309	Building Common Area					
Support	361	Building Common Area					
Support	235	Building Common Area					
Building Common Area: 4	1000						
Support: 4	1000						
Utility Space							
Building Common Area		Puilding Company to the					
wien's Koom Pipe Chase	25	Building Common Area					
Htility Closet	20	Building Common Area					
Women's Ream Dine Chase	2/	Building Common Area					
Mochanical Room	719	Building Common Area					
Electrical Room 1	92	Building Common Area					
Telephone Boom	69	Building Common Area					
Electrical Boom 2	105	Building Common Area					
Building Common Area: 8	1065	building common Arcu					
Major Vertical Penetration							
FCRC Electrical Riser Space	32	Major Vertical Penetration					
Duct Riser Space	19	Major Vertical Penetration					
Duct Riser Space	22	Major Vertical Penetration					
Duct Riser Space	145	Major Vertical Penetration					
F.B.S. Closet	20	Major Vertical Penetration					
Duct Riser Space	29	Major Vertical Penetration					
Duct Riser Space	24	Major Vertical Penetration					
Major Vertical Penetration: 7	291						
Utility Space: 15	1356						
Grand total: 37	25136						

Figure 301: Core and Corner Change Floors: 5-17



NYT 05-17 Core & Corner	Chang	e Area Schedule		Totals		
Name	Area	Area Type	Name	Area (S.F.)	Area Type	
Added Rentable Area			Added Corner Area	1733	Rentable	
Building Common Area			Dead Space	730	Not Rentable	
Office	433	Office Area	Elevator Lobby	714	Not Rentable	
Office	433	Office Area	Elevator Shaft	2137	Not Rentable	
Office	433	Office Area	Office	19048	Rentable	
Office	433	Office Area	Bestroom	578	Not Rentable	
Building Common Area: 4	1732		Stairway	333	Not Rentable	
Added Rentable Area: 4	1732		Support	509	Rentable	
Dead Space	17.52		Utility Space	1334	Not Rentable	
Building Common Area			Total	27115	SE	
Doad Space	24	Ruilding Common Area	Total	2/113	51	
Dead Space	24	Building Common Area	Dentable Area	21200		
Dead space	23	Building Common Area	Net Bestehle Area	21203	55	
Building Common Area: 2	49		Not Rentable Area	5820	SF	
Structure	242	Characterization of the second s	Iotal	2/115	SF	
30" Concrete Snear Wall	242	Structure				
30" Concrete Shear Wall	57	Structure	Average R	ental Price (Ş	per S.F. per M	onth)
Steel Column	5	Structure	2007	2008	2009	AVG.
30" Concrete Shear Wall	54	Structure	\$ 53.24	\$ 72.97	\$ 55.52	\$ 60.58
30" Concrete Shear Wall	54	Structure	\$ 1,133,426.36	\$ 1,553,458.33	\$1,181,965.28	\$ 1,289,616.66
30" Concrete Shear Wall	54	Structure				
30" Concrete Shear Wall	215	Structure				
Structure: 7	681					
Dead Space: 9	730					
Elevator Lobby						
Building Common Area						
Elevator Lobby	714	Building Common Area				
Building Common Area: 1	714					
Elevator Lobby: 1	/14					
Elevator Shaft						
Major Vertical Penetration	6.70	Malas Varial Development				
Elevator Shaft	5/2	Major Vertical Penetration				
Elevator Shaft	510	Major Vertical Penetration				
Elevator Shaft	509	Major Vertical Penetration				
Major Vertical Depatration 4	2127	Major vertical Penetration				
Major Vertical Penetration, 4	215/					
Pentable	213/					
Office Area						
Office	100/9	Office Area				
Office Area: 1	10048	Office Area				
Rentable: 1	100/08					
Bestroom	10040					
Building Common Area						
Women's Restroom	295	Building Common Area				
Men's Restroom	283	Building Common Area				
Building Common Area: 2	578					
Restroom: 2	578					
Stairway						
Major Vertical Penetration						
Emergency Stair	166	Major Vertical Penetration				
Emergency Stair	167	Major Vertical Penetration				
Major Vertical Penetration: 2	333					
Stairway: 2	333					
Support						
Building Common Area						
Support Space	291	Building Common Area				
Support Space	218	Building Common Area				
Building Common Area: 2	509					
Support: 2	509					
Utility Space						
Building Common Area						
Mechanical Room	624	Building Common Area				
Electrical Room 1	107	Building Common Area				
Electrical Room 2	113	Building Common Area				
A.V. Closet	18	Building Common Area				
Women's Room Pipe Chase	86	Building Common Area				
Men's Room Pipe Chase	92	Building Common Area				
Major Vortical Ropotration	1040					
Major Vertical Penetration	105	Major Vertical Popotration				
Duct Riser Space	135	Major Vertical Penetration				
Picer Closet	34	Major Vertical Penetration				
ECRC Electrical Risor Space	13	Major Vertical Penetration				
ECRC Electrical Riser Space	32	Major Vertical Penetration				
Rathroom Duct Riser Space	20	Major Vertical Penetration				
E.B.S. Closet / Mechanical Boom Enternet	33	Major Vertical Penetration				
Major Vortical Ropotration: 7	21	major vertical Penetration				
Major Vertical Penetration: 7	1324					
Grand total	27115					
Grand total	2/115					

Figure 302: Core and Corner Change Floors: 18-27



Added Rentable Dead Space Elevator Lobby Elevator Shaft Rentable Restroom Stainway
NYT 18-27 Core & Corner	Chang	e Area Schedule			Totals		
Name	Area	Area Type		Name	Area (S.F.)	Area Type	
Added Rentable Area				Added Corner Area	1732	Rentable	
Building Common Area			i i	Dead Space	727	Not Rentable	
Office	433	Office Area		Elevator Lobby	774	Not Rentable	
Office	433	Office Area	Ī	Elevator Shaft	1645	Not Rentable	
Office	433	Office Area		Office	19046	Rentable	
Office	433	Office Area	1	Restroom	489	Not Rentable	
Building Common Area: 4	1732		5	Stairway	341	Not Rentable	
Added Rentable Area: 4	1732			Support	1056	Rentable	
Dead Space			Ī	Utility Space	1304	Not Rentable	
Building Common Area			1	Total	27115	SF	
Dead Space	19	Building Common Area					
Dead Space	19	Building Common Area	1	Rentable Area	21835	SF	
Dead Space	5	Building Common Area	1	Not Rentable Area	5280	SF	
Building Common Area: 3	43		-	Total	27115	SF	
Structure							
Steel Column	5	Structure	Г	Average R	ental Price (Ś	per S.F. per M	onth)
20" Concrete Shear Wall	56	Structure		2007	2008	2009	
30" Concrete Shear Wall	242	Structure		\$ 53.24	\$ 72.07	\$ 55.52	\$ 60.58
30" Concrete Shear Wall	242	Structure		\$ 1 162 495 40	\$ 1 593 299 95	\$ 1 212 279 20	\$ 1 322 691 52
20" Concrete Shear Wall	54	Structure		ý 1,102,455.40	\$ 1,000,200.00	<i>Ş</i> 1,212,275.20	\$ 1,522,051.52
30" Concrete Shear Wall	58	Structure					
30" Concrete Shear Wall	55	Structure					
Structure: 7	684						
Dead Space: 10	727						
Elevator Lobby	-						
Building Common Area							
Elevator Lobby	774	Building Common Area					
Building Common Area: 1	774						
Elevator Lobby: 1	774						
Elevator Shaft							
Major Vertical Penetration							
Elevator Shaft	290	Major Vertical Penetration					
Elevator Shaft	292	Major Vertical Penetration					
Elevator Shaft	555	Major Vertical Penetration					
Elevator Shaft	508	Major Vertical Penetration					
Major Vertical Penetration: 4	1645						
Elevator Shaft: 4	1645						
Kentable							
Office	10046	Office Area					
Building Common Aroas 1	19040	Office Area					
Rentable: 1	19046						
Bestroom	15010						
Building Common Area							
Women's Restroom	268	Building Common Area					
Men's Restroom	221	Building Common Area					
Building Common Area: 2	489						
Restroom: 2	489						
Stairway							
Building Common Area							
Emergency Stair	171	Building Common Area					
Emergency Stair	170	Building Common Area					
Building Common Area: 2	341						
Stairway: 2	341						
Support							
Building Common Area							
Support Space	4/6	Building Common Area					
Support Space	291	Building Common Area					
Support Space	218	Building Common Area					
Building Common Area: 4	1056	sonding common Area					
Support: 4	1056						
Utility Space	2030						
Building Common Area							
Mechanical Room	624	Building Common Area					
Electrical Room 1	107	Building Common Area					
Electrical Room 2	117	Building Common Area					
A.V. Closet	18	Building Common Area					
Women's Room Pipe Chase	39	Building Common Area					
Men's Room Pipe Chase	66	Building Common Area					
Shared Restroom Pipe Chase	13	Building Common Area					
Shared Restroom Pipe Chase	17	Building Common Area					
Building Common Area: 8	1001						
Major Vertical Penetration							
Duct Riser Space	34	Major Vertical Penetration					
Duct Riser Space	136	Major Vertical Penetration					
Riser Closet	13	Major Vertical Penetration					
FORC Electrical Riser Space	29	Major Vertical Penetration					
Pone Electrical Riser Space	26	Major Vertical Penetration					
Bathroom Duct Riser Space	21	Major Vertical Penetration					
E.B.S. Closet / Mechanical Room Exhaust	21	Major Vertical Penetration					
Major Vertical Penetration: 8	303	major vertical Perieualion					
Utility Space: 16	1304						
Grand total: 45	27115						

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Figure 303: Core and Corner Change Floors: 29-38



FCRC 29-38 Core & Corner	Chang	ge Area Schedule			Totals			
Name	Area	Area Type	Nam	e	Area (S.F.)	Area Type	
Added Rentable Area		, and a type	Adder	Corner Area	/	1752	Rentable	
Building Common Area			Dead	Space		458	Not Rentable	
Office	438	Office Area	Elevat	tor Lobby		469	Not Rentable	
Office	438	Office Area	Elevat	tor Shaft		1255	Not Rentable	
Office	438	Office Area	Office		1	9294	Rentable	
Office	438	Office Area	Restro	oom		482	Not Rentable	
Building Common Area: 4	1752		Stairw	vav		340	Not Rentable	
Added Rentable Area: 4	1752		Suppo	ort		1929	Rentable	
Dead Space			Utility	Space		1261	Not Rentable	
Building Common Area			Total		27	7240	SF	
Dead Space	19	Building Common Area						
Dead Space	20	Building Common Area	Renta	ble Area	2	2975	SE	
Dead Space	3	Building Common Area	Not B	entable Area		4265	SE	
Building Common Area: 3	42		Total		27	7240	SE	
Structure								
Doad Space	4	Structure		Average R	ental Drice	1\$	ner SE ner M	onth)
24ll Conserve Share Wall	41	Structure		Average it		19	2000	
24" Concrete Shear Wall	41	Structure	6	2007	6 7	2008	2009	AVG
24 Concrete Shear Wall	40	Structure	\$	53.24	\$ 7.	2.97	\$ 55.52	\$ 00.58
24" Concrete Shear Wall	134	Structure	\$	1,223,189.00	\$ 1,676,485	0.75	\$1,275,572.00	\$ 1,391,748.92
24" Concrete Shear Wall	39	Structure						
24" Concrete Shear Wall	117	Structure						
Structure: 7	117	Structure						
Dead Space: 10	414							
Elevator Lobby	430							
Building Common Area								
Elevator Lobby	469	Building Common Area						
Building Common Area: 1	469							
Elevator Lobby: 1	469							
Elevator Shaft								
Major Vertical Penetration								
Elevator Shaft	336	Major Vertical Penetration						
Elevator Shaft	309	Major Vertical Penetration						
Elevator Shaft	294	Major Vertical Penetration						
Elevator Shaft	316	Major Vertical Penetration						
Major Vertical Penetration: 4	1255							
Elevator Shaft: 4	1255							
Rentable								
Building Common Area								
Office	19294	Office Area						
Building Common Area: 1	19294							
Rentable: 1	19294							
Restroom								
Building Common Area								
Women's Restroom	265	Building Common Area						
Men's Restroom	217	Building Common Area						
Building Common Area: 2	482							
Restroom: 2	482							
Stairway Building Common Area								
Emorgongy Stair	170	Major Vortical Popotration						
Emergency Stair	170	Major Vertical Penetration						
Building Common Area: 2	340	major verticari enetration						
Stainway: 2	340							
Support								
Building Common Area								
Support Space	291	Building Common Area						
Support Space	1571	Building Common Area						
Support Space	67	Building Common Area						
Building Common Area: 3	1929							
Support Space: 3	1929							
Utility Space								
Building Common Area								
Mechanical Room	548	Building Common Area						
Electrical Room 1	114	Building Common Area						
Electrical Room 2	104	Building Common Area						
Men's Room Pipe Chase	37	Building Common Area						
Shared Restroom Pipe Chase	14	Building Common Area						
Shared Restroom Pipe Chase	25	Building Common Area						
women's Room Pipe Chase	43	Building Common Area						
Puilding Common Arras 9	76	building common Area						
Major Vertical Popotration	961							
Duct Riser Space	195	Major Vertical Penetration						
ECRC Electrical Riser Space	135	Major Vertical Penetration						
FCRC Electrical Riser Space	23	Major Vertical Penetration						
Bathroom Duct Riser Space	30	Major Vertical Penetration						
Bathroom Duct Riser Space	21	Major Vertical Penetration						
Bathroom Duct Riser Space	41	Major Vertical Penetration						
F.B.S. Closet / Mechanical Room Exhaust	21	Major Vertical Penetration						
Major Vertical Penetration: 7	300							
Utility Space: 15	1261							
Grand total:	27240							

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Figure 304: Core and Corner Change Floors: 39-50



Area Legend Added Rentable Are Dead Space Elevator Lobby Elevator Shaft Rentable Restroom Staiway Support Utilly Space

FCRC 39-50 Core & Corner	Chang	ge Area Schedule		Totals		
Name	Area	Area Type	Name	Area (S.F.)	Area Type	
Added Rentable Area			Added Corner Area	1752	Rentable	
Building Common Area			Dead Space	398	Not Rentable	
Office	438	Office Area	Elevator Lobby	434	Not Rentable	
Office	438	Office Area	Elevator Shaft	642	Not Rentable	
Office	438	Office Area	Office	20648	Rentable	
Office	438	Office Area	Restroom	472	Not Rentable	
Building Common Area: 4	1752		Stairway	340	Not Rentable	
Added Rentable Area: 4	1752		Support	1158	Rentable	
Dead Space			Utility Space	1318	Not Rentable	
Building Common Area			Total	27162	SF	
Dead Space	19	Building Common Area				
Dead Space	20	Building Common Area	Rentable Area	23558	SE	
Building Common Area: 2	30	bunding common rice	Not Rentable Area	3604	SE	
Structure			Total	27162	SE	
18" Concrete Shear Wall	99	Structure		2/102	5.	
19" Concrete Shear Wall	24	Structure	Average P	ental Price (\$	nerSE nerM	onth)
18" Concrete Shear Wall	34	Structure	Average K		per S.F. per IVI	
18" Concrete Shear Wall	34	Structure	2007	2008	2009	AVG.
18" Concrete Shear Wall	34	structure	 \$ 53.24	\$ 72.97	\$ 55.52	\$ 60.58
18" Concrete Shear Wall	33	Structure	\$ 1,254,227.92	\$1,/19,027.26	\$1,307,940.16	\$ 1,427,065.11
18" Concrete Snear Wall	121	Structure				
Structure: 7	350	Suddure				
Dead Space: 0	359					
Elevator Lobby	298					
Building Common Area						
Elevator Lobby	/3/	Building Common Area				
Building Common Area: 1	434	serving common Area				
Elevator Lobby: 1	434					
Elevator Shaft						
Major Vertical Penetration						
Elevator Shaft	336	Maior Vertical Penetration				
Elevator Shaft	306	Major Vertical Penetration				
Major Vertical Penetration: 2	642					
Elevator Shaft: 2	642					
Rentable						
Building Common Area						
Office	20648	Office Area				
Building Common Area: 1	20648					
Rentable: 1	20648					
Restroom						
Building Common Area						
Men's Restroom	217	Building Common Area				
Women's Restroom	255	Building Common Area				
Building Common Area: 2	472					
Restroom: 2	472					
Stairway						
Major Vertical Penetration	170					
Emergency Stair	170	Major Vertical Penetration				
Energency stan	240	Major Vertical Penetration				
Stainway: 2	340					
Support	540					
Building Common Area						
Support Space	212	Building Common Area				
Support Space	354	Building Common Area				
Support Space	524	Building Common Area				
Support Space	68	Building Common Area				
Building Common Area: 4	1158	-				
Support Space: 4	1158					
Utility Space						
Building Common Area						
Mechanical Room	552	Building Common Area				
Electrical Room 1	114	Building Common Area				
Electrical Room 2	104	Building Common Area				
Telephone	77	Building Common Area				
Shared Restroom Pipe Chase	12	Building Common Area				
Shared Restroom Pipe Chase	124	Building Common Area				
Building Common Area: 6	983					
Iviajor Vertical Penetration	100	Major Vortical Developer				
Duct Riser Space	136	Major Vertical Penetration				
E.R.S. Closet / Mechanical Reem Exhaust	29	Major Vertical Penetration				
ECRC Electrical Riser Space	21	Major Vertical Penetration				
ECRC Electrical Riser Space	20	Major Vertical Penetration				
Bathroom Duct Riser Space	29	Major Vertical Penetration				
Bathroom Duct Riser Space	30	Major Vertical Penetration				
Bathroom Duct Riser Space	40	Major Vertical Penetration				
Major Vertical Penetration: 8	335	,,				
Utility Space: 14	1318					
Grand total	27162					

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Figure 305: Structural Column Schedule

Structural Column Sche	edule										riguie .	505. Stru		IIII Schedule											
Family and Type Ba	ase Level Leng	th Volume	Quantity	LineNumber	SourceSu	b Description	Crew	Daily Output Lab	or Hour Unit	Materia Labor E	Equipmen Tot	al Ext. I	Mat. Ext. L	abor Ext. Equ	iip. Ext.	Total N	lat. O&P Labo	O&P Equi	p. O&P Total C	D&P Ext.	Mat. O&P Ext.	abor O&P Ex	t. Equip. O&P Ext. Tota	al O&P Labor Da	ta R Zip Co Notes
1 Ground																									
Box Col: 30x30xtw2 Box Col: 30x30xtw2: 4	1	68 382.67	168	051223758100		FB-Flanged Box-Colu	umn: FB E5	255	0.077 L.F.	s 930.53 s 4.83 s	s 1.99 S	937.35 S	156.329.04 S	811.44 \$	334.32 S	157,474,80 \$	1.032.41 \$	8.35 S	2.19 \$	1.042.95 \$	173 444 88 \$	1.402.80 S	367.92 \$	648.297.72 STD Year	r 2009 100-102
Box Col: 30x30xtw7																									
Box Col: 30x30xtw7: 2 BUS Col: BU24X987		84 319.67	84	051223758100		FB-Flanged Box-Colu	umn: FB E5	255	0.077 L.F.	\$ 1,914.75 \$ 4.83 \$	\$ 1.99 \$	1,921.57 \$	160,839.00 \$	405.72 \$	167.16 \$	161,411.88 S	2,124.38 \$	8.35 \$	2.19 \$	2,134.92 \$	178,447.92 \$	701.40 S	183.96 \$	663,533.14 STD Year	r 2010 100-103
BUS Col: 8U240987: 6	2	52 507.5	252	051223758100		8U-Built Up-Column:	: W2400 E5	255	0.077 L.F.	\$ 1,796.34 \$ 4.83 \$	\$ 1.99 \$	1,803.16 \$	452,677.68 \$	1,217.16 \$	501.48 \$	454,396.32 \$	1,926.29 \$	8.35 S	2.19 \$	1,936.83 \$	485,425.08 \$	2,104.20 \$	551.88 \$	1,591,144.58 STD Year	r 2010 100-103
HSS-Hollow Structural Section-Column: HSS6X6X1/2		2 0.14	2	051223750360		HSS6x6x1/2	E2	550	0.102 L.F.	5 81.72 5 6.27 5	\$ 3.49 \$	91.48 \$	163.44 \$	12.54 \$	6 98 S	182.96 \$	90.00 \$	10.76 \$	383 5	104.59 S	180.00 S	21.52 \$	7.66 \$	209.18 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X342													100.44	14.54	0.00	102.50				104.05		21.52		200.10 0.00 0.00	
W-Wide Flange-Column: W14X342: 2 W-Wide Flange-Column: W14X550		84 58.51	84	051223177350		W14x342	E2	984	0.057 L.F.	\$ 584.82 \$ 3.51 \$	\$ 1.95 \$	590.28 \$	49,124.88 \$	294.84 \$	163.80 \$	49,583.52 \$	639.54 \$	6.00 S	2.15 \$	647.69 \$	53,721.36 \$	504.00 S	180.60 \$	54,405.96 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X550: 4	1	68 188.17	168	051223177350		W14x550	E2	984	0.057 L.F.	\$ 940.50 \$ 3.51 \$	\$ 1.95 \$	945.96 S	158,004.00 \$	589.68 \$	327.60 \$	158,921.28 \$	1,028.50 \$	6.00 S	2.15 S	1,036.65 \$	172,788.00 \$	1,008.00 S	361.20 \$	174,157.20 STD Year	r 2009 100-102
W-Wide Flange-Column: W140730: 2		84 125.06	84	051223177350		W14x730	E2	984	0.057 L.F.	\$ 1,248.30 \$ 3.51 \$	\$ 1.95 \$	1,253.76 \$	104,857.20 \$	294.84 \$	163.80 \$	105,315.84 \$	1,365.10 \$	6.00 \$	2.15 \$	1.373.25 \$	114,668.40 \$	504.00 S	180.60 S	115.353.00 STD Year	r 2009 100-102
1 Ground: 21 2	8	42 1581.71	Total									\$	1,081,995.24 \$	3,626.22 \$	1,665.14 \$	1,087,286.60				\$	1,178,675.64 \$	6,245.92 \$	1,833.82 \$	3,247,100.78	
W-Wide Flange-Column: W14X176																									
W-Wide Flange-Column: W14X176: 4 W-Wide Flange-Column: W14X311		64 22.89	64	051223177450		W14x176	E2	912	0.061 L.F.	\$ 300.15 \$ 3.78 \$	\$ 2.10 \$	306.03 \$	19,209.60 \$	241.92 \$	134.40 \$	19,585.92 \$	331.20 \$	6.47 \$	2.31 \$	339.98 \$	21,196.80 \$	414.08 \$	147.84 \$	21,758.72 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X311: 2		32 20.23 96 43.12	32 Total	051223177350		W14x311	E2	984	0.057 L.F.	\$ 531.81 \$ 3.51 \$	\$ 1.95 \$	537.27 S	17.017.92 \$	112.32 \$	62.40 S	17,192.64 \$	581.57 \$	6.00 S	2.15 \$	589.72 S	18,610.24 \$	192.00 \$	68.80 \$	18,871.04 STD Year	r 2009 100-102
3		90 40.12	TOTAL										00,000 0	304.04		20,110.20							210.04	44,022.10	
Box Col: 30x30xtw2 Box Col: 30x30xtw2: 4	1	76 400.89	176	051223758100		FB-Flanged Box-Colu	umn: F8 E5	255	0.077 L.F.	\$ 930.53 \$ 4.83 \$	s 1.99 S	937.35 S	163,773.28 \$	850.08 \$	350.24 \$	164,973.60 \$	1,032.41 \$	8.35 S	2.19 \$	1,042.95 \$	181,704.16 \$	1,469.60 S	385.44 S	679,169.04 STD Year	r 2009 100-102
Box Col: 30x30xtw7																									
Box Col: 30x30xtw7: 2 BUS Col: BU24x817		88 334.89	88	051223758100		FB-Flanged Box-Colu	umn: FB E5	255	0.077 L.F.	\$ 1,914.75 \$ 4.83 \$	\$ 1.99 \$	1,921.57 \$	168,498.00 S	425.04 \$	175.12 \$	169,098.16 \$	2,124.38 \$	8.35 \$	2.19 \$	2,134.92 \$	186,945.44 \$	734.80 S	192.72 \$	695,129.95 STD Year	r 2010 100-103
BUS Col: BU24x817: 6	2	64 440	264	051223758100		8U-Built Up-Column:	: W2400 E5	255	0.077 L.F.	\$ 1,486.94 \$ 4.83 \$	\$ 1.99 \$	1,493.76 \$	392,552.16 \$	1,275.12 \$	525.36 \$	394,352.64 \$	1,594.51 \$	8.35 S	2.19 \$	1,605.05 \$	420,950.64 \$	2,204.40 \$	578.16 \$	1,381,370.23 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X176: 4	1	76 62.95	176	051223177450		W14x176	E2	912	0.061 L.F.	s 300.15 s 3.78 s	s 2.10 S	306.03 \$	52.826.40 S	665.28 \$	369.60 S	53,861.28 \$	331.20 S	6.47 S	2.31 \$	339.98 \$	58,291.20 \$	1.138.72 \$	406.56 \$	59,836.48 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X257																									
W-Wide Flange-Column: W14X257: 2 W-Wide Flange-Column: W14X283		88 46.07	88	051223177350		W14x257	EZ	984	0.057 L.F.	\$ 439.47 \$ 3.51 \$	\$ 1.95 \$	444.93 \$	38,673.36 \$	308.88 \$	171.60 \$	39,153.84 \$	480.59 \$	6.00 \$	2.15 \$	488.74 \$	42,291.92 \$	528.00 S	189.20 \$	43,009.12 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X283: 2 W-Wide Flange-Column: W14X455		88 50.64	88	051223177350		W14x283	E2	984	0.057 L.F.	\$ 483.93 \$ 3.51 \$	\$ 1.95 \$	489.39 \$	42,585.84 \$	308.88 \$	171.60 \$	43,066.32 \$	529.21 \$	6.00 \$	2.15 \$	537.36 \$	46,570.48 \$	528.00 \$	189.20 \$	47,287.68 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X455: 4	1	76 162.92	176	051223177350		W14x455	E2	984	0.057 L.F.	\$ 778.05 \$ 3.51 \$	\$ 1.95 \$	783.51 S	136,936.80 \$	617.76 \$	343.20 \$	137,897.76 \$	850.85 \$	6.00 S	2.15 \$	859.00 \$	149,749.60 \$	1,056.00 S	378.40 S	151,184.00 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X605		-		464222477740		WILLOW			0.0071 6					202.02	171.00		404.05		245 6	4 470 70 4	00.000.00	500.00 E	400.00	400.075.00 (FTD)	- 2020 420 402
w-wide Hange-Column: wasksos: 2 3:26	11	44 1606.81	Total	1001223117350		1114/000	EZ	204	0.057 L.P.	\$ 1,034.55 \$ 3.51 \$	a 1.95 a	1,040.01 S	1,086,886.24 \$	4,759.92 \$	2,278.32 \$	1,093,924.48	1,131.35	6.00 5	2.15 \$	1,139.50 S	1,186,062.24 \$	8,187.52 \$	2,508.88 \$	3,157,262.50	2009 100-102
BUS Col: BU24x817																									
BUS Col: BU24x817: 2 W-Wide Flance-Column: W14X159		82 136.67	82	051223758100		8U-Built Up-Column:	: W2400 E5	255	0.077 L.F.	\$ 1,486.94 \$ 4.83 \$	\$ 1.99 \$	1,493.76 \$	121,929.08 \$	396.06 \$	163.18 \$	122,488.32 \$	1,594.51 \$	8.35 \$	2.19 \$	1,605.05 \$	130,749.82 \$	684.70 \$	179.58 \$	429,061.97 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X159: 4	1	64 52.99	164	051223177350		W14x159	E2	984	0.057 L.F.	\$ 271.89 \$ 3.51 \$	\$ 1.95 \$	277.35 \$	44,589.96 S	575.64 \$	319.80 S	45,485.40 \$	297.33 \$	6.00 S	2.15 \$	305.48 \$	48,762.12 \$	984.00 S	352.60 \$	50,098.72 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X233			164	661223177360		www.200	E2	604	0.0571 6		e 105 e	102.05	65 242 52	171.01 4	210.00	66 007 06	476.74 6		2.45 6	42.05	71.455.44	004.00	20.00	72 722 64 (ETD) V 42	- 2020 100.102
W-Wide Flange-Column: W140(257			104	0.120117550		11144200			0.007 [2 330.45 2 3.51 2		403.03	00,044,04	375.04	313,00 3	00,231.30	430.11 3	0.00 3	2.15 4	463.00	11,000,000	304.00	332.00 3	14,100 010 110	1003 100-101
W-Wide Flange-Column: W14X257: 2 W-Wide Flange-Column: W14X398		82 42.93	82	051223177350		W14x257	E2	984	0.057 L.F.	\$ 439.47 \$ 3.51 \$	\$ 1.95 \$	444.93 \$	36.036.54 \$	287.82 \$	159.90 \$	36,484.26 \$	480.59 \$	6.00 \$	2.15 \$	488.74 \$	39,408.38 \$	492.00 \$	176.30 \$	40.076.68 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X398: 8	3	28 266.44	328	051223177350		W14x398	E2	984	0.057 L.F.	\$ 680.58 \$ 3.51 \$	\$ 1.95 \$	686.04 S	223,230.24 \$	1,151.28 \$	639.60 \$	225,021.12 \$	744.26 \$	6.00 S	2.15 \$	752.41 \$	244,117.28 \$	1,968.00 S	705.20 \$	246,790.48 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X550		82 91.84	82	051223177350		W14x550	E2	984	0.057 L.F.	\$ 940.50 \$ 3.51 \$	s 1.95 S	945.96 \$	77.121.00 S	287.82 \$	159.90 \$	77.568.72 \$	1.028 50 S	6.00 S	2.15 S	1.036.65 \$	84.337.00 \$	492.00 S	176.30 \$	85.005.30 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X665																									
W-Wide Flange-Column: W14X665: 4 6:26	10	64 222.71 66 891.14	164 Total	051223177350		W14x665	E2	984	0.057 L.F.	\$ 1,137.15 \$ 3.51 \$	\$ 1.95 \$	1,142.61 S	186,492.60 S 754,741.94 S	575.64 \$ 3,849.90 \$	319.80 \$ 2,081.98 \$	187,388.04 \$ 760,673.82	1,243.55 \$	6.00 \$	2.15 \$	1.251.70 \$	203,942.20 \$ 822,773.24 \$	984.00 S 6,588.70 S	352.60 S 2,295.18 S	205,278.80 STD Year 1,129,104.99	r 2009 100-102
9 W-Wide Flange-Column: W14X145																									
W-Wide Flange-Column: W14X145: 4	1	68 49.42	168	051223177350		W14x145	E2	984	0.057 L.F.	\$ 247.95 \$ 3.51 \$	\$ 1.95 \$	253.41 \$	41,655.60 \$	589.68 \$	327.60 S	42,572.88 \$	271.15 \$	6.00 S	2.15 \$	279.30 \$	45,553.20 \$	1,008.00 S	361.20 \$	45,922.40 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X233: 6	2	52 119.17	252	051223177350		W14x233	E2	964	0.057 L.F.	\$ 398.43 \$ 3.51 \$	s 1.95 s	403.89 \$	100,404.36 \$	884.52 \$	491.40 \$	101,780.28 \$	435.71 \$	6.00 S	2.15 \$	443.86 \$	109,798.92 \$	1,512.00 \$	541.80 S	111.852.72 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X398						1111.000																		444 444 34 OTD V	
W-Wide Flange-Column: W14X398: 8 W-Wide Flange-Column: W14X500	3	36 272.94	336	051223177350		W14x398	EZ	984	0.057 L.F.	\$ 680.58 \$ 3.51 \$	\$ 1.95 \$	686.04 S	228,674.88 \$	1,179.36 \$	655.20 \$	230,509.44 \$	744.26 \$	6.00 \$	2.15 \$	752.41 \$	250,071.36 \$	2,016.00 \$	722.40 \$	252,809.76 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X500: 2 W-Wide Flange-Column: W14X550		84 85.53	84	051223177350		W14x500	E2	984	0.057 L.F.	\$ 855.00 \$ 3.51 \$	\$ 1.95 \$	860.46 \$	71,820.00 S	294.84 \$	163.80 S	72,278.64 \$	935.00 \$	6.00 S	2.15 \$	943.15 \$	78,540.00 \$	504.00 S	180.60 \$	79,224.60 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X550: 4	1	68 188.17	168	051223177350		W14x550	E2	984	0.057 L.F.	\$ 940.50 \$ 3.51 \$	\$ 1.95 \$	945.96 \$	158.004.00 \$	589.68 \$	327.60 \$	158,921.28 \$	1,028.50 \$	6.00 \$	2.15 \$	1,036.65 \$	172,788.00 \$	1,008.00 \$	361.20 \$	174,157.20 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X730				054222477350		W14-720	52	60.4	0.0571.5			100376 4	101 017 00 1		173 M		1750		246	1222.04		604.00 F	100.00	11/ 3/3 40 STD V+11	2000 100 102
9:26	10	92 840.28	Total	101223117300		W NACION	ŭ	104	0.007 [C.P.	a 1,240.30 a - 3.51 a	a 1.35 a	1,253.76 S	705,416.04 \$	3,832.92	2,129.40 \$	711,378.36	1,395.10	6.00 3	2.15 8	1,373.25 S	771,419.88 \$	6,552.00 \$	2,347.80 \$	780,319.68	100-102
W-Wide Flange-Column: W14X145																									
W-Wide Flange-Column: W14X145: 4 W-Wide Flange-Column: W14X211	1	.60 47.07	160	051223177350		W14x145	E2	984	0.057 L.F.	\$ 247.95 \$ 3.51 \$	\$ 1.95 \$	253.41 \$	39,672.00 \$	561.60 \$	312.00 S	40,545.60 \$	271.15 \$	6.00 S	2.15 \$	279.30 S	43,384.00 \$	960.00 S	344.00 \$	44,688.00 STD Year	r 2009 100-102
W-Wide Flange-Column: W140211: 4	1	60 68.43	160	051223177350		W14x211	E2	984	0.057 L.F.	\$ 360.81 \$ 3.51 \$	\$ 1.95 \$	366.27 \$	57,729.60 \$	561.60 \$	312.00 \$	58,603.20 \$	394.57 \$	6.00 S	2.15 \$	402.72 \$	63,131.20 \$	960.00 S	344.00 \$	64,435.20 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X233		80 37.63	80	051223177350		W14/233	E2	621	0.0571 6	5 398 43 5 3 51 4	5 105 F	403.85	31 874 40 8	200.00	166.00	12 244 20	416.71 6	600.6	2.16 8	413 BE 6	34 855 80 8	400.00	173.00 6	36.658.85 STD	2009 100.102
W-Wide Flange-Column: W140233: 2		31.85	eu	pro 1880 11 / 350		-TIMES/	Ež	204	w.wdf L.F.	× 330.43 & 3.51 &	v 1.35 ð	405.63 3	31,014.40 3	200.00 3	100.00 3	32,311.20 3	+ +20.11 B	0.00 3	£ 01.3	49.00 0	34,030.00	480.00 5	112.00 8	33,540,80 510 1488	
W-Wide Flange-Column: W14X370: 8 W-Wide Flange-Column: W14X500	3	20 241.48	320	051223177350		W14x370	E2	984	0.057 L.F.	\$ 632.70 \$ 3.51 \$	\$ 1.95 \$	638.16 S	202,464.00 \$	1,123.20 \$	624.00 \$	204,211.20 \$	691.90 S	6.00 S	2.15 \$	700.05 \$	221,408.00 \$	1,920.00 S	688.00 S	224.016.00 STD Year	r 2009 100-102
W-Wide Flange-Column: W14X500: 6	2	40 244.36	240	051223177350		W14x500	E2	984	0.057 L.F.	\$ 855.00 \$ 3.51 \$	\$ 1.95 \$	860.46 \$	205.200.00 \$	842.40 \$	468.00 \$	206,510.40 \$	935.00 \$	6.00 S	2.15 \$	943.15 \$	224,400.00 \$	1,440.00 S	516.00 \$	226,356.00 STD Year	r 2009 100-102
W-Write Flange-Column: W140605		80 98.6	80	051223177350		W14x605	E2	984	0.057 L.F.	\$ 1,034.55 \$ 3.51 \$	\$ 1.95 \$	1.040.01 \$	82.764.00 S	280.80 S	156.00 S	83,200,80 \$	1,131,35 \$	6.00 S	2.15 S	1.139.50 S	90,508.00 S	480.00 \$	172.00 \$	91,160.00 STD Year	r 2009 100-102
12:26	10	40 737.78	Total									\$	619.704.00 S	3,650.40 \$	2,028.00 \$	625,382.40				\$	677,688.00 \$	6,240.00 \$	2,236.00 \$	685,154.00	

15 W-Wide Flange-Column: W14X132					1																	
W-Wide Flange-Column: W14X132: 4	168 44.87	168	051223177350		W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95 \$	231.18 \$	37,920.96 \$	589.68 \$	327.60 \$	38,838.24 \$	246.84 \$	6.00 S	2.15 \$	254.99 \$	41,469.12 \$	1,008.00 S	361.20 \$	42,838.32 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193: 6	252 98.87	252	051223177350		W14x193	E2	984	0.057 L.F. \$ 330.03 \$ 3.51 \$ 1.95 \$	335.49 \$	83,167.56 \$	884.52 \$	491.40 S	84,543.48 \$	360.91 \$	6.00 S	2.15 \$	369.06 \$	90,949.32 \$	1,512.00 S	541.80 \$	93,003.12 STD	Year 2009 100-102
W-Wide Flange-Column: W14X311	136 212.16	336	051223177350		W14x311	E2	984	0.057 L.F. S. 531.81 S. 3.51 S. 1.95 S.	537.27 \$	178 688 16 5	1 179 35 5	655.20 \$	180 522 72 8	581.57 \$	6.00 5	2.15 5	589.72 \$	195,407,52 \$	2.016.00 5	722.40 \$	198.145.92 STD	Year 2009 100-102
W-Wide Flange-Column: W14X426																				112.40	100,000,00	
W-Wide Flange-Column: W14X426: 6 W-Wide Flange-Column: W14X550	252 219.12	252	051223177350		W14x426	E2	984	0.057 L.F. \$ 728.46 \$ 3.51 \$ 1.95 \$	733.92 \$	183,571.92 \$	884.52 \$	491.40 \$	184,947.84 \$	796.62 \$	6.00 \$	2.15 \$	804.77 \$	200,748.24 \$	1,512.00 \$	541.80 \$	202,802.04 STD	Year 2009 100-102
W-Wide Flange-Column: W14X550: 2 15:26	84 94.08 1092 669.31	84 Total	051223177350		W14x550	E2	984	0.057 L.F. \$ 940.50 \$ 3.51 \$ 1.95 \$	945.96 S	79,002.00 S	294.84 S 3,832.92 \$	163.80 S	79,460.64 S	1,028.50 \$	6.00 \$	2.15 \$	1,036.65 S	86,394.00 \$ 614,968.20 \$	504.00 S	180.60 S	87,078.60 STD 623,868.00	Year 2009 100-102
18 W-Wide Flange-Column: W14X132																						
W-Wide Flange-Column: W14X132: 4	164 43.8	164	051223177350		W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95 \$	231.18 \$	37,018.08 S	575.64 \$	319.80 \$	37,913.52 \$	246.84 S	6.00 S	2.15 \$	254.99 S	40,481.76 \$	964.00 S	352.60 \$	41,818.36 STD	Year 2009 100-102
W-Wide Flange-Column: W14X176 W-Wide Flange-Column: W14X176: 4	164 58.66	164	051223177450		W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10 \$	306.03 S	49,224.60 \$	619.92 \$	344.40 \$	50,188.92 \$	331.20 S	6.47 S	2.31 \$	339.98 S	54,316.80 \$	1,061.08 \$	378.84 \$	55,756.72 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193		62	064020477360		W44-402	E2	691		226.45	07.000.40		10.00		20.00	e 44 e		200.00		103.00		25.052.05 CTD	Very 2000 100 102
W-Wide Flange-Column: W14X195: 2 W-Wide Flange-Column: W14X311	82 32.17	92	1001220117000		W14X133	E2	304	0.007 L.F. 3 330.03 3 3.51 3 1.55 3	335.49 8	21,062.46 3	201.02 3	153.30 8	21,510.16 8	360.31 5	6.00 3	2.15 3	363.06 \$	23,534.62 a	492.00 5	1/6.30 \$	30,262.32 010	148/2003 100-102
W-Wide Flange-Column: W14X311: 8 W-Wide Flange-Column: W14X370	328 207.31	328	051223177350		W14x311	E2	984	0.057 L.F. \$ 531.81 \$ 3.51 \$ 1.95 \$	537.27 S	174,433.68 \$	1,151.28 \$	639.60 \$	176,224.56 \$	581.57 S	6.00 S	2.15 \$	589.72 \$	190,754.96 \$	1,968.00 S	705.20 \$	193,428.16 STD	Year 2009 100-102
W-Wide Flange-Column: W14X370: 4 W-Wide Flange-Column: W14X398	164 123.76	164	051223177350		W14x370	E2	984	0.057 L.F. \$ 632.70 \$ 3.51 \$ 1.95 \$	638.16 \$	103,762.80 \$	575.64 \$	319.80 \$	104,658.24 \$	691.90 \$	6.00 \$	2.15 \$	700.05 \$	113,471.60 \$	984.00 S	352.60 \$	114,808.20 STD	Year 2009 100-102
W-Wide Flange-Column: W14X398: 2	82 66.61	82	051223177350		W14x398	E2	984	0.057 L.F. \$ 680.58 \$ 3.51 \$ 1.95 \$	686.04 S	55,807.56 S	267.82 \$	159.90 S	56,255.28 \$	744.26 S	6.00 S	2.15 \$	752.41 \$	61,029.32 \$	492.00 S	176.30 \$	61,697.62 STD	Year 2009 100-102
W-Wide Flange-Column: W14X455	82 75.9	82	051223177350		W14x455	E2	984	0.057 L.F. \$ 778.05 \$ 3.51 \$ 1.95 \$	783.51 \$	63,800.10 \$	287.82 \$	159.90 \$	64,247.82 \$	850.85 \$	6.00 \$	2.15 \$	859.00 \$	69,769.70 \$	492.00 \$	176.30 \$	70,438.00 STD	Year 2009 100-102
18:26	1066 608.22	Total							\$	511,109.28 \$	3,785.94 \$	2,103.30 \$	516,998.52				\$	559,418.76 \$	6,473.08 \$	2,318.14 \$	568,209.98	
W-Wide Flange-Column: W14X132		164	A6122217736A		W14-192	62	694		221.42	27.049.09		210.00	27.012.02		6 00 E	246	254.60	10 101 76 6	001.00	202.00	44 848 36 CTD	Year 2000 100 102
W-Wide Flange-Column: W14X132: 4 W-Wide Flange-Column: W14X176	104 43.8	164	1051223117350	_	W14K13Z	EZ	304	0.007 L.P. \$ 225.72 \$ 3.51 \$ 1.95 \$	231.18 \$	37,018.08 \$	5/5.64 3	319.80 5	37,913.52 \$	246.84 \$	6.00 5	2.15 \$	254.39 \$	40,481./6 \$	384.00 5	352.60 \$	41,818.36 510	Tear 2009 100-102
W-Wide Flange-Column: W14X176: 4 W-Wide Flange-Column: W14X193	164 58.66	164	051223177450		W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10 \$	306.03 \$	49,224.60 \$	619.92 \$	344.40 \$	50,188.92 \$	331.20 S	6.47 S	2.31 \$	339.98 \$	54,316.80 \$	1,061.08 S	378.84 \$	55,756.72 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193: 2 W-Wide Flange-Column: W14X111	82 32.17	82	051223177350		W14x193	E2	984	0.057 L.F. \$ 330.03 \$ 3.51 \$ 1.95 \$	335.49 S	27,062.46 \$	287.82 \$	159.90 S	27,510.18 \$	360.91 S	6.00 S	2.15 \$	369.06 \$	29,594.62 \$	492.00 S	176.30 \$	30,262.92 STD	Year 2009 100-102
W-Wide Flange-Column: W14X311: 8	328 207.31	328	051223177350		W14x311	E2	984	0.057 L.F. \$ 531.81 \$ 3.51 \$ 1.95 \$	537.27 \$	174,433.68 \$	1,151.28 \$	639.60 \$	176,224.56 \$	581.57 \$	6.00 \$	2.15 \$	589.72 \$	190,754.96 \$	1,968.00 \$	705.20 \$	193,428.16 STD	Year 2009 100-102
W-Wide Flange-Column: W14X370 W-Wide Flange-Column: W14X370: 4	164 123.76	164	051223177350		W14x370	E2	984	0.057 L.F. \$ 632.70 \$ 3.51 \$ 1.95 \$	638.16 S	103,762.80 \$	575.64 \$	319.80 \$	104,658.24 \$	691.90 S	6.00 S	2.15 \$	700.05 S	113,471.60 \$	984.00 S	352.60 \$	114,808.20 STD	Year 2009 100-102
W-Wide Flange-Column: W14X398			4/10001770/4			52						240.00					779.44	100.070.01			102.225.01 (270)	V 2020 100 100
W-Wide Flange-Column: W14X198: 4 21:26	104 133.22	Total	051223117350		W14X390	EZ	204	0.007 L.P. \$ 660.56 \$ 3.51 \$ 7.95 \$	686.04 S	503,116.74 \$	3,785.94 \$	2,103.30 \$	509,005.98	/44.20 5	6.00 5	2.15 \$	752,41 5 \$	550,678.38 \$	6,473.08 \$	2,318.14 \$	123,395,24 STD 559,469.60	14ar 2009 100-102
W-Wide Flange-Column: W14X132																						
W-Wide Flange-Column: W14X132: 4 W-Wide Flange-Column: W14X176	164 43.8	164	051223177350		W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95 \$	231.18 \$	37,018.08 \$	575.64 \$	319.80 \$	37,913.52 \$	246.84 \$	6.00 S	2.15 \$	254.99 \$	40,481.76 \$	984.00 \$	352.60 \$	41,818.36 STD	Year 2009 100-102
W-Wide Flange-Column: W14X176: 4 W-Wide Flange-Column: W14X193	164 58.66	164	051223177450		W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10 \$	306.03 S	49,224.60 S	619.92 \$	344.40 S	50,188.92 \$	331.20 S	6.47 S	2.31 \$	339.98 \$	54,316.80 \$	1,061.08 S	378.84 \$	55,756.72 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193: 2	82 32.17	82	051223177350		W14×193	E2	984	0.057 L.F. \$ 330.03 \$ 3.51 \$ 1.95 \$	335.49 \$	27,062.46 \$	287.82 \$	159.90 S	27,510.18 \$	360.91 S	6.00 S	2.15 \$	369.06 \$	29,594.62 \$	492.00 S	176.30 \$	30,262.92 STD	Year 2009 100-102
W-Wide Flange-Column: W14X311 W-Wide Flange-Column: W14X311: 8	328 207.31	328	051223177350		W14x311	E2	984	0.057 L.F. \$ 531.81 \$ 3.51 \$ 1.95 \$	537.27 \$	174,433.68 \$	1,151.28 \$	639.60 \$	176,224.56 \$	581.57 \$	6.00 \$	2.15 \$	589.72 \$	190,754.96 \$	1,968.00 S	705.20 \$	193,428.16 STD	Year 2009 100-102
W-Wide Flange-Column: W14X370	164 122 26	164	051223177350		W14v370	F2	984	0.057 LE 5.612.70 5.3.61 5. 1.96 5	638.56 5	103 762 80 5	676.64 \$	319.00 \$	104.658.24	691.90 5	6.00 5	2.16 8	700.05 5	113.471.60 \$	984 00 S	362.60 \$	114 838 20 STD	Year 2009 100-102
W-Wide Flange-Column: W14X398	104 112.10								000.10	100,102.00	575.64	515.00	104,030.24	071.30		2.15	100.00	113,471.00	204.00	552.00	114,000.20 010	
W-Wide Flange-Column: W14X198: 4 24:26:00	164 133.22 1066 598.92	Total	051223177350		W14x398	E2	964	0.057 L.F. \$ 680.58 \$ 3.51 \$ 1.95 \$	686.04 S	111,615.12 \$ 503,116.74 \$	575.64 \$ 3,785.94 \$	319.80 \$ 2,103.30 \$	112,510.56 \$ 509,005.98	744.26 \$	6.00 \$	2.15 \$	752.41 \$	122,058.64 \$ 550,678.38 \$	984.00 \$ 6,473.08 \$	352.60 \$ 2,318.14 \$	123.395.24 STD 559,469.60	Year 2009 100-102
27 W-Wide Flange-Column: W14X132																						
W-Wide Flange-Column: W14X132: 4 W-Wide Flange-Column: W14X176	220 58.76	220	051223177350		W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95 \$	231.18 \$	49,658.40 \$	772.20 \$	429.00 \$	50,859.60 \$	246.84 \$	6.00 S	2.15 \$	254.99 \$	54,304.80 \$	1,320.00 \$	473.00 \$	56,097.80 STD	Year 2009 100-102
W-Wide Flange-Column: W14X176: 4	220 78.69	220	051223177450		W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10 \$	306.03 \$	66,033.00 \$	831.60 \$	462.00 S	67,326.60 \$	331.20 \$	6.47 \$	2.31 \$	339.98 \$	72,864.00 \$	1,423.40 S	508.20 \$	74,795.60 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193: 2	110 43.16	110	051223177350		W14x193	E2	984	0.057 L.F. \$ 330.03 \$ 3.51 \$ 1.95 \$	335.49 \$	36,303.30 \$	386.10 \$	214.50 S	36,903.90 \$	360.91 S	6.00 S	2.15 \$	369.05 \$	39,700.10 \$	660.00 S	236.50 \$	40,596.60 STD	Year 2009 100-102
W-Wide Flange-Column: W14X311	440 278.1	440	051223177350		W14x311	E2	984	0.057 L.F. 5 53181 5 3.51 5 1.95 5	537.27 \$	233 996 40 \$	1.544.40 S	858.00 \$	236 398 80 \$	581.57 \$	6.00 S	2.15 5	589.72 5	255.890.80 \$	2.640.00 5	946.00 S	259.476.80 STD	Year 2009 100-102
W-Wide Flange-Column: W14X370			051000177070			E*	674										200.00	10.010				New 2000 600 400
W-Wide Flange-Column: W14X370: 4 W-Wide Flange-Column: W14X398	220 166.02	220	101263117350		1114X3/Q	E2	204	v.w/rp.r. a 632.ru 3 3.51 3 1.95 5	030.16 3	139,194.00 \$	112.20 3	423.00 3	140,335.20 \$	6 06.100	0.00 3	2.15 \$	100.05 5	152,218.00 \$	1,320.00 5	473.00 \$	154,011.00 [SID	1 Har 2003 100-102
W-Wide Flange-Column: W34X398: 4 27:26:00	220 178.71 1430 803.43	220 Total	051223177350		W14x398	E2	964	0.057 L.F. \$ 680.58 \$ 3.51 \$ 1.95 \$	686.04 S	149,727.60 \$ 674,912.70 \$	772.20 \$ 5,078.70 \$	429.00 \$ 2,821.50 \$	150,928.80 \$ 682,812.90	744.26 \$	6.00 \$	2.15 \$	752.41 \$	163,737.20 \$ 738,714.90 \$	1,320.00 S 8,683.40 S	473.00 \$ 3,109.70 \$	165,530.20 STD 750,508.00	Year 2009 100-102
30 W-Wide Flange-Column: W14X99																						
W-Wide Flange-Column: W14X99: 4 W-Wide Flange-Column: W14X120	164 32.92	164	051223177350		W14x99	E2	964	0.057 L.F. \$ 169.29 \$ 3.51 \$ 1.95 \$	174.75 \$	27,763.56 \$	575.64 \$	319.80 \$	28,659.00 \$	185.13 \$	6.00 \$	2.15 \$	193.28 \$	30,361.32 \$	984.00 S	352.60 \$	31,697.92 STD	Year 2009 100-102
W-Wide Flange-Column: W14X120: 6	246 59.93	246	051223177400		W14x120	E2	960	0.058 L.F. \$ 204.93 \$ 3.60 \$ 1.99 \$	210.52 \$	50,412.78 S	885.60 \$	489.54 S	51,787.92 \$	225.63 \$	6.15 \$	2.19 \$	233.97 S	55,504.98 \$	1,512.90 S	538.74 \$	57,556.62 STD	Year 2009 100-102
W-Wide Flange-Column: W14X193 W-Wide Flange-Column: W14X193: 8	328 128.68	328	051223177350		W14x193	E2	984	0.057 L.F. \$ 330.03 \$ 3.51 \$ 1.95 \$	335.49 \$	108,249,84 \$	1,151.28 \$	639.60 \$	110,040.72 \$	360.91 \$	6.00 S	2.15 \$	369.06 \$	118,378.48 \$	1,968.00 \$	705.20 \$	121.051.68 STD	Year 2009 100-102
W-Wide Flange-Column: W34X233		161	464020477360			E2						240.00									20 340 AL OTO	V 2020 422 402
W-Wese Hange-Column: W14X233: 4 W-Wide Flange-Column: W14X283	164 77.55	164	101263117350		11 14X233	E2	204	v.w/rjur. ja 398.43 \$ 3.51 \$ 1.95 \$	403.89 5	65,342.52 S	5/5.64 3	319.80 \$	66,237.96 \$	435./1 5	0.00 3	2.15 \$	443.65 5	/1,456.44 5	304.00 5	352.60 \$	72,793.04 STD	1 Har 2003 100-102
W-Wide Flange-Column: W14X283: 4 30:26:00	164 94.37 1066 393.46	164 Total	051223177350		W14x283	E2	984	0.057 L.F. \$ 483.93 \$ 3.51 \$ 1.95 \$	489.39 \$	79,364.52 \$ 331,133.22 \$	575.64 \$ 3,763.80 \$	319.80 \$ 2,088.54 \$	80,259.96 \$ 336,985.56	529.21 \$	6.00 \$	2.15 \$	537.36 \$	85,790.44 \$ 362,491.66 \$	984.00 \$ 6,432.90 \$	352.60 \$ 2,301.74 \$	88,127.04 STD 371,226.30	Year 2009 100-102
33 W-Wide Flange-Column: W14X90																						
W-Wide Flange-Column: W140390: 4 W-Wide Flange-Column: W140309	164 29.8	164	051223177350		W14x90	E2	984	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95 \$	159.36 \$	25,239.60 \$	575.64 \$	319.80 \$	26,135.04 \$	168.30 \$	6.00 \$	2.15 \$	176.45 \$	27,601.20 \$	984.00 S	352.60 \$	28,937.80 STD	Year 2009 100-102
W-Wide Flange-Column: W14X109: 6	246 54.12	246	051223177350		W14×109	E2	984	0.057 L.F. \$ 186.39 \$ 3.51 \$ 1.95 \$	191.85 S	45,851.94 S	863.46 \$	479.70 S	47,195.10 \$	203.83 S	6.00 S	2.15 \$	211.98 \$	50,142.18 \$	1,476.00 S	528.90 \$	52,147.08 STD	Year 2009 100-102
w-write Hange-Column: W10X176 W-Wide Flange-Column: W14X176: 8	328 117.32	328	051223177450		W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10 \$	306.03 S	98,449.20 \$	1.239.84 \$	688.80 \$	100,377.84 S	331.20 S	6.47 S	2.31 \$	339.98 \$	108,633.60 \$	2,122.16 \$	757.68 S	111.513.44 STD	Year 2009 100-102
W-Wide Flange-Column: W14X211		101	0612221477360		W14v2+4	#2	60.1	0.0071 E 8 20.91 6 3.44 6 4 4	366.07	69.577.04	576 C	340.00	50.050.00 C	201.07	6 00 e	2.15	402 70 4	54 700 40 F	601.00	200.00	CE 045 40 0000	Yest 2020 502 402
W-Wide Flange-Column: W14X233	104 70.14	164	por nata titrabl		PT /45211	E4	204		309.27 3	37,172.64 \$	5/5/04 3	313.00 \$	vv,voo.28 \$	004.01 3	0.00 3	6. IQ 9		04,703,46 \$	304.00 \$	304.60 \$	66,046.08 [STD	1998 2002 100-102
W-Wide Flange-Column: W14X233: 4 33:26:00	164 77.55 1066 348.95	164 Total	051223177350		W14x233	E2	984	0.057 L.F. \$ 398.43 \$ 3.51 \$ 1.95 \$	403.89 \$	65,342.52 \$ 294,056.10 \$	575.64 \$ 3,830.22 \$	319.80 \$ 2,127.90 \$	66,237.96 \$ 300,014.22	435.71 \$	6.00 \$	2.15 \$	443.86 \$	71,456.44 \$ 322,542.90 \$	984.00 S 6,550.16 S	352.60 \$ 2,344.38 \$	72,793.04 STD 331,437.44	Year 2009 100-102

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30 W-Wide Flange-Column: W14090																					
W-Wide Flange-Column: W140390: 8 W-Wide Flange-Column: W140399	336 61.06	336	051223177350	W14x90	E2	984	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$	51,710.40 \$	1,179.36 \$	655.20 \$	53,544.96 \$	168.30 \$	6.00 \$	2.15 \$	176.45 \$	56,548.80 \$	2,016.00 \$	722.40 \$	59,287.20 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X99: 2 W-Wide Flange-Column: W14X145	84 16.86	84	051223177350	W14x99	E2	984	0.057 L.F. \$ 169.29 \$ 3.51 \$ 1.95	\$ 174.75 \$	14,220.36 \$	294.84 \$	163.80 \$	14,679.00 \$	185.13 \$	6.00 S	2.15 \$	193.28 \$	15,550.92 \$	504.00 \$	180.60 \$	16,235.52 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X145: 8 W-Wide Flange-Column: W14X176	336 98.85	336	051223177350	W14x145	E2	984	0.057 L.F. \$ 247.95 \$ 3.51 \$ 1.95	\$ 253.41 \$	83.311.20 \$	1,179.36 \$	655.20 \$	85,145.76 \$	271.15 \$	6.00 S	2.15 \$	279.30 \$	91,106.40 \$	2,016.00 \$	722.40 \$	93,844.80 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X176: 4 W-Wide Flange-Column: W14X211	168 60.09	168	051223177450	W14×176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10	\$ 306.03 \$	50.425.20 \$	635.04 \$	352.80 S	51,413.04 S	331.20 \$	6.47 S	2.31 \$	339.98 \$	55,641.60 \$	1,086.96 \$	388.08 \$	57,116.64 STD Year 2009 1	00-102
W-Wide Flange-Column: W140C211: 4 36:26:00	168 71.86 1092 308.72	168 Total	051223177350	W14x211	E2	984	0.057 L.F. \$ 360.81 \$ 3.51 \$ 1.95	\$ 366.27 \$ \$	60,616.08 \$ 260,283.24 \$	589.68 S 3,878.28 S	327.60 \$ 2,154.60 \$	61,533.36 \$ 266,316.12	394.57 \$	6.00 \$	2.15 \$	402.72 \$ \$	66,287.76 \$ 285,135.48 \$	1,008.00 S 6,630.96 S	361.20 \$ 2,374.68 \$	67,656.96 STD Year 2009 1 294,141.12	00-102
39 W-Wide Flange-Column: W14X74																					
W-Wide Flange-Column: W14074: 4 W-Wide Flange-Column: W14030	164 24.53	164	051223177350	W14x74	E2	984	0.057 L.F. \$ 126.27 \$ 3.51 \$ 1.95	\$ 131.73 \$	20,708.28 \$	575.64 \$	319.80 \$	21,603.72 \$	138.69 \$	6.00 \$	2.15 \$	146.84 \$	22,745.16 \$	984.00 \$	352.60 \$	24,081.76 STD Year 2009 1	00-102
W-Wide Flange-Column: W14030: 6 W-Wide Flange-Column: W14032	246 44.71	245	051223177350	W14x90	E2	584	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$	37,859.40 \$	863.46 \$	479.70 S	39,202.56 \$	168.30 \$	6.00 \$	2.15 \$	176.45 \$	41,401.80 \$	1,476.00 S	528.90 \$	43,406.70 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X132: 8 W-Wide Flange-Column: W14X159	328 87.61	328	051223177350	W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95	\$ 231.18 \$	74,036.16 \$	1,151.28 \$	639.60 \$	75,827.04 \$	246.84 \$	6.00 S	2.15 \$	254.99 \$	80,963.52 \$	1,968.00 \$	705.20 \$	83,636.72 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X159: 4 W-Wide Flange-Column: W14X176	164 52.99	164	051223177350	W14x159	E2	984	0.057 L.F. \$ 271.89 \$ 3.51 \$ 1.95	\$ 277.35 \$	44,589.96 \$	575.64 \$	319.80 \$	45,485.40 \$	297.33 \$	6.00 \$	2.15 \$	305.48 \$	48,762.12 \$	984.00 \$	352.60 \$	50,098.72 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X176: 4 39:26:00	164 58.66 1066 268.5	164 Total	051223177450	W14x176	E2	912	0.061 L.F. \$ 300.15 \$ 3.78 \$ 2.10	\$ 306.03 \$	49,224.60 S 226,418.40 S	619.92 S 3,785.94 S	344.40 S 2,103.30 S	50,188.92 \$ 232,307.64	331.20 S	6.47 S	2.31 \$	339.98 S	54,316.80 \$ 248,189.40 \$	1,061.08 S 6,473.08 S	378.84 \$ 2,318.14 \$	55,756.72 STD Year 2009 1 256,980.62	00-102
42 W-Wide Flange-Column: W14X74				-										_							
W-Wide Flange-Column: W14X74: 8 W-Wide Flange-Column: W14X82	328 49.06	328	051223177350	W14x74	E2	584	0.057 L.F. \$ 126.27 \$ 3.51 \$ 1.95	\$ 131.73 \$	41,416.56 \$	1,151.28 \$	639.60 S	43,207.44 \$	138.69 \$	6.00 S	2.15 \$	146.84 S	45,490.32 \$	1,968.00 S	705.20 \$	48,163.52 STD Year 2009 1	00-102
W-Wide Flange-Column: W14082: 2 W-Wide Flange-Column: W14009	82 13.51	82	051223177350	W14x82	E2	984	0.057 L.F. \$ 140.22 \$ 3.51 \$ 1.95	\$ 145.68 \$	11,498.04 \$	287.82 \$	159.90 \$	11,945.76 \$	153.34 \$	6.00 S	2.15 \$	161.49 \$	12,573.88 \$	492.00 \$	176.30 \$	13,242.18 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X109: 8 W-Wide Flange-Column: W14X132	328 72.17	328	051223177350	W14x109	E2	\$64	0.057 L.F. \$ 186.39 \$ 3.51 \$ 1.95	\$ 191.85 \$	61,135.92 \$	1,151.28 \$	639.60 S	62,926.80 \$	203.83 \$	6.00 S	2.15 \$	211.98 \$	66,856.24 \$	1,968.00 \$	705.20 \$	69,529.44 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X132: 4 W-Wide Flange-Column: W14X145	164 43.8	164	051223177350	W14x132	E2	984	0.057 L.F. \$ 225.72 \$ 3.51 \$ 1.95	\$ 231.18 \$	37,018.08 \$	575.64 \$	319.80 S	37,913.52 \$	246.84 \$	6.00 \$	2.15 \$	254.99 \$	40,481.76 \$	584.00 S	352.60 \$	41,818.36 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X145: 4 42:26:00	164 48.25 1066 226.79	164 Total	051223177350	W14x145	E2	984	0.057 L.F. \$ 247.95 \$ 3.51 \$ 1.95	\$ 253.41 S	40,663.80 S 191,732.40 S	575.64 S 3,741.66 S	319.80 S 2,078.70 S	41,559.24 \$ 197,552.76	271.15 \$	6.00 S	2.15 \$	279.30 S	44,458.60 \$ 209,870.80 \$	584.00 S 6,396.00 S	352.60 \$ 2,291.90 \$	45,805.20 STD Year 2009 1 218,558.70	00-102
45 W-Wide Flange-Column: W14X68			-																		
W-Wide Flange-Column: W14X58: 6 W-Wide Flange-Column: W14X74	246 33.44	245	051223177350	W14x68	E2	984	0.057 L.F. \$ 116.28 \$ 3.51 \$ 1.95	\$ 121.74 \$	28,604.88 \$	863.46 \$	479.70 S	29,948.04 \$	127.16 \$	6.00 S	2.15 \$	135.31 \$	31,281.36 \$	1,476.00 S	528.90 \$	33,286.26 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X74: 4 W-Wide Flange-Column: W14X90	164 24.53	164	051223177350	W14x74	E2	984	0.057 L.F. \$ 126.27 \$ 3.51 \$ 1.95	\$ 131.73 \$	20,708.28 \$	575.64 \$	319.80 \$	21,603.72 \$	138.69 \$	6.00 \$	2.15 \$	146.84 \$	22,745.16 \$	584.00 \$	352.60 \$	24,081.76 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X90: 8 W-Wide Flange-Column: W14X99	328 59.61	328	051223177350	W14x90	E2	564	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$	50.479.20 \$	1,151.28 \$	639.60 S	52,270.08 \$	168.30 \$	6.00 S	2.15 \$	176.45 \$	55,202.40 \$	1,968.00 S	705.20 \$	57,875.60 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X99: 4 W-Wide Flange-Column: W14X109	164 32.92	164	051223177350	W14x99	E2	984	0.057 L.F. \$ 169.29 \$ 3.51 \$ 1.95	\$ 174.75 \$	27,763.56 \$	575.64 \$	319.80 S	28,659.00 \$	185.13 \$	6.00 S	2.15 \$	193.28 \$	30,361.32 \$	984.00 S	352.60 \$	31,697.92 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X109: 4 45:26:00	164 36.08 1066 186.59	164 Total	051223177350	W14x109	E2	984	0.057 L.F. \$ 186.39 \$ 3.51 \$ 1.95	\$ 191.85 \$ \$	30,567.96 S 158,123.88 S	575.64 \$ 3,741.66 \$	319.80 S 2,078.70 S	31,463.40 \$ 163,944.24	203.83 \$	6.00 S	2.15 \$	211.98 S	33,428.12 \$ 173,018.36 \$	984.00 S 6,396.00 S	352.60 \$ 2,291.90 \$	34,764.72 STD Year 2009 1 181,706.26	00-102
48 W-Wide Flange-Column: W14X61																					
W-Wide Flange-Column: W14X61: 2 W-Wide Flange-Column: W14X68	84 10.28	84	051223177350	W14x61	E2	984	0.057 L.F. \$ 104.31 \$ 3.51 \$ 1.95	\$ 109.77 \$	8,762.04 \$	294.84 \$	163.80 \$	9,220.68 \$	114.07 \$	6.00 S	2.15 \$	122.22 \$	9,581.88 \$	504.00 S	180.60 \$	10,256.48 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X68: 4 W-Wide Flange-Column: W14X74	168 22.84	168	051223177350	W14x68	E2	984	0.057 L.F. \$ 116.28 \$ 3.61 \$ 1.95	\$ 121.74 \$	19,535.04 \$	589.68 S	327.60 \$	20,452.32 \$	127.16 \$	6.00 \$	2.15 \$	135.31 \$	21,362.88 \$	1,008.00 S	361.20 \$	22,732.06 STD Year 2009 1	00-102
W-Wide Flange-Column: W14074: 4 W-Wide Flange-Column: W14082	168 25.13	168	051223177350	W14x74	E2	984	0.057 L.F. \$ 126.27 \$ 3.51 \$ 1.95	\$ 131.73 \$	21,213.36 \$	589.68 \$	327.60 \$	22,130.64 \$	138.69 \$	6.00 \$	2.15 \$	146.84 \$	23,299.92 \$	1,008.00 \$	361.20 \$	24,659.12 STD Year 2009 1	00-102
W-Wide Flange-Column: W14082: 8 W-Wide Flange-Column: W14090	336 55.36	336	051223177350	W14x82	E2	984	0.057 L.F. \$ 140.22 \$ 3.51 \$ 1.95	\$ 145.68 \$	47,113.92 \$	1,179.36 \$	655.20 \$	48,948.48 \$	153.34 \$	6.00 S	2.15 \$	161.49 \$	51,522.24 \$	2,016.00 \$	722.40 \$	54,260.64 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X99 W-Wide Flange-Column: W14X99	168 30.53	168	051223177350	W14x90	E2	984	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$	25,855.20 \$	589.68 \$	327.60 \$	26,772.48 \$	168.30 \$	6.00 \$	2.15 \$	176.45 \$	28,274,40 \$	1,008.00 \$	361.20 \$	29,643.60 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X99: 4 48:26:00	168 33.72 1092 177.86	168 Total	051223177350	W14x99	E2	984	0.057 L.F. \$ 169.29 \$ 3.51 \$ 1.95	\$ 174.75 \$ \$	28,440.72 \$ 150,920.28 \$	589.68 \$ 3,832.92 \$	327.60 S 2,129.40 S	29,358.00 \$ 156,882.60	185.13 \$	6.00 S	2.15 \$	193.28 S	31,101.84 \$ 165,143.16 \$	1,008.00 S 6,552.00 S	361.20 \$ 2,347.80 \$	32,471.04 STD Year 2009 1 174,042.96	00-102
W-Wide Flange-Column: W14X61																				6 mm 40 mm hu - 6440	
W-Wide Flange-Column: W14081: 2 W-Wide Flange-Column: W14068	55 6.73	50	101223117350	W14X61	E2	304	0.057 L.P. \$ 104.31 \$ 3.51 \$ 1.95	\$ 109.77 \$	5,737.05 \$	193.05 \$	107.25 \$	6,037.35 \$	114.07 5	6.00 \$	2.15 \$	122.22 \$	6,2/3.85 \$	330.00 \$	118.25 \$	6,722.10 SID Tear 2009 1	00-102
W-Wide Flange-Column: W14038: 4 W-Wide Flange-Column: W14074	110 14.95	110	051223177350	W14x08	EZ	304	0.007 L.P. \$ 116.28 \$ 3.51 \$ 1.95	\$ 121.74 \$	12,790.80 \$	386.10 S	214.50 \$	13,391.40 \$	127.16 \$	6.00 \$	2.15 \$	135.31 5	13,957.60 \$	660.00 S	236.50 \$	14,884.10 STD Year 2009 1	00-102
w-wide Flange-Column: W14074: 4 W-Wide Flange-Column: W14082	110 16.45	110	051223177350	v/14X/4	EZ	964	v.vo/jLP. \$ 126.27 \$ 3.51 \$ 1.95	> 131.73 \$	13,869,70 \$	386.10 \$	214.50 \$	14,490.30 \$	138.69 \$	6.00 \$	2.15 \$	145.84 S	15,255.90 \$	660.00 S	238.50 \$	16,152.40 STD Year 2009 1	00-102
W-Wide Flange-Column: W14082: 8 W-Wide Flange-Column: W14090	220 36.25	220	001223177350	v/74x82	E2	984	v.vo/jLF. \$ 140.22 \$ 3.51 \$ 1.95	a 145.68 \$	30,848.40 S	7/2.20 \$	429.00 S	32,049.60 \$	153.34 \$	6.00 \$	2.15 \$	161.49 \$	33,734.80 \$	1,320.00 S	473.00 \$	35,527.80 STD Year 2009 1	00-102
W-Wide Flange-Column: W14030: 4 W-Wide Flange-Column: W14039	110 19.99	110	051223177350	W14x90	E2	984	0.057 LF. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$	16,929.00 \$	386.10 \$	214.50 \$	17,529.60 \$	168.30 \$	6.00 \$	2.15 \$	176.45 \$	18,513.00 \$	660.00 S	236.50 \$	19,409.50 STD Year 2009 1	00-102
W-Wide Flange-Column: W14X99; 4 51:26:00 52	110 22.08 715 116.46	Total	1051223177350	W14x99	E2	984	0.057 L.F. \$ 169.29 \$ 3.51 \$ 1.95	5 174.75 \$ \$	18,621.90 \$ 98,816.85 \$	386.10 \$ 2,509.65 \$	214.50 \$ 1,394.25 \$	19,222.50 \$ 102,720.75	185.13 \$	6.00 \$	2.15 \$	193.28 \$	20,364.30 \$ 108,129.45 \$	660.00 S	236.50 \$ 1,537.25 \$	21,260.80 [STD Year 2009 1 113,956.70	00-102
HSS-Hollow Structural Section-Column: HSS12X4X5/16	178 7 60	128	051223750360	HSS12x4x5/16	E2	550	0.102 LF. 5 68 13 5 6 97 6 3 46	\$ 77.05 C	8 720 64	802 KE 6	446 70 E	9.969.92 e	75.03 \$	10.76 \$	3.63 5	89.62 e	9.603.84	1 377 28 6	490.24 €	11.471 36 STD Very 2000	00-102
W-Wide Flange-Column5: W12X53	612 64.01	612	051223177150	W12x53	F2	1012	0.054 LF. 5 8639 5 34 5 4 or	s 90.60 c	52 258 FB 6	2 044 02 6	1 132 30 6	55.441 NR C	94,19 5	5.72 \$	2.05 5	101 96 6	57.644.28 ¢	3 500 54 6	1,964.60	62 399 52 STD Very 2000	00-102
W-Wide Flange-Column5: W14X68	10.00 mm	51	051223177350	W14x68	E2	624	0.057 LF & 116.58 e 3.64 e 4.04	5 101.74 E	6 000 00 e	176.01 C	a 21,000	6 208 74 6	127.16 €	6.00 e	2 16 5	136.31 6	6 425 16 E	305.00	109.65	6 000 25 STD Vas 2000	00-102
W-Wide Flange-Column5: W1406:2	24 0.95	10	061222177360	W14+132		101		e 004.40 e	0,030.00 0	1/3.01 0	33.40 0	100 222 40	040 04 =	5.00 F	2.10 0	264.60	107 439 70 0	2 604.00	022 40 4	410 222 22 0070	00.102
W-Wide Flange-Column5: W24X132: 17 W-Wide Flange-Column5: W21X68	434 115.79	434	101223117350	W14X132	- E4	304	0.097 L.P. \$ 225.72 \$ 3.51 \$ 1.95	5 231.18 5	97,962.48 5	1,523.34 8	846.30 5	100,332.12 8	246.84 5	6.00 5	2.15 5	254.39 8	107,128.56 \$	2,604.00 5	933.10 5	110,005.06 SID Tear 2009	00-102
w-wide Hange-Column5: W21X68: 2 W-Wide Flange-Column: W14X68	51 7.01	51	001223754700	VY21008	ES	1036	0.0771 F. 5 115.92 \$ 4.83 \$ 1.99	> 122.74 \$	5,911.92 \$	246.33 \$	101.49 \$	0,259.74 \$	127.31 \$	8.35 \$	2.19 5	13/.85 \$	0,492.81 \$	425.85 \$	111.69 \$	r,u30.35 [STD] Year 2009 1	vv+102
W-Wide Flange-Column: W14X68: 4 W-Wide Flange-Column: W14X90	162 22	162	J051223177350	vV14x58	E2	984	0.057 L.F. \$ 116.28 \$ 3.51 \$ 1.95	5 121.74 \$	18,837.36 \$	568.62 \$	315.90 \$	19,721.88 \$	127.16 \$	6.00 \$	2.15 \$	135.31 \$	20,599.92 \$	972.00 \$	348.30 \$	21,920.22 STD Year 2009	00-102
W-Wide Flange-Column: W14030: 4 52:58:00	162 29.41 1599 253.84	162 Total	051223177350	W14x90	E2	984	0.057 L.F. \$ 153.90 \$ 3.51 \$ 1.95	\$ 159.36 \$ \$	24,931.80 \$ 214,553.16 \$	568.62 \$ 5,932.56 \$	315.90 \$ 3,264.08 \$	25.816.32 \$ 223,749.80	168.30 \$	6.00 \$	2.15 \$	176.45 \$ \$	27,264.60 \$ 235,219.17 \$	972.00 S 10,157.77 S	348.30 \$ 3,595.88 \$	28,584.90 STD Year 2009 1 248,972.82	00-102
HSS-Hollow Structural Section-Column: HSS12X12X1/4	712 64.55	713	051223750340	HSS12+12-14		640	0 102 I F & 163 59 6 5 97 6 5 94	\$ 173.00 F	115 5P0 70 e	4.475.54 6	2 400 27 6	123 548 54	180.08	10.75 €	383 5	194 67 6	100 307 /4	7 674 00 6	2 730 70 6	132 759 71 ETD	00-102
rss-millow structural section-Column: HSS12X12X1/4: 57 53:57:00 54	713 54.26	Total	101223104360	1100128120114	EZ	500	v.iuzjur. 9 103.52 5 6.27 5 3.49	a 1/3.28 S	116,589.76 \$	4,470.51 \$	2,488.37 \$ 2,488.37 \$	123,548.64	100.00 \$	10.10 3	3.63 \$	194.0/ S	128,397.04 \$	7,671.88 \$	2,730.79 \$	138,799.71 STD Tear 2009 1 138,799.71	vv-102
HSS-Hollow Structural Section-Column: HSS6X6X1/4 HSS-Hollow Structural Section-Column: HSS6X6X1/4: 69	184 6.91	184	051223750360	HSS6x6x1/4	E2	550	0.102 LF. \$ 40.86 \$ 6.27 \$ 3.49	\$ 50.62 \$	7,518.24 \$	1,153.68 \$	642.16 S	9,314.08 \$	45.00 \$	10.76 \$	3.83 \$	59.59 \$	8,280.00 S	1,979.84 S	704.72 \$	10,964.56 STD Year 2009 1	00-102
54:69	184 6.91	Total						\$	7,518.24 \$	1,153.68 \$	642.16 \$	9,314.08				\$	8,280.00 \$	1,979.84 \$	704.72 \$	10,954.56	
Grand total: 653	21724 11322	Iotal						\$ 9	,089,722.57 \$	80,983.92 \$	44,190.44 ###	*****				\$ 9,9	37,302.08 \$	138,605.45 \$	48,689.42 \$	14,442,894.08	

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BARBEN | CASEY | DUBOWSKI | MILLER

Figure 306: Structural Framing Schedule

Struc	ctural Framing Sche	dule																								
					Sourc	a da antarian		aily Labor Putpu Hour						Fort Labor	5				Labor Equi	p.		Ent labor 000	Fut Fault	000 Feet Test	Lab	or Data Zip
ramily and Type	Reference Level	Length Cut Length	volume Number of Stude	Quantity Emerium	liber	Sulpescription	Clewit	5 0	mit mater		quipment		Mac	EXt. Labor	EALE	quip. E	AL TOTAL	Mat. Vo	ar Var Var	Total Oar	EXt. Mdt. Odp	EXt. Labor Oap	Ext. Equip.	CAP EXL TOL	TOAP Typ	Release Code Notes
1 Ground																										
C-Channel: C6X8.2 C-Channel: C6X8.2: 7		16.27 11.9	0.24	16.27 05122340056	58	C6x8.2	E3	55 0.436 L.I	F. \$ 1	7.40 \$ 28.04	\$ 2.69 \$	38.13 \$	120.40	\$	456.21 \$	43.77 \$	620	38 \$ 8.	12 \$ 50.27 \$ 2.9	61.34	\$ 132.1	11 \$ 817.8	89 \$	48.00 \$	998.00 STD	Year 2009 100-102
Concrete-Rectangular Beam: 36x30				60 00000000000		Concerto Bostonardos Boors: 36%	0.		F 4 44	2.00 e		60.00	2.726.62				0.302	60 E 69				14 A			A SUCCE STD	Very 2000 100 401
HSS-Hollow Structural Section: HSS6X4X3/8		60 60	450	60 0331053041	14	Concrete Rectangular Deam: 36 X.	0		F. 3 64	2.26 3 . 3	s · 3	62.26 3	3,735.64	3	. 3	. 3	3,735	.60 3 68.	61 3 . 3 .	3 68.61	s 4,116.0	su s .	3	. 5	4,116.60 510	14ar 2009 100-401
HSS-Hollow Structural Section: HSS6X4X3/8: 20		205.58 181.08	8.14	205.58 05122375036	50	HSS6x4x3/8	E2	550 0.102 L.I	F. \$ 40	0.88 \$ 6.27	\$ 3.49 \$	50.64 \$	8,404.11	\$	1,288.99 \$	717,47 \$	10,410	57 \$ 45.	02 \$ 10.76 \$ 3.8	33 \$ 59.61	\$ 9,255.2	21 \$ 2,212.0	04 \$	787.37 \$	12,254.62 STD	Year 2009 100-102
W-Wide Flange: W10X15: 1		3.73 2.79	0.08 4	3.73 05122375062	20	W10x15	E2	600 0.093 L.I	F. \$ 2	5.88 \$ 5.75	\$ 3.20 \$	34.83 \$	96.53	\$	21.45 \$	11.94 \$	129	92 \$ 27.	95 \$ 9.84 \$ 3.9	52 \$ 41.31	s 104.2	25 \$ 36.7	70 S	13.13 \$	154.09 STD	Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 1		36.57 36.1		26.57 05122375072	20	W10x26	E2	600 0.093	FSA	1 51 5 5 75	\$ 3.20 \$	63.46 S	1 192 63	5	152.78 \$	85.02 \$	1.420	43 5 48	65 5 9 24 5 36	2 5 62.01	\$ 1.292.6	3 5 261/	15 8	93.63 5	1.647.61 STD	Year 2009 100-102
W-Wide Flange: W10X20.1 W-Wide Flange: W12X19		20.37 20.1		20.01		11111111		000 0.000 0.0			0 5.20 0	55.46	1,102.03	-	152.70	05.02 9	1,420	40 0 40.	00 0 0.04 0 0.0	02.01	a 1,222.1	2013		55.55	1,041.01 010	1101 2007 107 102
W-Wide Flange: W12X19: 40 W-Wide Flange: W12X22		301.86 271.75	10.41 302	301.86 05122375110	0	W12x19	E2	880 0.054 L.I	F. \$ 33	2.57 \$ 3.92	\$ 2.18 \$	38.67 \$	9,831.58	\$	1,183.29 \$	658.05 \$	11,672	.93 \$ 35.	65 \$ 6.71 \$ 2.4	10 \$ 44.76	10,761.3	31 \$ 2,025.4	48 \$	724.46 \$	13,511.25 STD	Year 2009 100-102
W-Wide Flange: W12X22: 1		10 9.58	0.43 10	10 05122375130	0	W12x22	E2	880 0.064 L.S	F. \$ 31	7.78 \$ 3.92	\$ 2.18 \$	43.88 \$	377.80	\$	39.20 \$	21.80 \$	438	80 \$ 41	40 \$ 6.71 \$ 2.4	40 \$ 50.51	\$ 414.0	00 \$ 67.1	10 S	24.00 S	505.10 STD	Year 2009 100-102
W-Wide Flange: W14X22 W-Wide Flange: W14X22: 1		18.18 17.49	0.77 18	18.18 05122375190	20	W14x22	E2	990 0.057 L.I	F. S 4	4.51 \$ 3.48	\$ 1.94 S	49.93 \$	809.19	s	63.27 \$	35.27 \$	907	73 \$ 48	65 \$ 5.96 \$ 2.1	13 \$ 56.74	\$ 884.4	16 S 108.3	35 S	38.72 \$	1,031.53 STD	Year 2009 100-102
W-Wide Flange: W14X43						1444.12																			A 444 44 070	No
W-Wide Flange: W14X43: 1 W-Wide Flange: W14X132		26.39 25.58	2.19 26	26.39 051223/5232	~	W14x43	EZ	810 0.069 L.1	F. S T.	3.49 \$ 4.26	\$ 2.37 \$	80.12 5	1,939.40	5	112.42 5	62.54 \$	2,114	37 5 80.	73 5 7.29 5 2.0	50 S 90.62	\$ 2,130.4	16 \$ 192.3	38 5	68.61 \$	2,391.46 SID	Year 2009 100-102
W-Wide Flange: W14X132: 1		28.08 26.79	7.16 28	28.08 05122375250	20	W14x132	E2	720 0.078 L.I	F. \$ 22	5.42 \$ 4.80	\$ 2.67 \$	232.89 \$	6,329.79	\$	134.78 \$	74.97 \$	6,539	55 \$ 273	24 \$ 8.21 \$ 2.9	3 \$ 284.38	\$ 7,672.5	58 \$ 230.5	54 S	82.27 \$	7,985.39 STD	Year 2009 100-102
W-Wide Flange: W14X145 W-Wide Flange: W14X145: 1		37 35.67	10.49 37	37 05122375250	0	W14x145	E2	720 0.078 L.I	F. \$ 241	7.62 \$ 4.80	\$ 2.67 \$	255.09 \$	9,161.94	\$	177.60 \$	98.79 \$	9,438	33 \$ 300	15 \$ 8.21 \$ 2.9	3 \$ 311.29	11,105.5	55 \$ 303.7	77 S	108.41 \$	11.517.73 STD	Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31 2		20 16.62		20 05122375290	20	W46-31	E2	900 0.0521.1	E 8 6	270 6 2.84	e 242 e	60.70 8	1.055.00	e	76.00 5	12.60 5	4 175	20 8 68	10 5 5 5 5 2 2	16 6 67 10	s 1 400.1	A E 494 5	20 E	47.00 5	1 347 85 STD	Vear 2009 100.102
W-Wide Flange: W16X31: 2 W-Wide Flange: W16X36		20 16.63	1.04 20	20 05122515230	~	141100.51	62	300 0.062 0.1	F. 3 54	2.19 8 3.84	a 2.13 a	56.76 3	1,055.80	3	76.60 3	42.60 3	1,1/5	20 3 50	40 3 0.50 3 2.3	15 a 67.33	s 1,163.0	50 S 131.4	20 8	47.00 5	1,347.80 510	14ar 2009 100-102
W-Wide Flange: W16X36: 7 W-Wide Flange: W16X50		160.31 156.52	11.38 160	160.31 05122375310	00	W16x36	E2	800 0.07 L.I	F. \$ 68	8.31 \$ 4.32	\$ 2.40 \$	75.03 \$	10,950.78	\$	692.54 \$	384.74 \$	12,028	06 \$ 75	04 \$ 7.36 \$ 2.6	53 \$ 85.03	12,029.6	56 \$ 1,179.8	88 \$	421.62 \$	13,631.16 STD	Year 2009 100-102
W-Wide Flange: W16X50: 2		45.8 44.47	4.51 46	45.8 05122375312	05	W16x50	E2	800 0.07 L.	F. \$ 8	5.39 \$ 4.32	\$ 2.40 S	92.11 \$	3,910.86	\$	197.86 S	109.92 \$	4,218	64 S 94	19 \$ 7.36 \$ 2.0	53 S 104.18	\$ 4,313.5	0 \$ 337.0	09 S	120.45 S	4,771.44 STD	Year 2009 100-102
W-Wide Flange: W16X67 W-Wide Flange: W16X67: 3		68.72 66.84	9.03 69	68.72 05122375314	10	W16x67	E2	760 0.074 L	F. S 114	4.89 \$ 4.55	\$ 2.52 \$	121.96 S	7.895.24	s	312.68 \$	173.17 \$	8.381	09 \$ 126	27 5 7.79 5 2.1	78 5 136.84	\$ 8.677.2	27 \$ 535.3	33 5	191.04 5	9.403.64 STD	Year 2009 100-102
W-Wide Flange: W16X89			1																							
W-Wide Flange: W16X89: 1 W-Wide Flange: W18X35		22.81 22.26	4.03 23	22.81 [05122375314	10 10	W16x89	E2	760 0.074 L.I	F. \$ 153	2.62 \$ 4.55	\$ 2.52 \$	159.69 \$	3,481.26	\$	103.79 \$	57.48 \$	3,642	.53 \$ 167.	73 \$ 7.79 \$ 2.1	78 \$ 178.30	\$ 3,825.5	92 \$ 177.0	59 S	63.41 S	4,067.02 STD	Year 2009 100-102
W-Wide Flange: W18X35: 5		116.94 110.81	7.83 117	116.94 05122375330	20	W18x35	E5	950 0.083 L.I	F. \$ 60	0.03 \$ 5.20	\$ 2.15 \$	67.38 \$	7,019.91	\$	608.09 S	251.42 \$	7,879	42 \$ 65.	72 \$ 8.99 \$ 2.3	87 S 77.08	\$ 7,685.3	30 S 1,051.2	29 \$	277.15 \$	9,013.74 STD	Year 2009 100-102
W-Wide Flange: W18X46 W-Wide Flange: W18X46: 2		34 33.25	3.1 34	34 05122375352	80	W18x46	E5	960 0.083 L.I	F. \$ 78	8.66 \$ 5.20	\$ 2.15 \$	86.01 \$	2,674,44	\$	176.80 \$	73.10 S	2,924	34 \$ 86.	42 \$ 8.99 \$ 2.3	37 S 97.78	\$ 2,938.2	28 \$ 305.6	66 S	80.58 \$	3.324.52 STD	Year 2009 100-102
W-Wide Flange: W21X44				100.55 051000075110		Marca		4054 0.0751	5 6 7				6.647.4		604.00	040.44		70 6 00						076.40	11.000 30 PTD	Very 2000 400 400
W-Wide Flange: W21X44: 5 W-Wide Flange: W21X57		128.56 122.09	10.91 129	120.50 05122375410	~	7721384	ED	1064 0.075 L.	r. s /	5.04 5 4.70	5 1.94 S	81.66 3	9,647.14	3	604.23 3	249.41 3	10,500	16 5 82	6U 3 8.14 3 Z.1	14 5 93.06	10,644./	7 3 1,046.4	15 3	2/5.12 3	11,966.36 510	Tear 2009 100-102
W-Wide Flange: W21X57: 3		69.88 66.95	7.69 70	69.88 05122375430	20	W21x57	E5	1054 0.075 L.I	F. \$ 97	7.34 \$ 4.70	\$ 1.94 \$	103.98 \$	6,802.12	\$	328.44 \$	135.57 \$	7,266	12 \$ 107.	38 \$ 8.14 \$ 2.1	14 \$ 117.66	\$ 7,503.7	71 \$ 568.8	82 \$	149.54 \$	8.222.08 STD	Year 2009 100-102
W-Wide Flange: W21X62 W-Wide Flange: W21X62: 3		83.89 81.88	10.23 84	83.89 05122375450	20	W21x62	E5	1036 0.077 L.I	F. \$ 10	5.57 \$ 4.83	\$ 1.99 \$	112.39 \$	8,856.27	\$	405.19 \$	166.94 \$	9,428	40 \$ 116.	96 \$ 8.35 \$ 2.1	19 \$ 127.50	\$ 9,811.7	77 S 700.4	48 \$	183.72 \$	10,695.98 STD	Year 2009 100-102
W-Wide Flange: W21X68 W-Wide Flange: W21X68: 4		130 125.49	. 17.24 130	130 05122375470	20	W21x68	E5	1036 0.077 L	F. S 11	592 \$ 4.83	s 1.99 S	122.74 \$	15.059.60	s	627.90 S	258.70 \$	15.956	20 5 127	31 5 8 35 5 2 1	19 \$ 137.85	16.550 3	1.085 f	50 S	284.70 5	17 920 50 STD	Year 2009 100-102
W-Wide Flange: W21X83		10 10.45		00 00 00 00 00 00 00 00 00 00 00 00 00							• 1.07 •	122.14	10,000,000		40.00	200.10	10,000	20 0 121		10 0 101100			~ ~		11,000,00 010	
W-Wide Flange: W21X83: 1 W-Wide Flange: W21X93		32.5 31.33	5.25 33	32.5 05122375472	20	W21x83	E5	1000 0.08 L.I	F. \$ 14	1.80 \$ 5.00	\$ 2.07 \$	148.87 \$	4,608.50	\$	162.50 \$	67.28 \$	4,838	28 \$ 156.	29 \$ 8.64 \$ 2.2	27 \$ 167.20	\$ 5,079.4	13 \$ 280.8	90 S	73.78 \$	5,434.00 STD	Year 2009 100-102
W-Wide Flange: W21X93: 2		65 62.74	11.8 65	65 05122375474	10	W21x93	E5	1000 0.08 L.I	F. \$ 150	8.36 \$ 5.00	\$ 2.07 \$	165.43 S	10,293.40	\$	325.00 \$	134.55 \$	10,752	95 \$ 174.	92 \$ 8.64 \$ 2.2	27 \$ 185.83	i 11,369.0	00 S 561.0	60 S	147.55 \$	12,078.95 STD	Year 2009 100-102
W-Wide Flange: W21X111 W-Wide Flange: W21X111: 1		32.5 31.4	7.06 33	32.5 05122375476	50	W21x111	E5	1000 0.08 L.I	F. \$ 172	2.85 \$ 5.00	\$ 2.07 \$	179.92 \$	5,617.63	\$	162.50 \$	67.28 \$	5,847	40 \$ 189	41 \$ 8.64 \$ 2.3	7 \$ 200.32	\$ 6,155.8	33 \$ 280.8	80 S	73.78 \$	6.510.40 STD	Year 2009 100-102
W-Wide Flange: W21X122				60.04 0F400075470		1404-400		4030 0.001	r a . and							101.00		76 4 010		1 0 0 0 0					11 201 10 070	No
W-Wide Hange: W21X122: 2 W-Wide Flange: W21X132		60.01 59.13	14.6/ 60	60.01 05122375470	90	WEIX122	ED	1000 0.08 0.1	F. 5 20	5.04 5 5.00	s 2.07 s	215.11 8	12,464.46	3	300.05 8	124.22 5	12,906	.75 S 228.	74 5 8.64 5 2.2	239.65	13,726.0	9 3 518.4	19 2	136.22 8	14,361.40 510	Tear 2009 100-102
W-Wide Flange: W21X132: 1		30 29.17	7.81 30	30 05122375478	30	W21x132	E5	1000 0.08 L.I	F. \$ 22	5.09 \$ 5.00	\$ 2.07 \$	232.16 \$	6,752.70	\$	150.00 \$	62.10 \$	6,964	80 \$ 247	49 \$ 8.64 \$ 2.2	258.40 S	\$ 7,424.7	ro \$ 259.2	20 S	68.10 \$	7,752.00 STD	Year 2009 100-102
W-Wide Flange: W24X55 W-Wide Flange: W24X55: 4		148.09 144	15.98 148	148.09 05122375490	20	W24x55	E5	1110 0.072 L.I	F. \$ 94	4.19 \$ 4.50	\$ 1.86 \$	100.55 \$	13,948.60	\$	666.41 \$	275.45 S	14,890	45 \$ 103	50 \$ 7.79 \$ 2.0	05 \$ 113.34	15,327.3	1,153.6	52 \$	303.58 \$	16,784.52 STD	Year 2009 100-102
W-Wide Flange: W24X68 W-Wide Flange: W24X68: 4		133.75 129.16		133 75 05122375530	20	W24x68	E5	1110 0.072	F. S 114	5 92 5 4 50	\$ 1.85 \$	122.28 5	15 504 30	5	601.88 5	248.78 5	16 354	95 \$ 127	31 5 7 79 5 20	15 \$ 137.15	17 027 1	71 5 10419	91 5	274.19 5	18 343 81 STD	Year 2009 100-102
W-Wide Flange: W24X76		1000															10,000									
W-Wide Flange: W24X76: 13 W-Wide Flange: W24X94		519.3 501.29	77.17 519	519.3 05122375550	00	W24x76	E5	1110 0.072 L.I	F. \$ 12	9.38 \$ 4.50	\$ 1.85 \$	135.74 \$	67,187.03	\$ 3	2,336.85 \$	965.90 \$	70,489	78 \$ 142.	83 \$ 7.79 \$ 2.0	5 152.67	5 74,171.6	52 \$ 4,045.3	35 \$	1,064.57 \$	79,281.53 STD	Year 2009 100-102
W-Wide Flange: W24X94: 2		80 77.78	14.85 80	80 05122375572	80	W24x94	E5	1080 0.074 L.1	F. \$ 160	0.43 \$ 4.63	\$ 1.92 \$	166.98 \$	12,834.40	\$	370.40 S	153.60 \$	13,358	40 \$ 176.	99 \$ 8.00 \$ 2.1	10 \$ 187.09	5 14,159.2	20 S 640.0	00 S	168.00 S	14,967.20 STD	Year 2009 100-102
W-Wide Flange: W24X104 W-Wide Flange: W24X104: 1		23 22.61	4.79 23	23 05122375574	10	W24x104	E5	1050 0.076 L.I	F. \$ 178	8.02 \$ 4.76	\$ 1.97 \$	184.75 \$	4,094.46	\$	109.48 \$	45.31 S	4,249	25 \$ 195.	62 \$ 8.21 \$ 2.1	16 \$ 205.99	\$ 4,499.2	26 \$ 188.8	B3 \$	49.68 \$	4,737.77 STD	Year 2009 100-102
W-Wide Flange: W24X192		60 56.4		60 05122376574	10	W24-192	ES	1050 0.076	E 6 10	66 8 476	¢ 107 ¢	226.20 8	10 710 00	e .	286.60 8	110.00 8	20.422	80 6 361	14 8 8 21 8 21	16 8 371.61	21.668	10 8 1001	(A) 6	120.60 5	012 00 00 CT	Vear 2009 100.102
W-Wide Flange: W24X192; 2 W-Wide Flange: W24X207		60 56.4	22.03 60	00 05122575514		7724X172	ED	1050 0.076 2.1	F. 3 32	5.65 3 4.76	a 1.97 a	335.38 a	19,719.00	3	265.60 3	110.20 3	20,122	.60 S .351.	14 3 8.21 3 2.1	16 a 3/1.51	21,000.4	492.0	50 a	129.60 \$	22,290.60 510	100-102
W-Wide Flange: W20X207: 2		60 56.49	23.72 60	60 05122375574	10	W24x207	E5	1050 0.076 L.I	F. \$ 354	4.33 \$ 4.76	\$ 1.97 \$	361.06 \$	21,259.80	\$	285.60 \$	118.20 \$	21,663	60 \$ 389	36 \$ 8.21 \$ 2.1	16 \$ 399.73	23,361.6	50 \$ 492.6	60 S	129.60 \$	23,983.80 STD	Year 2009 100-102
W-Wide Flange: W27X84: 2		52.37 51.25	8.73 52	52.37 05122375580	>0	W27x84	E5	1190 0.067 L.	F. \$ 14	3.87 \$ 4.19	\$ 1.74 \$	149.80 \$	7,534.47	\$	219.43 \$	91.12 \$	7,845	.03 \$ 157.	32 \$ 7.29 \$ 1.9	1 \$ 166.52	\$ 8,238.8	35 \$ 381.7	78 \$	100.03 \$	8,720.65 STD	Year 2009 100-102
W-Wide Flange: W27X102 W-Wide Flange: W27X102: 3		90 86.85	17.9 90	90 05122375590	0	W27x102	E5	1190 0.067 L.I	F. \$ 160	0.43 \$ 4.19	\$ 1.74 \$	166.36 S	14,438,70	5	377.10 \$	156.60 S	14.972	40 \$ 176	99 5 7 29 5 1.9	1 \$ 186.19	15.929.1	10 S 656.1	10 S	171.90 S	16.757.10 STD	Year 2009 100-102
W-Wide Flange: W27X114		30 00.03										100.00	14,436.14				14,214									
W-Wide Flange: W27X114: 1 W-Wide Flange: W30X108		30 28.98	6.7 30	30 05122375592	20	W27x114	E5	1150 0.07 L.I	F. \$ 194	4.58 \$ 4.35	\$ 1.80 S	200.73 \$	5,837,40	\$	130.50 \$	54.00 \$	6,021	.90 \$ 214	25 \$ 7.50 \$ 1.9	97 \$ 223.72	\$ 6,427.5	50 \$ 225.0	00 \$	59.10 \$	6,711.60 STD	Year 2009 100-102
W-Wide Flange: W30X108: 1		30.45 29.49	6.44 30	30.45 05122375630	20	W30x108	E5	1200 0.067 L.I	F. \$ 184	4.23 \$ 4.16	\$ 1.72 \$	190.11 S	5,609.80	\$	126.67 \$	52.37 \$	5,788	85 \$ 202	86 \$ 7.22 \$ 1.9	0 \$ 211.98	\$ 6,177.0	9 \$ 219.8	85 \$	67.86 S	6,454.79 STD	Year 2009 100-102
W-Wide Flange: W30X132 W-Wide Flange: W30X132: 10		398.02 388.56	103.5 398	398.02 05122375652	20	W30x132	E5	1160 0.059 L.I	F. \$ 225	5.63 \$ 4.30	\$ 1.79 \$	231.72 \$	89,805.25	s	1,711.49 \$	712.46 \$	92.229	19 \$ 248	40 \$ 7,43 \$ 1.9	6 \$ 257,79	98,868.1	17 \$ 2,957.2	29 \$	780.12 \$	102,605.58 STD	Year 2009 100-102
W-Wide Flange: W30X173		00.77		90.75	-	W20-472		\$\$20 0.07ch	E 6 00	100 0 100		201.02			101.71	100.00	49.000	10 0 000	A1 8 7 70 4 5	19 0 000 000			(A) F	101.00	30 (35 44 070	Van 2009 400 400
W-Wide Flange: W30X173; 3 W-Wide Flange: W33X118		90.75 89.6		90.75 05122375656	~	waaxira	ED	1120 0.071 0.1	F. 3 29	4.98 5 4.46	a 1.64 a	301.28 8	26,769.44	9	404.75 8	166.98 3	27,341	.16 3 326	03 5 7.72 5 20	13 5 335.78	29,561.4	2 5 700.5	24 9	164.22 5	30,472.04 510	14ar 2009 100-102
W-Wide Flange: W33X118: 12 W-Wide Flange: W33X110		454.9 438.97	104.52 455	454.9 05122375670	20	W33x118	E5	1176 0.068 L.I	F. \$ 20	1.83 \$ 4.25	\$ 1.75 \$	207.83 \$	91,812.47	\$	1,933.33 \$	795.08 \$	94,541	87 \$ 221	49 \$ 7.36 \$ 1.9	3 \$ 230.78	\$ 100,755.8	30 \$ 3,348.0	06 S	877.95 \$	104,981.82 STD	Year 2009 100-102
W-Wide Flange: W33X130: 1		30 28.04	7.37 30	30 05122375690	00	W33x130	E5	1134 0.071 L.I	F. \$ 222	2.53 \$ 4.40	\$ 1.82 \$	228.75 \$	6,675.90	\$	132.00 \$	54.60 \$	6,862	50 \$ 244	26 \$ 7.65 \$ 2.0	01 \$ 253.92	\$ 7,327.0	0 \$ 229.5	50 S	60.30 \$	7,617.60 STD	Year 2009 100-102
W-Wide Flange: W33X141 W-Wide Flange: W33X141: 2		46 45 04	12.86	46 05122375710	20	W33x141	ES.	1134 0.071	F. 8 24	1.16 5 4.40	\$ 122 4	247.38 5	11.002.24	\$	202.40 5	£1 72 ¢	64 976	48 5 254	96 S 766 S 97	1 \$ 274.62	10 100	16 8 31	2 00	92.45 \$	12 632 62 STD	Year 2009 100.102
W-Wide Flange: W36X135		45.04	40	porcestor to				0.011			- 1.02 3		11,033.35			03.12 3	11,313			20.012	· · · · · · · · · · · · · · · · · · ·	351.1		-6.77 8	18,008.02 010	
W-Wide Flange: W36X135: 10 W-Wide Flange: W36X150		374.98 363.05	99.35 375	374.98 05122375730	00	W36x135	E5	1170 0.058 L.I	F. \$ 23	0.81 \$ 4.28	\$ 1.76 \$	236.85 \$	86,549.13	\$	1,604.91 \$	659.96 \$	88,814	01 \$ 253.	58 \$ 7.36 \$ 1.9	4 \$ 262.88	95,087.4	13 \$ 2,759.8	85 \$	727.46 \$	98,574,74 STD	Year 2009 100-102
W-Wide Flange: W36X150: 2		52.83 51.32	15.63 53	52.83 05122375750	00	W36x150	E5	1170 0.058 L.1	F. \$ 256	5.68 \$ 4.28	\$ 1.76 \$	262.72 \$	13,560.40	\$	226.11 \$	92.98 S	13,879	50 \$ 281	52 \$ 7.36 \$ 1.9	4 \$ 290.82	14,872.7	10 \$ 388.0	83 \$	102.49 \$	15,364.02 STD	Year 2009 100-102
W-Wide Flange: W40X167 W-Wide Flange: W40X167: 1		23.01 22.46	7.49 23	23.01 05122375760	20	W40x167	E5	1150 0.07 L.I	F. \$ 28	5.71 \$ 4.35	\$ 1.80 S	291.86 \$	6,574.19	\$	100.09 \$	41.42 5	6.715	70 \$ 315	19 \$ 7.50 \$ 1.9	7 \$ 324.66	\$ 7,252.5	2 \$ 172.5	58 S	45.33 \$	7,470.43 STD	Year 2009 100-102
1 Ground: 200		4532.03 4341.64	1223.19	Total								\$	679,917.20	\$ 2	0,689.36 \$	9,055.83 \$	709,662	.39			\$ 749,703.5	54 \$ 35,722.2	25 S	9,960.71 \$	795,386.49	

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| Concrete-Rectangular Beam: 36x30 | 50 50 50

 | 60 033106360412

 | Concrete Restance for B | Baam: 36"v30" | IE ¢

 | 8 8 90.03
 | 8 62.26 8

 | 2 735 60 8 | ¢ | e
 | 2 736 20 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 2 13 23 2
 | 1 116 60 8 | ¢
 | e | 4 516 60 STD Van 2009 100-401 |
| Concrete-Nectangular Beam: 36x30: 6
HSS-Hollow Structural Section1: HSS4X2X1/8 | 60 60 450

 | 60 033105350412

 | Concrete Rectangular E | Deam: 36 X30 | L.F. Ş

 | 02.20 3 - 3
 | - > 02.20 >

 | 3,735.60 5 | |
 | 3,735.00 \$ 60.01 \$ - \$ | 5 00.01 S
 | 4,110.00 \$ | . ,
 | . \$ | 4,116.60 510 1488 2009 100-401 |
| HSS-Hollow Structural Section1: HSS40(2X1/8:8 | 15.42 11.76 0.11

 | 15.42 051223750360

 | HSS4x2x1/8 | E2 | 550 0.102 L.F. \$

 | 4.54 \$ 6.27 \$
 | 3.49 \$ 14.30 \$

 | 70.01 S | 96.68 \$ | 53.82 \$
 | 220.51 \$ 5.00 \$ 10.76 \$ 3 | 83 \$ 19.59 \$
 | 77.10 S | 165.92 \$
 | 59.06 S | 302.08 STD Year 2009 100-102 |
| HSS-Hollow Structural Section1: HSS6X4X3/8 | 101.09 172.43 7.20

 | 191.98 061223260360

 | W006v1v1/8 | E2 | 660 0 1021 E S

 | 40.00 5 5.07 5
 | 2 49 8 60 64 8

 | 7 040 14 5 | 1 202 71 6 | 670.01 S
 | 9 701 97 6 46 02 6 10 76 6 2 | 2 12.02 2 50
 | 9 642 04 8 | 2.055.70 \$
 | 736.39 6 | 11 442 92 STD Year 2009 100-102 |
| W-Wide Flange1: W10X12 | 1771/0 AP3/42 7/77

 |

 | | |

 | 40.00 0 0.21 0
 | 0.45 0 00.04

 | 1,010.14 | 1,240.11 |
 | |
 | 0,012.01 | 2,000.10
 | 100.20 | 11,449,99 010 148,2009 149,148 |
| W-Wide Flange1: W10X12: 2 | 52.69 48.82 1.17 53

 | 52.69 051223750600

 | W10x12 | E2 | 600 0.093 L.F. \$

 | 20.49 \$ 5.75 \$
 | 3.20 \$ 29.44 \$

 | 1,079.62 \$ | 302.97 \$ | 168.61 \$
 | 1.551.19 \$ 22.77 \$ 9.84 \$ 3 | 52 \$ 36.13 \$
 | 1,199.75 \$ | 518.47 \$
 | 185.47 \$ | 1,903.69 STD Year 2009 100-102 |
| W-Wide Flange1: W12X16: 3 | 65.63 63.26 2.04 66

 | 65.63 051223751100

 | W12x16 | E2 | 880 0.064 L.F. \$

 | 27.43 \$ 3.92 \$
 | 2.18 \$ 33.53 \$

 | 1,800.23 \$ | 257.27 \$ | 143.07 \$
 | 2,200.57 \$ 30.02 \$ 6.71 \$ 2 | 40 \$ 39.13 \$
 | 1,970.21 \$ | 440.38 \$
 | 157.51 \$ | 2,568.10 STD Year 2009 100-102 |
| W-Wide Flange1: W12X19 |

 | 172.00 051222751100

 | W42-40 | E2 | 990 0.0541 5 6

 | 22/7 6 202 6
 | 0.40 E . 20.67 E

 | 6.004.07 | 674.60 8 | 376.66
 | 6 (K 1 7) C 7 (K 1 6 7) C 7 | 10 0 11 70 0
 | 6 104 01 8 | 11/122
 | 412.02 | 7 200 27 OTD View 2009 100 102 |
| W-Wide Flange1: W12X19: 16
W-Wide Flange1: W14X22 | 172.09 163.04 6.24 172

 | 112.09 051223151100

 | 11123.19 | 62 | 000 0.004 L.P. \$

 | 32.57 \$ 3.92 \$
 | 2.10 \$ 30.07 \$

 | 5,004.97 8 | 074.03 3 | 3/5.10 \$
 | 0,004.72 5 30.00 5 0.71 5 2 | eU 5 46.70 5
 | 0,135.01 5 | 1,154.72 3
 | 413.02 \$ | 1,102.15 510 1488 2009 100-102 |
| W-Wide Flange1: W14X22: 28 | 878.62 833.39 36.82 879

 | 878.62 051223751900

 | W14x22 | E2 | 990 0.057 L.F. \$

 | 44.51 \$ 3.48 \$
 | 1.94 \$ 49.93 \$

 | 39,107.38 S | 3,057.60 \$ | 1,704.52 \$
 | 43,869.50 \$ 48.65 \$ 5.96 \$ 2 | 13 \$ 56.74 \$
 | 42,744.86 \$ | 5,236.58 \$
 | 1,871.46 \$ | 49,852.90 STD Year 2009 100-102 |
| W-Wide Flange1: W14X82.2
W-Wide Flange1: W14X82.2: 1 | 26.33 24.07 3.97 26

 | 26.33 051223752380

 | W14x82 | E2 | 740 0.076 L.F. S

 | 154.22 \$ 4.67 \$
 | 2.59 \$ 161.48 \$

 | 4.050.61 S | 122.96 \$ | 68.19 \$
 | 4.251.77 \$ 168.71 \$ 8.00 \$ 2 | 85 \$ 179.56 \$
 | 4.442.13 \$ | 210.64 S
 | 75.04 S | 4.727.81 STD Year 2009 100-102 |
| W-Wide Flange1: W14X109 2 |

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 | | |
| W-Wide Flange1: W14X109 2: 1
W-Wide Flange1: W16X26 | 37.67 36.06 7.93 38

 | 37.67 051223752500

 | W14x109 | E2 | 720 0.078 L.F. \$

 | 204.93 \$ 4.80 \$
 | 2.67 \$ 212.40 \$

 | 7,719.71 \$ | 180.82 \$ | 100.58 \$
 | 8,001.11 \$ 225.63 \$ 8.21 \$ 2 | 93 \$ 236.77 \$
 | 8,499.48 \$ | 309.27 \$
 | 110.37 S | 8,919.13 STD Year 2009 100-102 |
| W-Wide Flange1: W16X26: 3 | 65.63 63.03 3.3 66

 | 65.63 051223752700

 | W16x26 | E2 | 1000 0.056 L.F. S

 | 44.51 \$ 3.46 \$
 | 1.92 \$ 49.89 \$

 | 2,921.19 \$ | 227.08 \$ | 126.01 \$
 | 3,274.28 \$ 48.65 \$ 5.90 \$ 2 | 12 \$ 56.67 \$
 | 3,192.90 \$ | 387.22 \$
 | 139.14 S | 3,719.25 STD Year 2009 100-102 |
| W-Wide Flange1: W16X31
W-Wide Flange1: W16X31 | 151 10 146 05 0 12 151

 | 151 19 051223752900

 | W16v31 | E2 | 900 0.0521 F S

 | 52 79 S 3.84 S
 | 2 13 5 58 76 5

 | 7 681 32 6 | 580 57 S | 322.03 \$
 | C 2 33 3 8 81 83 2 C0 588 8 | 35 5 67 39 5
 | 8 8/1 59 \$ | 991.81 \$
 | 355.30 € | 10 188 69 STD Vaar 2009 100-102 |
| W-Wide Flange1: W18X35 | 191.19 190.00 9.12 1954

 | 151.15 051225152500

 | 1110031 | | 0.002 C.F. 3

 | 52.19 3 3.04 3
 | 2.13 3 30.70 3

 | 1,001.02 0 | 540.57 3 | 322.03 \$
 | 0,003.32 3 30.40 3 0.30 3 2 | 35 3 67.33 3
 | 0,041,53 3 | 331.01 3
 | 355.34 | 10,100,00 010 1481 2009 100-102 |
| W-Wide Flange1: W18X35: 30 | 1158 1045.79 73.91 1,158

 | 1158 051223753300

 | W18x35 | E5 | 950 0.083 L.F. \$

 | 60.03 \$ 5.20 \$
 | 2.15 \$ 67.38 \$

 | 69,514.74 S | 6,021.60 \$ | 2,489.70 \$
 | 78,026.04 \$ 65.72 \$ 8.99 \$ 2 | 37 S 77.08 S
 | 76,103.76 \$ | 10,410.42 S
 | 2,744.46 \$ | 89,258.64 STD Year 2009 100-102 |
| W-Wide Flange1: W18X40: 1 | 37.68 35.41 2.86 33

 | 37.68 051223753500

 | W18x40 | E5 | 950 0.083 L.F. \$

 | 68.31 \$ 5.20 \$
 | 2.15 \$ 75.66 \$

 | 2,573.92 \$ | 195.94 \$ | 81.01 \$
 | 2,850.87 \$ 75.04 \$ 8.99 \$ 2 | 37 \$ 86.40 \$
 | 2,827.51 \$ | 338.74 \$
 | 89.30 \$ | 3,255.55 STD Year 2009 100-102 |
| W-Wide Flange1: W21X50 |

 | 210 051222751200

 | M04-co | 56 | 1054 0.0751 5 8

 | 05 30 8 4 70 8
 | 101 0 00 00 0

 | 10 700 / 1 | 1 000 30 F | 104.00 0
 | 2016167 C 0110 C 011 C 0 |
 | 00.007.01 P | 1700.00
 | 100.00 0 | 20 070 070 View 2000 100 102 |
| W-Wide Flange: W21X50: 7
W-Wide Flange: W12X19 | 219 213.18 21.42 213

 | 213 051223154300

 | 4421004 | 65 | 0.075 6.17. 3

 | 05.39 8 4.10 8
 | 1.94 8 92.03 8

 | 10,700.41 5 | 1,029.30 8 | 424.00 3
 | 20,154.57 8 34.13 8 0.14 8 2 | 14 3 104.47 3
 | 20,627.61 3 | 1,762.00 3
 | 400.00 3 | 22,678.93 510 1481 2009 100-102 |
| W-Wide Flange: W12X19: 8 | 46.23 42.68 1.63 46

 | 46.23 051223751100

 | W12x19 | E2 | 880 0.054 L.F. S

 | 32.57 \$ 3.92 \$
 | 2.18 \$ 38.67 \$

 | 1,505.71 \$ | 181.22 \$ | 100.78 S
 | 1,787.71 \$ 35.65 \$ 6.71 \$ 2 | 40 S 44.76 S
 | 1,648.10 \$ | 310.20 \$
 | 110.95 \$ | 2,069.25 STD Year 2009 100-102 |
| W-Wide Flange: W14X43
W-Wide Flange: W14X43: 2 | 7.33 6.38 0.55 7

 | 7.33 051223752320

 | W14x43 | E2 | 810 0.059 L.F. \$

 | 73.49 \$ 4.26 \$
 | 2.37 \$ 80.12 \$

 | 538.68 \$ | 31.23 \$ | 17.37 \$
 | 587.28 \$ 80.73 \$ 7.29 \$ 2 | 60 S 90.62 S
 | 591.75 S | 53.44 S
 | 19.06 \$ | 664.24 STD Year 2009 100-102 |
| W-Wide Flange: W14X500 |

 | 70 07400070705

 | | 50 | 700 0.0701 5

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 | |
 | | 34 454 45 OTD 1/ 0100 420 400 |
| W-Wide Flange: W14X500: 4
W-Wide Flange: W14X550 | 78 73.83 75.16 78

 | 76 051223752500

 | W14x500 | EZ | 720 0.078 L.F. S

 | 853.88 \$ 4.80 \$
 | 2.67 \$ 861.35 \$

 | 66,602.64 \$ | 374.40 \$ | 208.26 \$
 | 67,185.30 \$ 940.13 \$ 8.21 \$ Z | 93 \$ 951.27 \$
 | 73,330.14 \$ | 640.38 S
 | 228.54 \$ | 74,199.06 S1D Year 2009 100-102 |
| W-Wide Flange: W14X550: 2 | 39 36.92 41.35 39

 | 39 051223752500

 | W14x550 | E2 | 720 0.078 L.F. \$

 | 939.26 \$ 4.80 \$
 | 2.67 \$ 946.73 \$

 | 36,631.14 \$ | 187.20 \$ | 104.13 S
 | 36,922.47 \$ 1,034.14 \$ 8.21 \$ 2 | 93 \$ 1,045.28 \$
 | 40,331.46 \$ | 320.19 \$
 | 114.27 \$ | 40,765.92 STD Year 2009 100-102 |
| w-wide Flange: W16X31
W-Wide Flange: W16X31: 2 | 49.99 48.7 3.04 50

 | 49.99 051223752900

 | W16x31 | E2 | 900 0.062 L.F. \$

 | 52.79 \$ 3.84 \$
 | 2.13 \$ 58.76 \$

 | 2,638.97 \$ | 191.96 \$ | 106.48 S
 | 2,937.41 \$ 58.48 \$ 6.56 \$ 2 | 35 S 67.39 S
 | 2,923.42 \$ | 327.93 \$
 | 117.48 S | 3,368.83 STD Year 2009 100-102 |
| W-Wide Flange: W18X35 | · · · · · · · · · · · · · · · · · · ·

 | (00.30)

 | 14466.54 | | 644 (111 F

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| W-Wide Flange: W18X35: 20
W-Wide Flange: W18X40 | 539.72 481.98 34.06 540

 | 539.72 051223753300

 | W18x35 | E5 | 960 0.083 L.F. \$

 | 60.03 \$ 5.20 \$
 | 2.15 \$ 67.38 \$

 | 32,399.39 \$ | 2,806.54 \$ | 1,160.40 \$
 | 36,366.33 \$ 65.72 \$ 8.99 \$ 2 | 37 \$ 77.08 \$
 | 35,470.40 \$ | 4,852.08 \$
 | 1,279.14 \$ | 41,601.62 STD Year 2009 100-102 |
| W-Wide Flange: W18X40: 4 | 120 117.54 9.5 120

 | 120 051223753500

 | W18x40 | E5 | 960 0.083 L.F. \$

 | 68.31 \$ 5.20 \$
 | 2.15 \$ 75.66 \$

 | 8,197.20 \$ | 624.00 \$ | 258.00 \$
 | 9.079.20 \$ 75.04 \$ 8.99 \$ 2 | 37 \$ 86.40 \$
 | 9,004.80 \$ | 1,078.80 \$
 | 284.40 \$ | 10.368.00 STD Year 2009 100-102 |
| W-Wide Flange: W18X46
W-Wide Flange: W18X46: 2 | 60 58.83 5.48 60

 | 60 051223753520

 | W18x46 | E5 | 960 0.083 L.F. \$

 | 78.66 \$ 5.20 \$
 | 2.15 \$ 86.01 \$

 | 4,719.60 \$ | 312.00 \$ | 129.00 \$
 | 5.160.60 \$ 86.42 \$ 8.99 \$ 2 | 37 \$ 97.78 \$
 | 5.185.20 \$ | 539.40 S
 | 142.20 S | 5.865.80 STD Year 2009 100-102 |
| W-Wide Flange: W18X55 |

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| W-Wide Flange: W18X55: 2
W-Wide Flange: W18X65 | 10.01 8.74 0.97 10

 | 10.01 051223753920

 | W18x55 | E5 | 900 0.089 L.F. \$

 | 93.71 \$ 5.55 \$
 | 2.29 \$ 101.55 \$

 | 938.04 \$ | 55.56 \$ | 22.92 \$
 | 1,016.52 \$ 103.34 \$ 9.63 \$ 2 | 52 \$ 115.49 \$
 | 1,034.43 \$ | 96.40 \$
 | 25.23 \$ | 1,156.05 STD Year 2009 100-102 |
| W-Wide Flange: W18X65: 10 | 45.86 34.31 4.52 46

 | 45.86 051223753920

 | W18x65 | E5 | 900 0.089 L.F. \$

 | 110.75 \$ 5.55 \$
 | 2.29 \$ 118.59 \$

 | 5,079.00 \$ | 254.52 \$ | 105.02 \$
 | 5,438.54 \$ 122.13 \$ 9.63 \$ 2 | 52 \$ 134.28 \$
 | 5,600.88 \$ | 441.63 \$
 | 115.57 \$ | 6,158.08 STD Year 2009 100-102 |
| W-Wide Flange: W18X76
W-Wide Flange: W18X76: 6 | 183 169 25.96 183

 | 163 051223753940

 | W18x76 | ES | 900 0.089 L.F. S

 | 129.38 \$ 5.55 \$
 | 2 29 5 137 22 5

 | 23.676.54 5 | 1.015.65 \$ | 419.07 5
 | 25 111 26 5 142 83 5 9 63 5 2 | 52 S 154 98 S
 | 26 137 89 5 | 1762.29 5
 | 461.16 \$ | 28 361 34 STD Year 2009 100-102 |
| W-Wide Flange: W18X106 | 103 103 1750 105

 |

 | | |

 | 12.50 0 5.55 0
 |

 | 20,010.04 | 1,010.00 | 412.01
 | |
 | 20,121.02 | 1,102.27
 | | |
| W-Wide Flange: W18X106: 4
W-Wide Flange: W21X44 | 67.33 61.74 13.29 67

 | 67.33 051223753980

 | W18x106 | E5 | 900 0.089 L.F. \$

 | 181.13 \$ 5.55 \$
 | 2.29 \$ 188.97 \$

 | 12,195.48 \$ | 373.68 \$ | 154.19 \$
 | 12,723.35 \$ 198.72 \$ 9.63 \$ 2 | 52 \$ 210.87 \$
 | 13,379.82 \$ | 648.39 \$
 | 169.67 \$ | 14,197.88 STD Year 2009 100-102 |
| W-Wide Flange: W21X44: 3 | 90 85.45 7.6 90

 | 90 051223754100

 | W21x44 | E5 | 1054 0.075 L.F. \$

 | 75.04 \$ 4.70 \$
 | 1.94 \$ 81.68 \$

 | 6,753.60 \$ | 423.00 \$ | 174.60 \$
 | 7.351.20 \$ 82.80 \$ 8.14 \$ 2 | 14 \$ 93.08 \$
 | 7,452.00 \$ | 732.60 \$
 | 192.60 \$ | 8.377.20 STD Year 2009 100-102 |
| 0.221527778 | 8 4468.4 4143.39 849.8

 | Total

 | | |

 |
 | \$

 | 374,593.84 \$ | 20,782.05 \$ | 9,687.79 \$
 | 405,063.69 | 5
 | 411,511.74 \$ | 35,816.26 \$
 | 10,664.34 \$ | 457,992.32 |
| 3 |

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| Concrete-Rectangular Beam: 36x30 |

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| Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30: 6 | 60 60 450

 | 60 033105350412

 | Concrete Rectangular B | Beam: 36"x30" | LF. S

 | 62.26 \$ - \$
 | - \$ 62.26 \$

 | 3,735.60 \$ | - \$ | - \$
 | 3,735.60 \$ 68.61 \$ - \$ | S 68.61 S
 | 4,116.60 S | - S
 | - \$ | 4,116.60 STD Year 2009 100-401 |
| Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30: 6
HSS-Hollow Structural Section1: HSS402X1/8
HSS-Hollow Structural Section1: HSS402X1/8: 8 | 60 60 450
15.42 11.76 0.11

 | 60 033105350412
15.42 051223750360

 | Concrete Rectangular E | Beam: 36"x30" E2 | 550 0.102 L.F. \$

 | 62.26 \$ - \$
4.54 \$ 6.27 \$
 | - \$ 62.26 \$

 | 3,735.60 \$ | - \$
96.68 \$ | - \$
 | 3,735.60 \$ 68.61 \$ - \$ | \$ 68.61 \$
 | 4,116.60 \$ | - \$
 | - \$
59.06 \$ | 4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102 |
| Concrete-Rectangular Beam: 36x80
Concrete-Rectangular Beam: 36x86; 6
HSS-Hollow Structural Section: HSS402XL/8
HSS-Hollow Structural Section: HSS402XL/8; 8
HSS-Hollow Structural Section: HSS402XL/8; 8 | 60 60 450
15.42 11.76 0.11

 | 60 033106350412
15.42 051223750360

 | Concrete Rectangular B | Beam: 36"x30"
E2 | L.F. \$

 | 62.26 S - S
4.54 S 6.27 S
 | - \$ 62.26 \$

 | 3,735.60 \$
70.01 \$ | - \$
96.68 \$ | - \$
 | 3,735.60 \$ 68.61 \$ - \$ | S 68.61 S
 | 4,116.60 S
77.10 S | - \$
 | - \$ | 4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102 |
| Concrete-Rectangular Beam: 36:30
Concrete-Rectangular Beam: 36:30: 6
His5-Hollow Structural Section: H55402X1/8
His5-Hollow Structural Section: H55402X1/8
His5-Hollow Structural Section: H55402X1/8
His5-Hollow Structural Section: H55402X1/8
His5-Hollow Structural Section: H55402X1/8
Widfe-Flame: WUB22 | 60 60 450 15.42 11.76 0.11 191.98 170.83 7.68

 | 60 033105350412 15.42 051223750360 191.98 051223750360

 | Concrete Rectangular B
HSS4x2x1/8
HSS6x4x3/8 | Beam: 36"x30"
E2
E2 | L.F. \$
550 0.102 L.F. \$
550 0.102 L.F. \$

 | 62.26 S - S
4.54 S 6.27 S
40.88 S 6.27 S
 | - \$ 62.26 \$
3.49 \$ 14.30 \$
3.49 \$ 50.64 \$

 | 3.735.60 \$
70.01 \$
7.848.14 \$ | - \$
96.68 \$
1,203.71 \$ | - \$
53.82 \$
670.01 \$
 | 3,735.60 \$ 68.61 \$ \$ \$ 220.51 \$ 5.00 \$ 10.76 \$ 3 9,721.87 \$ 46.62 \$ 10.76 \$ 3 | \$ 68.61 \$
83 \$ 19.59 \$
83 \$ 59.61 \$
 | 4,116.60 \$
77.10 \$
8,642.94 \$ | - \$
165.92 \$
2,065.70 \$
 | - \$
59.06 \$
735.28 \$ | 4,116.66 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11,443.93 STD Year 2009 100-102 |
| Concrete Rectangular Beam: X8:00
Concrete Rectangular Beam: X8:00 6
1555-1601000 Xtructural Section: 1555402X1/8
1555-1601000 Xtructural Section: 1555402X1/8
W Wilder Flanget: W10022 2 | 60 60 450 15.42 11.76 0.11 191.58 120.83 7.68 52.69 48.82 1.17 51

 | 60 0.33105350412 15.42 051223750360 191.98 051223750360 52.69 051223750600

 | Concrete Rectangular E
HSS4x2x1/8
HSS6x4x3/8
W10x12 | Beam: 36%30"
E2
E2
E2
E2 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.093 L.F. S

 | 62.26 \$ - \$ 4.54 \$ 6.27 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$
 | - \$ 62.26 \$ 3.49 \$ 14.30 \$ 3.49 \$ 50.64 \$ 3.20 \$ 29.44 \$
 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
 | - \$
96.68 \$
1,203.71 \$
302.97 \$ | - \$
53.82 \$
670.01 \$
168.61 \$
 | 3.735.60 5 68.61 5 5 220.51 \$ 5.00 \$ 10.76 \$ 3 9.721.87 \$ 45.62 \$ 10.76 \$ 3 1.551.19 \$ 22.77 \$ 9.84 \$ 3 | S 68.61 S 83 S 19.59 S 83 S 59.61 S 52 S 36.13 S
 | 4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$ | - \$
165.92 \$
2,065.70 \$
518.47 \$
 | - \$
59.05 \$
735.28 \$
185.47 \$ | 4,116.60 [STD Year 2009 100-401
302.08 [STD Year 2009 100-102
11,443.93 [STD Year 2009 100-102
1,903.69 [STD Year 2009 100-102 |
| Concrete Rectangular Basen: X8630
Concrete Rectangular Basen: X8630
Concrete Rectangular Basen: X8630
HSN-Infolms Virtuarial Section: HSNADXXI/8
HSN-Infolms Virtuarial Section: HSNADXXI/8
HSN-Infolms Virtuarial Section: HSNADXXI/8
HSN-Infolms Virtuarial Section: HSNADXXI/8
HSN-Infolms Virtuarial Section: HSNADXXI/8
W-Wide Flanget: VVIDX2
W-Wide Flanget: VVIDX2
W-Wide Flanget: VVIDX2
HSNADS | 60 60 450 15.42 11.76 0.11 191.90 120.83 7.68 52.69 48.82 1.17 55.61 61.26 2.04

 | 60 0.33105350412 15.42 051223750360 191.98 051223750360 52.69 051223750600 65.63 051223751100

 | Concrete Rectangular B
HSS4x2x1/8
HSS6x4x3/8
W10x12
W12x16 | Beem: 35'x30"
E2
E2
E2
E2
E2 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.053 L.F. S
880 0.064 L.F. S

 | 62.26 \$. \$ 4.54 \$ 6.27 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$
 | 5 62.26 5 3.49 5 14.30 5 3.49 5 50.64 5 3.20 5 29.44 5 2.18 5 33.53 5

 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
1,000.23 \$ | - \$
96.68 \$
1.203.71 \$
302.97 \$
257.27 \$ | - \$
53.82 \$
670.01 \$
168.61 \$
143.07 \$
 | 3.735.60 \$ 606.11 \$ - \$ 2205.11 \$ 5 500.01 \$ 10.76 \$ 3 9.721.67 \$ 45.02 \$ 10.76 \$ 3 1.551.19 \$ 2.200.77 \$ 9.44 \$ 3 2.200.67 \$ 3.022 \$ 6.71 \$ 2 | S 68.61 S 83
S 19.59 S 83 S 59.61 S 52 S 36.13 S 40 S 39.13 S | 4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$
1.970.21 \$ | - \$ 165.92 \$ 2.065.70 \$ 518.47 \$ 440.38 \$
 | - 5
59.06 \$
735.28 \$
186.47 \$
157.51 \$ | 4.116.60 [STD Year 2009 100-401
302.08 [STD Year 2009 100-102
11.4.43.93 [STD Year 2009 100-102
1.903.68 [STD Year 2009 100-102
2.666 10 [STD Year 2009 100-102
2.666 10 [STD Year 2009 100-102] |
| Concrete-Rectangial Ream: X630
Concrete-Rectangial Ream: X630 6
HS5 Hollow Structural Section: HS5A02X1/8
HS5 Hollow Structural Section: HS5A02X1/8
HS5 Hollow Structural Section: HS5A02X1/8
HS5 Hollow Structural Section: HS5A02X1/8
W Wide Tanget: W10012
W Wide Tanget: W10012
W Wide Tanget: W10012
W Wide Tanget: W10012 | 60 60 650 15.42 11.76 0.11 191.98 170.83 7.68 52.69 468.42 1.17 65.63 61.26 2.04

 | 60 033165360412 15.42 051223750360 191.90 061223750360 42.69 061223750400 65.63 061223750400

 | Concrete Rectangular B
HSS4x2x1/8
HSS6x4x3/8
W10x12
W12x15 | Btam: 36'x30"
E2
E2
E2
E2
E2 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.093 L.F. S
880 0.064 L.F. S

 | 62.26 \$. \$ 4.54 \$ 6.27 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$
 | S 62.26 S 3.49 S 54.30 S 3.49 S 50.64 S 3.20 S 29.44 S 2.18 S 33.53 S

 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
1,800.23 \$ | - \$
96.68 \$
1.203.71 \$
302.97 \$
257.27 \$ | - \$
53.82 \$
670.01 \$
168.61 \$
143.07 \$
 | 3,755.60 S 68.61 S - S 220.51 S 5.60 S 10.76 S 3 9,721.87 S 45.02 S 10.76 S 3 1,551.19 S 22.277 S 9.84 S 3 2,200.67 S 30.02 S 6.71 S 2 | S 68.61 S 83
S 19.59 S 83 S 59.61 S 52 S 36.13 S 40 S 39.13 S | 4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$
1,970.21 \$ | - \$
165.92 \$
2.065.70 \$
518.47 \$
440.38 \$
 | - \$
59.06 \$
735.28 \$
185.47 \$
157.51 \$ | 4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11.443.33 STD Year 2009 100-102
1.903.69 STD Year 2009 100-102
2.568.10 STD Year 2009 100-102 |
| Concrete-Rectangial Ream: X8:30
Concrete-Rectangial Ream: X8:30
HS5-Bollow Structural Section: HS5402X1/8
HS5-Bollow Structural Section: HS5402X1/8
HS5-Bollow Structural Section: HS540X1/8
HS5-Bollow Structural Section: HS540X1/8
Wilder Flanget: W10X12
W. Wilder Flanget: W10X12
W. Wilder Flanget: W10X12
W. Wilder Flanget: W10X15
W. Wilder Flanget: W10X15 | 60 60 650 15.40 11.76 0.11 191.98 170.83 7.68 52.69 48.82 1.17 65.63 65.26 2.04 172.09 161.04 6.24

 | 60 033165560412 15 42 051223750360 191 90 051223750360 52 69 051223750360 65 63 051223750400 172.09 051223751100 172.09 051223751100

 | Concrete Rectangular B
HSS4x2x1/8
HSS6x4x3/8
W10x12
W12x16
W12x19 | Bram: 36'X30"
E2
E2
E2
E2
E2
E2 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.033 L.F. S
880 0.064 L.F. S
880 0.064 L.F. S

 | 62 26 \$ - \$ 4.54 \$ 627 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$ 32.57 \$ 3.92 \$
 | S 62.26 S 3.49 \$ 5.430 \$ 3.49 \$ 5.66.4 \$ 3.20 \$ 29.44 \$ 2.18 \$ 33.53 \$ 2.18 \$ 38.67 \$
 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
1,800.23
\$
5,604.97 \$ | - 5
96.68 5
1.203.71 5
302.97 5
257.27 5
674.59 5 | - \$
53.82 \$
670.01 \$
168.61 \$
143.07 \$
375.16 \$
 | 3.735.60 \$ 68.61 \$ \$ \$ 200.51 \$ 5.00 \$ 10.76 \$ 3 9.721.87 \$ 46.02 \$ 10.76 \$ 3 1.551.19 \$ 22.277 \$ 9.84 \$ 3 2.200.57 \$ 30.02 \$ 6.71 \$ 2 6.654.72 \$ 35.65 \$ 6.71 \$ 2 | S 68.61 S 83 S 19.59 S 83 S 59.61 S 83 S 59.61 S 82 S 36.13 S
 80 S 39.13 S 40 S 44.76 S | 4,116.60 \$
77.10 \$
8.642.94 \$
1.999.75 \$
1.970.21 \$
6,135.01 \$ | - \$
165.92 \$
2.065.70 \$
5.18.47 \$
4.40.38 \$
1.154.72 \$
 | - \$
59.06 \$
735.28 \$
185.47 \$
157.51 \$
413.02 \$ | 4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11,443.93 STD Year 2009 100-102
1,903.60 STD Year 2009 100-102
2,568.10 STD Year 2009 100-102
7,702.75 STD Year 2009 100-102 |
| Concrete Rectangular Beam: X8:00
Concrete Rectangular Beam: X8:00 6
1955 Hollow Structural Section: 1955A02X1/8
1955 Hollow Structural Section: 1956A02X1/8
1955 Hollow Structural Section: 1956A02X1/8
1955 Hollow Structural Section: 1956A02X1/8
1955 Hollow Structural Section: 1956A02X1/8
2000 Hollow Structural Section: 1956A02X1/ | 60 60 450 15.42 11.76 0.11 191.96 170.83 7.68 52.69 48.82 1.17 65.65 61.26 2.04 172.09 161.04 6.24 172.09 161.04 6.24

 | 60 03310536412 15.42 051223763360 191.90 051223763360 62.69 051223760360 65.63 051223764600 172.09 051223751100 172.09 051223751100 878.62 051223751900

 | Concrete Rectangular B
HSS4x2x1/8
HSS6x4x3/8
W10x12
W12x16
W12x19
W14x22 | Bram. 36'X30"
E2
E2
E2
E2
E2
E2
E2
E2
E2 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.003 L.F. S
880 0.064 L.F. S
800 0.064 L.F. S
990 0.057 L.F. S
 | 62 26 \$ - \$ 4.54 \$ 627 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$ 32.57 \$ 3.92 \$ 44.51 \$ 3.48 \$

 | · \$ 62.26 \$ 3.49 \$ 14.30 \$ 3.49 \$ 50.44 \$ 3.20 \$ 20.44 \$ 2.18 \$ 33.53 \$ 2.18 \$ 36.67 \$ 1.94 \$ 36.77 \$
 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
1,000.23 \$
5,604.97 \$
39,107.38 \$
 | - 5
96.68 5
1.203.71 5
302.97 5
267.27 5
674.59 5
3.067.60 5 | - \$
53.82 \$
670.01 \$
168.61 \$
143.07 \$
375.16 \$
1,704.52 \$ | 3.725 60 \$ 60.61 \$. \$ 220 51 \$ 5.00 \$ 10.76 \$ 3 9.721 67 \$ 4.602 \$ 10.76 \$ 3 9.721 67 \$ 4.602 \$ 10.76 \$ 3 1.551 19 \$ 227.75 \$ 30.02 \$ 6.71 \$ 2.200 57 \$ 30.02 \$ 6.71 \$ 2 6.654.72 \$ 36.65 \$
6.71 \$ 2 43.699 50 \$ 48.65 \$ 5.96 \$ 2 | S 68,61 S 83 S 19.59 S 83 S 59.61 S 82 S 36.13 S 840 S 39.13 S 840 S 44.76 S 131 S 56.74 S
 | 4,116.60 \$
77.10 \$
8.642.94 \$
1.999.75 \$
1.970.21 \$
6,135.01 \$
42.744.86 \$ | - \$
165 92 \$
2.065 70 \$
518.47 \$
4.40 38 \$
1.154.72 \$
5.236 50 \$
 | - \$
59.06 \$
735.28 \$
105.47 \$
157.51 \$
413.02 \$
1.871.46 \$ | 4.116.60 [STD Year 2009 100-401
302.08 [STD Year 2009 100-102
11.43.93 [STD Year 2009 100-102
1.992.68 [STD Year 2009 100-102
2.568.10 [STD Year 2009 100-102
7.702.75 [STD Year 2009 100-102
49.852.90 [STD Year 2009 100-102 |
| Concrete Rectangular Bases: X8630
Concrete Rectangular Bases: X8630
Concrete Rectangular Bases: X8630 6
HS5 Hollow Structural Section: HS5002X1/8
HS5 Hollow Structural Section: HS5002X1/8
HS5 Hollow Structural Section: HS5002X1/8
HS5 Hollow Structural Section: HS5002X1/8
HS6 Hanget: W10022 2
W: Wide Flanget: W10022 1
W: Wide Flanget: W10225 1
W: Wide Flanget: W10225 1
H: Wide Flanget: W10222 1
W: Wide Flanget: W10222 1
H: Wide Flanget: W10222 1 | 60 60 450 15.42 11.76 0.11 191.90 170.83 7.68 52.60 48.82 1.17 65.61 63.26 2.04 172.09 163.04 6.28 172.09 163.04 6.28 813.36 56.42 877 826.42 1.17 26

 | 60 03310536412 15.42 051223763360 191.98 051223756386 52.69 051223756360 65.63 051223756360 177.09 051223756300 878.62 051223751100 878.62 051223751100 878.62 051223751300 26.33 051223751300

 | Concrete Rectangular E HSSS42x18 HSS54x2x18 HSS54x2x18 W10x12 W12x16 W12x19 W14x22 W14x42 | Beam: 36%30"
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2 | L.F. 5
550 0.102[L.F. \$
550 0.102[L.F. \$
600 0.033[L.F. \$
800 0.064[L.F. \$
800 0.064[L.F. \$
900 0.064[L.F. \$
900 0.057[L.F. \$

 | 62.26 \$. \$ 4.54 \$ 6.27 \$ 40.88 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$ 32.57 \$ 3.92 \$ 44.51 \$ 3.48 \$
 | · S 62.26 S 3.49 S 14.30 S 3.49 S 50.64 S 3.29 S 29.44 S 3.216 S 30.67 S 1.16 S 30.67 S 1.18 S 49.27 S 1.54 S 49.27 S
 | 3,735.60 \$
70.01 \$
7,848.14
\$
1,075.62 \$
1,800.23 \$
5,604.97 \$
39,107.38 \$
4,000.61 \$ | - 5
96.68 \$
1.203.71 \$
302.97 \$
2457.27 \$
674.59 \$
3.057.60 \$
122.95 \$ | - 5
53.82 S
670.01 S
168.61 S
143.07 S
375.16 S
1.704.52 S
68.19 S
 | 3.755.60 S 606.61 S S S 2005.11 S 600.01 S 107.61 S 3 9.721.87 S 45.02 S 107.61 S 3 1.551.19 S 220.057 S 9.04.8 S 3 2.2005.71 S 302.057 S 302.05 S 67.11 S 2.2005.71 S 305.05 S 67.11 S 2 6.66.47 S 356.65 S 67.11 S 4.3069.50 S 4.06.65 S 56.96 S 4.25.17 S 102.07 S 9.05 S | S 68.61 S 83 S 19.59 S 833 S 59.61 S 835 S 59.61 S 836
 S 39.13 S 840 S 39.13 S 840 S 44.76 S 13 S 56.74 S 85 S 172.96 S | 4,116.60 \$ 77.10 \$ 0.642.94 \$ 1,199.75 \$ 1.970.21 \$ 6,135.01 \$ 42.744.86 \$ 4.442.13 \$ | - \$
165.92 \$
2.065.70 \$
518.47 \$
440.38 \$
1.154.72 \$
5.226.58 \$
210.64 \$
 | S 59.06 \$ 735.28 \$ 196.47 \$ 157.51 \$ 413.02 \$ 1,871.46 \$ 75.64 \$ | 4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11.443.93 STD Year 2009 100-102
1.903.69 STD Year 2009 100-102
2.668.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
49.852.99 STD Year 2009 100-102
4.727.81 ISTD Year 2009 100-102 |
| Concrete-Rectangial Reser: X6030
Concrete-Rectangial Reser: X6030 6
HSS Hollow Structural Section: HSSA02X1/R
HSS HSSA02X1/R
HSS HSSA02X1/R
HSSA02X1/R
HSSA02X1/R
HSSA02X1/R
HSSA02X1/R
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HSSA02X1/R
HSSA02X1/R
HSSA02X1/R
HSSA02X1/R
HSSA | 60 60 450 15.42 11.76 0.31 191.98 120.83 7.68 52.69 448.42 1.17 65.61 63.36 2.04 172.09 163.04 6.24 172.09 163.04 56.22 26.33 24.07 3.97

 | 60 033105360412 15.42 051223750360 191.98 051223750360 42.69 051223750360 45.64 051223750100 46.643 061223751100 172.09 061223751100 878.62 061223751900 26.33 061223752380

 | Concrete Rectangular E HSS4a2x18 HSS6a4x38 W10x12 W12x16 W12x19 W12x19 W12x19 W14x19 W14x2 W14x82 | Beam: 36%30" E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2 | LF. 5
550 0.102[LF. 5
550 0.102[LF. 5
600 0.093[LF. 5
800 0.064[LF. 5
900 0.064[LF. 5
990 0.057[LF. 5
740 0.076[LF. 5

 | 6226 \$ - \$ 454 \$ 627 \$ 4080 \$ 627 \$ 4080 \$ 627 \$ 2049 \$ 675 \$ 2743 \$ 392 \$ 3257 \$ 392 \$ 4451 \$ 348 \$ 15422 \$ 467 \$
 | · \$ 62.26 \$ 3.49 \$ 14.30 \$ 3.49 \$ 50.64 \$ 3.20 \$ 29.44 \$ 2.16 \$ 33.53 \$ 2.16 \$ 30.67 \$ 1.94 \$ 49.93 \$ 2.95 \$ 161.48 \$
 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
5,604.97 \$
39,107.30 \$
4,060.61 \$
 | - 5
96.68 5
1.203.71 5
267.27 5
674.59 5
3.067.60 5
1.22.96 5 | - 5
53.82 5
670.01 5
168.61 5
143.07 5
375.16 5
1.704.52 5
68.19 5
 | 3.735.60 S 68.61 S - S 220.51 S 6.60.51 S - S 3 9.721.87 S 46.02 S 10.76 S 3 1.551.19 S 22.277 S 9.64 S 3 2.200.67 S 30.02 S 6.71 S 2 6.664.72 S 35.66 S 6.71 S 2 41.969.50 S 48.66 S 5.96 S 2 42.81.77 S 166.71 S 0.00 S 2.9 | S 68.61 S 83 \$ 19.59 \$ 83 \$ 59.61 \$ 840 \$ 39.13 \$ 840 \$ 39.13 \$ 840 \$ 39.13 \$ 840 \$ 54.76
 \$ 85 \$ 179.56 \$ | 4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$
1,970.21 \$
6,135.01 \$
42,744.06 \$
4,442.13 \$ | 5
165 52
2.065 70
5
18.47
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1.154 72
5
5.295 58
5
210 64
5
 | - 59 06 5
775 28 5
185 47 5
157 51 5
413 02 5
1.871.46 5
75 64 5 | 4.116.60 STD Year 2009 100-401
302.00 STD Year 2009 100-102
11.443.33 STD Year 2009 100-102
1.900.69 STD Year 2009 100-102
2.568.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
49.852.96 STD Year 2009 100-102
4.727.81 STD Year 2009 100-102 |
| Concrete-Rectangular Beam: X8:00
Concrete-Rectangular Beam: X8:00:6
HSS-Hollow Xtructural Section: HSSA02X1/R
BSS-Hollow Xtructural Section: HSSA02X1/R
W Wide Flanget: W1022: 2
W Wide Flanget: W1022: 3
W Wide Flanget: W1022: 3 | 60 50 450 15.42 11.76 0.11 191.58 170.63 7.68 52.69 46.82 1.17 65.63 61.26 2.04 172.09 163.04 6.24 172 163.04 6.42 172 163.04 6.43 172 163.04 6.43 172 163.04 6.42 172 163.04 6.43 172 163.04 6.43 172 163.04 6.43 172 163.04 6.43 172 163.04 6.43 172 172 172 172 172 173 173 174 173

 | 60 003105356412 15.42 051223760360 191.98 051223760360 52.69 051223760360 65.63 051223750360 172.09 051223751100 172.09 051223751100 878.62 051223751900 26.33 051223751300 37.67 051223752380

 | Concrete Rectangular D HSSR42x119 HSSR42x119 W10x12 W10x12 W10x12 W12x16 W12x16 W14x219 W14x22 W14x23 W14x19 | Bram. 367307 E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E2
E | LF \$ 550 0.102 LF \$ 550 0.102 LF \$ 600 0.030 LF \$ 880 0.644 LF \$ 990 0.671 LF \$ 740 0.076 LF \$ 720 0.978 LF \$
 | 6226 \$ \$ \$ 454 \$ 627 \$ 4080 \$ 627 \$ 2049 \$ 575 \$ 2049 \$ 575 \$ 2143 \$ 392 \$ 3257 \$ 3.92 \$ 4451 \$ 3.48 \$ 15422 \$ 4.67 \$ 20493 \$ 4.08 \$

 | S 62.26 S 3.49 \$ 14.30 \$ 3.49 \$ 50.64 \$ 3.20 \$ 29.44 \$ 2.18 \$ 33.53 \$ 2.18 \$ 38.67 \$ 1.94 \$ 49.93 \$ 2.59 \$ 161.48 \$ 2.67 \$ 212.40 \$
 | 3,735.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
5,604.97 \$
39,107.38 \$
4,000.61 \$
7,795.71 \$
 | - 5 96.60 5 1.203.71 5 302.97 5 674.59 5 3.057.60 5 122.96 5 190.82 5 | - \$ 53.82 \$ 670.01 \$ 168.61 \$ 375.16 \$ 1.704.52 \$ 68.99 \$ | 3.735.60 \$ 68.61 \$ \$ \$ 220.51 \$ 5.00 \$ 10.76 \$ 3 9.721.87 \$ 45.02 \$ 10.76 \$ 3 1.551.19 \$ 22.277 \$ 9.84 \$ 3 2.200.57 \$ 30.02 \$ 6.71 \$ 2 6.654.12 \$ 35.65 \$ 6.71 \$ 2 4.3809.50 \$ 48.65 \$ \$ 5 \$ 4.251.77 \$ 160.71 \$ 8.00 \$ 2 4.2801.71 \$ 225.63 \$
 8.21 \$ 2 | S 68.61 S 83 S 19.59 S 83 S
 | 4,116.60 S
77.10 S
8.642.94 S
1.199.75 S
6.135.01 S
42.744.86 S
4.442.13 S
8.499.48 S | 5 165.02 \$ 2.065.70 \$ 518.47 \$ 440.38 \$ 1.154.72 \$ 5.206.58 \$ 2.006.4 \$ 309.27 \$ | 5 59.06 \$ 735.28
 \$ 185.47 \$ 137.51 \$ 413.62 \$ 756.46 \$ 756.41 \$ 103.77 \$ | 4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11,443.50 STD Year 2009 100-102
1,903.60 STD Year 2009 100-102
2,568.10 STD Year 2009 100-102
7,702.75 STD Year 2009 100-102
49,852.90 STD Year 2009 100-102
44,852.90 STD Year 2009 100-102
4,722.81 STD Year 2009 100-102
8,919.13 STD Year 2009 100-102 |
| Concrete Rectangular Beam: X8:00
Concrete Rectangular Beam: X8:00
(Soncrete Rectangular Beam: X8:00
(Soncrete Rectanual Rectan : ISSA02X1/8
(Soncretar Rectanual Section : ISSA02X1/8
(Soncretar Section : ISSA02X1/8)
(Soncretar Section : ISSA02X1/8 | 60 60 60 650 15.42 11.76 0.11 191.98 170.83 7.68 52.69 48.82 1.17 655.51 61.26 2.04 172.09 161.04 6.24 172.09 161.04 6.24 172.09 161.04 6.20 172.09 161.04 5.29 26.33 24.67 3.37 26.55 16.56 7.91 36.56 61.09 3.31

 | 60 03310536412 15.42 051223760360 191.90 051223760360 52.69 051223760360 65.63 051223750360 172.09 051223751100 172.09 051223751100 172.09 051223751100 26.33 051223751900 26.33 051223752380 37.67 051223762380 37.67 051223752700

 | Concrete Rectangular E
HSS4a2x18
HSS4a2x18
W10x12
W12x16
W12x19
W14x22
W14x82
W14x82
W14x109
W14x109 | Bram. 363307 22
22
22
22
22
22
22
22
22
22
22
22
22 | LF. 5
550 0.102[LF. \$
550 0.102[LF. \$
600 0.031[LF. \$
880 0.064[LF. \$
980 0.064[LF. \$
990 0.052[LF. \$
740 0.076[LF. \$
720 0.076[LF. \$
1000 0.056[LF. \$
 | 62.26 \$ \$ \$ \$ 4.54 \$ 6.27 \$ <td< th=""><th>· § 62.26 §
 3.49 § 14.30 § 3.49 § 50.64 § 3.29 § 29.44 § 2.18 \$ 32.50 § 2.18 \$ 39.57 § 1.54 \$ 49.33 § 2.59 \$ 161.48 \$ 2.67 \$ 22.44 \$</th><th>3,735.60 \$
7,048.14 \$
1,075.62 \$
1,000.22 \$
5,604.97 \$
9,107.38 \$
4,060.61 \$
7,719.71 \$
2,921.19 \$</th><th>- 5
96.60 5
1.200.77 5
302.97 5
2.77.27 5
0.74.59 5
1.22.96 5
1.00.52 5
2.27.00 5</th><th>- \$ 53.82 \$ 670.01 \$ 1968.61 \$ 143.07 \$ 375.65 \$ 1,704.52 \$ 100.619 \$ 100.68 \$ 100.68 \$</th><th>3.735.60 \$ 00.61 \$ \$ \$ 2020 51 \$ 5 00.51 \$ 10.76 \$ 9.721 67 \$ 4.602 \$ 10.76 \$ 3 9.721 67 \$ 4.602 \$ 10.76 \$ 3 1.551 19 \$ 2.200.67 \$ 9.464 \$ 3 2.200.67 \$ 3.002 \$ 6.71 \$ 2 6.664.72 \$ 3.665 \$ 6.71 \$ 2 4.869.60 \$ 4.665 \$ 5.65 \$ 2 4.251.77 \$ 106.71 \$ 8 8 3 4.251.77 \$ 106.71 \$ 8 8 7 1 2 8.001.11 \$ 225.65 \$ 8 7 1 2 3.274.28 \$ 4.666 \$ 5 5 5 5 <td< th=""><th>S 6661 S 83 S 19.59 S 83 S 59.611 S 82 S 36.13 S 80 S 39.13 S 80 S 44.76 S 81 S 5.67.4 S 85 S 179.56 S 93 S 266.77 S 93 S 266.67 S</th><th>4,116.60 5
77.10 5
8,642.94 5
1,199.75 5
6,135.01 5
4,274.86 5
4,442.13 5
8,499.48 5
3,192.90 5</th><th>5 5 165 92 \$ 2.065 70 \$ 519.47 \$ 440.33 \$ 1.154 72 \$ 5205 \$\$ \$ 2010 \$\$ \$ 309 27 \$ 307 22 \$</th><th>5 5 59.06 5 7755.28 5 165.47 5 157.51 5 413.62 5 755.46 5 75.64 5 100.77 5 139.14 5</th><th>4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11.443.93 STD Year 2009 100-102
1.90.69 STD Year 2009 100-102
2.668.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
4.952.90 STD Year 2009 100-102
4.727.81 STD Year 2009 100-102
3.719.25 STD Year 2009 100-102
3.719.25 STD Year 2009 100-102</th></td<></th></td<>
 | · § 62.26 § 3.49 § 14.30 § 3.49 § 50.64 § 3.29 § 29.44 § 2.18 \$ 32.50 § 2.18 \$ 39.57 § 1.54 \$ 49.33 § 2.59 \$ 161.48 \$ 2.67 \$ 22.44 \$
 | 3,735.60 \$
7,048.14 \$
1,075.62 \$
1,000.22 \$
5,604.97 \$
9,107.38 \$
4,060.61 \$
7,719.71 \$
2,921.19 \$
 | - 5
96.60 5
1.200.77 5
302.97 5
2.77.27 5
0.74.59 5
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Concrete-Rectangular Beam: X8:00-6
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 | Concerte Rectangular E HSS4x2x18 HSS4x2x18 W19x12 W19x12 W12x15 W12x15 W14x21 W14x22 W14x22 W14x23 W14x24 W14x25 W14x26 W14x27 W14x28 W14x21 W14x21 W14x22 W14x21 W14x22 W14x21 W14x21 W14x22 W14x21 W14x22 W14x22 W14x22 W14x22 W14x21 W14x22 W14x21 W14x21 W14x21 W14x21 W14x21 W14x21 W14x21 | Beam 36330" | LF 5
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| Concrete-Rectangular Beam: X8:03
Concrete-Rectangular Beam: X8:03
Concrete-Rectangular Beam: X8:03-6
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HS1-Biolow Structural Section: HS5A02X1/8
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| Concrete Rectangular Beam: X8:03
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| Concrete-Rectanglate Beam: X8:09
Concrete-Rectanglate Beam: X8:09.6
HSS-Hellow Structural Section: HSSA02XU/B
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1555: Hollow Structural Section: 1550002X1/8
1557: Hollow Structural Section: 1550002X1/8 | 60 60 60 60 15.42 11.76 0.11 191.50 170.63 7.66 52.66 46.42 1.17 53 65.43 63.33 2.04 66 112.209 143.04 6.24 172 878.62 633.33 36.42 679 978.63 63.06 7.91 38 65.63 66.03 1.37 66 137.47 156.06 7.91 38 65.63 66.03 1.3 66 137.47 156.06 9.12 155 151.19 146.06 9.12 155 151.31 1065.81 7.51 1.159 135.41 24.60 38 36 255 213.13 24.02 215 40.37 37.83 1.99 40 40.37 27.83 1.50 40 40.37 27.85 50 50 6.90

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 | S 600 61 S 82 S 19.59 S 82 S 90.61 S 82 S 90.61 S 82 S 90.61 S 82 S 90.61 S 83 S 90.61 S 84 S 94.76 S 85 S 179.56 S 85 S 226.77 S 85 S 66.67 S 85 S 777.60 S 87 S 66.40 S 81 S 104.47 S 82 S 42.01 S 82 S 42.01 S 83 S 99.062 S 83 S 99.062 S 83 S 99.127 S 83 S 99.127 S
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Concrete-Rectanglate Bases: X8630 6
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10,707.41 \$ 10,707.41 | - \$ 9668 \$ 1200377 \$ 30297 \$ 2672727 \$ 67459 \$ 112256 \$ 110227 \$ 2672727 \$ 10226 \$ 10225 \$ 22708 \$ 500577 \$ 6.02160 \$ 10554 \$ 102930 \$ 20393 \$ 18122 \$ 197240 \$ 197240 \$ 197240 \$ | - \$ 53 82 \$ 670 61 \$ 1661 \$ 1670 61 \$ 1704 52 \$ 1704 52 \$ 1704 52 \$ 1704 52 \$ 681 91 \$ 100 81 \$ 100 82 \$ 220 31 \$ 2249 70 \$ 424 86 \$ 100 78 \$ 97 00 \$ 1703 15 \$ 100 78 \$ 97 00 \$ 173 7 \$ 100 78 \$ 97 00 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ 100 78 \$ | 3.735 60 5 60.61 5 . 5 2205 15 5 500 5 10.76 5 3 3.721 87 5 45.02 5 10.76 5 3 3.751 197 5 45.02 5 10.76 5 3 2.005 17 5 2.0277 5 9.04 5 3 2.2005 17 5 3.056 5 6.71 5 2 4.0805 00 5 4.066 5 5.06 5 2 4.0305 01 5 4.066 5 5.06 5 2
4.0305 02 5 4.066 5 5.05 5 2 3.011 15 2.256.05 5 9.07 5 2 5.05 5 3.0205 07 5 5.080 5 5.05 5 2 2.050.87 5 5.09 5 2 2.0154.67 5 5.177.05 5 | S 680 61 S 82 S 19.59 S 82 S 90 61 S 82 S 913 S 840 S 44.76 S 831 S 66.74 S 831 S 777.68 S 837 S 66.77 S 845 S 104.477 S 852 S 642.01 S 835 S 642.01 S 844.76 S S S 853 S 90.42 S 843 S 90.42 S 853 S 90.42 S 853 S 91.427 S 853 S 91.427 S 853 S <th>4,116.60 \$ 77.10 \$ 8,642.94 \$ 1,1199.75 \$ 1,970.21 \$ 6,125.01 \$ 42,744.86 \$ 4,42.13 \$ 9,499.48 \$ 3,192.99 \$ 8,641.59 \$ 2,627.61 \$ 1,954.27 \$ 1,648.10 \$ 2,432.60 \$ 5,917.5 \$ 36,665.07 \$ 36,665.07 \$ 36,665.07 \$ 36,665.07 \$</th> <th>S 165.92 S 2.065.70 S 518.47 S 440.33 S 1.154.72 S 6.226.59 S 2.206.71 S 3.027 S 3.037.72 S 3.037.72 S 3.037.74 S 3.037.74 S 3.037.74 S 3.037.74 S 3.032.02 S 3.032.03 S 3.032.04 S 3.032.05 S 3.032.05 S 3.032.05 S
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| Concrete-Rectangular Beam: X8:00
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 | Concete Rectangular E
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2</th><th>. 5 5.3.22 5 6.70.21 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 2.2409.70 5 1.28.64 5 1.707.7 5 1.707.7 5 1.707.7 5 1.28.64 5 1.707.7 5 1.208.26 5 5.77.00 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.2</th><th>3.73560 5 60.61 5 - 5 22051 5 60.61 5 - 5 3.73560 5 60.61 5 - 5 5 3.7757137 5 46.02 5 10.76 5 3 3.75119 5 3.002 5 6.71 5 2 6.64172 5 3.66 5 6.67 5 5 4.869.01 4.86.5 5 5.67 5 2 2 1.57 5 8.00 5 4.86.5 5 5.67 5 4.25177 5 168.71 5 8.00 5 2 5 3.07 5 8.07 5 2 1.257.75 5.80.1 5 5.67 5 2 1.257.75 5.90.1 5 2 1.257.75 5.90.1 5 2 2.80.32 5 5.657 5 5 7 7.80.8 6.90.5 5<!--</th--><th>S 60.61 S 83 S 19.59 S 83 S </th><th>4,116.60 5 77.10 5 1,199.75 5 1,199.75 5 1,199.75 5 1,270.21 5 4,274.86 5 4,442.13 5 3,192.90 5 3,192.90 5 3,192.90 5 2,642.74 5 2,627.61 5 1,964.27 5 3,192.90 5 1,964.27 5 1,964.27 5 3,965.07 5 3,994.85 5 3,997.85 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5</th><th>· S 165.92 5 2.065.70 5 5.067.70 5 440.33 5 1.154.72 5 5.205.85 5 2.005.70 5 3.027 5 3.027 5 99161 5 1.762.66 5 3.020 5 200.00 5 200.00 5 3.020 5 2.020.91 5 3.020 5 3.020 5 5.344 5 3.020 5 5.344 5 5.241.77 5 5.3240 5 5.3240 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 <th>5 59.06 5 7755.28 5 1454.47 5 157551 5 137552 5 137543 5 137544 5 77542 5 10275 5 103745 5 27444 5 103530 5 27444 5 10394 5 40065 5 10055 5 100565 5 110275 5 20344 5 110275 5 20344 5 110275 5 20344 5 111427 5 20345 5 1112735 5 213305 5 21329 5 11557 5 445145 5 11557 5 445145 5 11557</th><th>4.116.60 STD Yew 2009 100-401 302.00 STD Yew 2009 100-102 11.41.33 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 2.666.10 STD Yew 2009 100-102 7.102.75 STD Yew 2009 100-102 4.952.90 STD Yew 2009 100-102 4.727.81 STD Yew 2009 100-102 3.719.25 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 2.409.45.15 STD Yew 2009 100-102 2.409.45.15</th></th></th></tr<></th>
 | · S 62.26 S 2.49 S 14.30 S 2.49 S 20.44 S 2.20 S 10.43 S 2.60 S 22.40 S 2.61 S 20.45 S 2.62 S 10.44 S 2.61 S 20.75 S 2.15 S 50.76 S 2.16 S 75.66 S 2.13 S 30.67 S 2.20 S 50.12 S 2.21 S 30.67 S 2.20 S 50.12 S <tr< th=""><th>3,755.60 5
70.01 5
7,848.14 5
1,075.62 5
1,000.22 5
5,600.47 5
9,9197.30 5
4,060.61 5
7,719.71 5
2,921.19 5
7,991.32 5
69,544.74 5
1,779.71 5
2,921.25 5
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5,137.50 5
5,13</th><th>- 5
96.00 5
1200.77 5
227.72 5
277.27 5
277.20 5
2</th><th>. 5 5.3.22 5 6.70.21 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 2.2409.70 5 1.28.64 5 1.707.7 5 1.707.7 5 1.707.7 5 1.28.64 5 1.707.7 5 1.208.26 5 5.77.00 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.2</th><th>3.73560 5 60.61 5 - 5 22051 5 60.61 5 - 5 3.73560 5 60.61 5 - 5 5 3.7757137 5 46.02 5 10.76 5 3 3.75119 5 3.002 5 6.71 5 2 6.64172 5 3.66 5 6.67 5 5 4.869.01 4.86.5 5 5.67 5 2 2 1.57 5 8.00 5 4.86.5 5 5.67 5 4.25177 5 168.71 5 8.00 5 2 5 3.07 5 8.07 5 2 1.257.75 5.80.1 5 5.67 5 2 1.257.75 5.90.1 5 2 1.257.75 5.90.1 5 2 2.80.32 5 5.657 5 5 7 7.80.8 6.90.5 5<!--</th--><th>S 60.61 S 83 S 19.59 S 83 S </th><th>4,116.60 5 77.10 5 1,199.75 5 1,199.75 5 1,199.75 5 1,270.21 5 4,274.86 5 4,442.13 5 3,192.90 5 3,192.90 5 3,192.90 5 2,642.74 5 2,627.61 5 1,964.27 5 3,192.90 5 1,964.27 5 1,964.27 5 3,965.07 5 3,994.85 5 3,997.85 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5</th><th>· S 165.92 5 2.065.70 5 5.067.70 5 440.33 5 1.154.72 5 5.205.85 5 2.005.70 5 3.027 5 3.027 5 99161 5 1.762.66 5 3.020 5 200.00 5 200.00 5 3.020 5 2.020.91 5 3.020 5 3.020 5 5.344 5 3.020 5 5.344 5 5.241.77 5 5.3240 5 5.3240 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 <th>5 59.06 5 7755.28 5 1454.47 5 157551 5 137552 5 137543 5 137544 5 77542 5 10275 5 103745 5 27444 5 103530 5 27444 5 10394 5 40065 5 10055 5 100565 5 110275 5 20344 5 110275 5 20344 5 110275 5 20344 5 111427 5 20345 5 1112735 5 213305 5 21329 5 11557 5 445145 5 11557 5 445145 5 11557</th><th>4.116.60 STD Yew 2009 100-401 302.00 STD Yew 2009 100-102 11.41.33 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 2.666.10 STD Yew 2009 100-102 7.102.75 STD Yew 2009 100-102 4.952.90 STD Yew 2009 100-102 4.727.81 STD Yew 2009 100-102 3.719.25 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 2.409.45.15 STD Yew 2009 100-102 2.409.45.15</th></th></th></tr<>
 | 3,755.60 5
70.01 5
7,848.14 5
1,075.62 5
1,000.22 5
5,600.47 5
9,9197.30 5
4,060.61 5
7,719.71 5
2,921.19 5
7,991.32 5
69,544.74 5
1,779.71 5
2,921.25 5
19,779.71 5
2,921.25 5
19,779.71 5
2,921.25 5
19,779.71 5
2,225.60 5
3,309.72 5
3,309.72 5
3,309.72 5
3,409.11 5
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3,409.14 5
3,137.50 5
5,137.50 5
5,13 | - 5
96.00 5
1200.77 5
227.72 5
277.27 5
277.20 5
2 | . 5 5.3.22 5 6.70.21 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 1.704.52 5 2.2409.70 5 1.28.64 5 1.707.7 5 1.707.7 5 1.707.7 5 1.28.64 5 1.707.7 5 1.208.26 5 5.77.00 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.24.62 5 1.2 | 3.73560 5 60.61 5 - 5 22051 5 60.61 5 - 5 3.73560 5 60.61 5 - 5 5 3.7757137 5 46.02 5 10.76 5 3 3.75119 5 3.002 5 6.71 5 2 6.64172 5 3.66 5 6.67 5 5 4.869.01 4.86.5 5 5.67 5 2 2 1.57 5 8.00 5 4.86.5 5 5.67 5 4.25177 5 168.71 5 8.00 5 2 5 3.07 5 8.07 5 2 1.257.75 5.80.1 5 5.67 5 2 1.257.75 5.90.1 5 2 1.257.75 5.90.1 5 2 2.80.32 5 5.657 5 5 7 7.80.8 6.90.5 5 </th <th>S 60.61 S 83 S 19.59 S 83 S </th> <th>4,116.60 5 77.10 5 1,199.75 5 1,199.75 5 1,199.75 5 1,270.21 5 4,274.86 5 4,442.13 5 3,192.90 5 3,192.90 5 3,192.90 5 2,642.74 5 2,627.61 5 1,964.27 5 3,192.90 5 1,964.27 5 1,964.27 5 3,965.07 5 3,994.85 5 3,997.85 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5</th> <th>· S
165.92 5 2.065.70 5 5.067.70 5 440.33 5 1.154.72 5 5.205.85 5 2.005.70 5 3.027 5 3.027 5 99161 5 1.762.66 5 3.020 5 200.00 5 200.00 5 3.020 5 2.020.91 5 3.020 5 3.020 5 5.344 5 3.020 5 5.344 5 5.241.77 5 5.3240 5 5.3240 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 <th>5 59.06 5 7755.28 5 1454.47 5 157551 5 137552 5 137543 5 137544 5 77542 5 10275 5 103745 5 27444 5 103530 5 27444 5 10394 5 40065 5 10055 5 100565 5 110275 5 20344 5 110275 5 20344 5 110275 5 20344 5 111427 5 20345 5 1112735 5 213305 5 21329 5 11557 5 445145 5 11557 5 445145 5 11557</th><th>4.116.60 STD Yew 2009 100-401 302.00 STD Yew 2009 100-102 11.41.33 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 2.666.10 STD Yew 2009 100-102 7.102.75 STD Yew 2009 100-102 4.952.90 STD Yew 2009 100-102 4.727.81 STD Yew 2009 100-102 3.719.25 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 2.409.45.15 STD Yew 2009 100-102 2.409.45.15</th></th> | S 60.61 S 83 S 19.59 S 83 S
 | 4,116.60 5 77.10 5 1,199.75 5 1,199.75 5 1,199.75 5 1,270.21 5 4,274.86 5 4,442.13 5 3,192.90 5 3,192.90 5 3,192.90 5 2,642.74 5 2,627.61 5 1,964.27 5 3,192.90 5 1,964.27 5 1,964.27 5 3,965.07 5 3,994.85 5 3,997.85 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 3,999.86 5 | · S 165.92 5 2.065.70 5 5.067.70 5 440.33 5 1.154.72 5 5.205.85 5 2.005.70 5 3.027 5 3.027 5 99161 5 1.762.66 5 3.020 5 200.00 5 200.00 5 3.020 5 2.020.91 5 3.020 5 3.020 5 5.344 5 3.020 5 5.344 5 5.241.77 5 5.3240 5 5.3240 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 5.3940 5 <th>5 59.06 5 7755.28 5 1454.47 5 157551 5 137552 5 137543 5 137544 5 77542 5 10275 5 103745 5 27444 5 103530 5 27444 5 10394 5 40065 5 10055 5 100565 5 110275 5 20344 5 110275 5 20344 5 110275 5 20344 5 111427 5 20345 5 1112735 5 213305 5 21329 5 11557 5 445145 5 11557 5 445145 5 11557</th> <th>4.116.60 STD Yew 2009 100-401 302.00 STD Yew 2009 100-102 11.41.33 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 2.666.10 STD Yew 2009 100-102 7.102.75 STD Yew 2009 100-102 4.952.90 STD Yew 2009 100-102 4.727.81 STD Yew 2009 100-102 3.719.25 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 2.409.45.15 STD Yew 2009 100-102 2.409.45.15</th> | 5 59.06 5 7755.28 5 1454.47 5 157551 5 137552 5 137543 5 137544 5 77542 5 10275 5 103745 5 27444 5 103530 5 27444 5 10394 5 40065 5 10055 5 100565 5 110275 5 20344 5 110275 5 20344 5 110275 5 20344 5 111427 5 20345 5 1112735 5 213305 5 21329 5 11557 5 445145 5 11557 5 445145 5 11557 | 4.116.60 STD Yew 2009 100-401 302.00 STD Yew 2009 100-102 11.41.33 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 1.902.66 STD Yew 2009 100-102 2.666.10 STD Yew 2009 100-102 7.102.75 STD Yew 2009 100-102 4.952.90 STD Yew 2009 100-102 4.727.81 STD Yew 2009 100-102 3.719.25 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 10.102.65 STD Yew 2009 100-102 2.409.45.15
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| Concrete-Rectangular Beam: 36x30 | 60 60 850
 | 60 033105350412

 | Concrete Rectangular Beam: 36"x30"
 | IF \$
 | 62.26 5 . 5

 | s 62.26 \$ | 3 735 60 5
 | |
 | 2 13 83 2 . 2 . 2 13 83 2 03 267 5
 | 4 116 60 \$ | | | 4 116 60 STD Vear 2009 100-401
 |
| HSS-Hollow Structural Section1: HSS4X2X1/8 |
 |

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 | | | |
 |
| HSS-Hollow Structural Section1: HSS40(2X1/8: 8
HSS-Hollow Structural Section1: HSS60(4X3/8 | 15.42 11.76 0.11
 | 15.42 051223750360

 | HSS4x2x1/6 E2
 | 550 0.102 L.F. S
 | 4.54 \$ 6.27 \$

 | 3.49 \$ 14.30 \$ | 70.01 \$
 | 96.68 \$ | 53.82 \$
 | 220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$
 | 77.10 \$ | 165.92 \$ | 59.06 \$ | 302.08 STD Year 2009 100-102
 |
| HSS-Hollow Structural Section1: HSS6X4X3/8: 20 | 191.98 170.83 7.68
 | 191.98 051223750360

 | HSS6x4x3/8 E2
 | 550 0.102 L.F. \$
 | 40.88 \$ 6.27 \$

 | 3.49 \$ 50.64 \$ | 7,848.14 \$
 | 1,203.71 \$ | 670.01 \$
 | 9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$
 | 8,642.94 \$ | 2,065.70 \$ | 735.28 \$ | 11,443.93 STD Year 2009 100-102
 |
| W-Wide Flange1: W10X12: 2 | 52.69 48.88 1.17 53
 | 52.69 051223750600

 | W10x12 E2
 | 600 0.093 L.F. \$
 | 20.49 \$ 5.75 \$

 | 3.20 \$ 29.44 \$ | 1,079.62 \$
 | 302.97 S | 168.61 \$
 | 1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$
 | 1,199.75 \$ | 518.47 \$ | 185.47 \$ | 1,903.69 STD Year 2009 100-102
 |
| W-Wide Flange1: W12X16
W-Wide Flange1: W12X16: 3 | 65.63 63.26 2.04 66
 | 65.63 051223751100

 | W12x16 E2
 | 880 0.064 L.F. \$
 | 27.43 \$ 3.92 \$

 | 2.18 \$ 33.53 \$ | 1,800.23 \$
 | 257.27 \$ | 143.07 \$
 | 2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$
 | 1,970.21 \$ | 440.38 \$ | 157.51 \$ | 2,568.10 STD Year 2009 100-102
 |
| W-Wide Flange1: W12X19 |
 | 172.00 064222764400

 | W42-46 E2
 | 990 0.054LE #
 | 22/7 6 200 6

 | 2.00 0 20.02 0 | 100.02
 | 674.00 | 274 46 8
 |
 | 6 104 01 1 | 1 10 1 23 1 | 413.03 | 7 203 26 CTD Van 2009 100 102
 |
| W-Wide Flange1: W12X19: 16
W-Wide Flange1: W14X22 | 1172.09 163.04 6.24 172
 | 112.00 001220101100

 | 1112/17
 | 000 0.004 6.11. 3
 | 32.57 8 3.32 8

 | 2.10 3 30.07 3 | 5,604.37 a
 | 674.53 3 | 375.16 a
 | 0,004.72 a 30.00 a 0.71 a 2.40 a 44.76 a
 | 6,125.01 3 | 1,154.72 8 | 413.02 5 | 1,102.15 310 1481 2009 100-102
 |
| W-Wide Flange1: W14X22: 28
W-Wide Flange1: W14X82 2 | 878.21 834.44 36.86 878
 | 878.21 051223751900

 | W14x22 E2
 | 990 0.057 L.F. S
 | 44.51 \$ 3.48 \$

 | 1.94 \$ 49.93 \$ | 39,089.13 \$
 | 3,056.17 \$ | 1,703.73 \$
 | 43,849.03 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$
 | 42,724.92 \$ | 5,234.13 \$ | 1,870.59 \$ | 49,829.64 STD Year 2009 100-102
 |
| W-Wide Flange1: W14X82 2: 1 | 26.33 24.13 3.98 26
 | 26.33 051223752380

 | W14x82 E2
 | 740 0.076 L.F. \$
 | 154.22 \$ 4.67 \$

 | 2.59 \$ 161.48 \$ | 4,060.61 \$
 | 122.96 \$ | 68.19 S
 | 4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$
 | 4,442.13 \$ | 210.64 \$ | 75.04 S | 4,727.81 STD Year 2009 100-102
 |
| W-Wide Flange1: W14X109 2
W-Wide Flange1: W14X109 2: 1 | 37.67 36.06 7.93 38
 | 37.67 051223752500

 | W14x109 E2
 | 720 0.078 L.F. \$
 | 204.93 \$ 4.80 \$

 | 2.67 \$ 212.40 \$ | 7,719.71 \$
 | 180.82 \$ | 100.58 \$
 | 8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$
 | 8,499.48 \$ | 309.27 \$ | 110.37 S | 8,919.13 STD Year 2009 100-102
 |
| W-Wide Flange1: W16X26
W-Wide Flange1: W16X26: 3 |
 | 65 63 051223752700

 | W15x26 E2
 | 1000 0.0561 F S
 | 44.51 \$ 3.45 \$

 | 192 5 49.89 5 | 2 921 19 5
 | 227.08 5 | 126.01 5
 | 2 774 28 5 48 55 5 5 60 5 2 12 5 55 57 5
 | 3 192 90 5 | 387.22 \$ | 139.14 5 | 3 719 25 STD Year 2009 100-102
 |
| W-Wide Flange1: W16X31 |
 |

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 |
 | | | |
 |
| W-Wide Flange1: W16X31: 4
W-Wide Flange1: W18X35 | 151.19 146.06 9.12 151
 | 151.19 051223752900

 | W16x31 E2
 | 900 0.052 L.F. S
 | 52.79 \$ 3.84 \$

 | 2.13 \$ 58.76 \$ | 7,981.32 \$
 | 580.57 \$ | 322.03 \$
 | 8,883.92 \$ 58.48 \$ 6.55 \$ 2.35 \$ 67.39 \$
 | 8,841.59 \$ | 991.81 \$ | 355.30 \$ | 10,188.69 STD Year 2009 100-102
 |
| W-Wide Flange1: W18X35: 30 | 1158 1046.79 73.98 1,158
 | 1158 051223753300

 | W18x35 E5
 | 960 0.083 L.F. \$
 | 60.03 \$ 5.20 \$

 | 2.15 \$ 67.38 \$ | 69,514.74 \$
 | 6,021.60 \$ | 2,489.70 \$
 | 78,026.04 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$
 | 76,103.76 \$ | 10,410.42 \$ | 2,744.46 \$ | 89,258.64 STD Year 2009 100-102
 |
| W-Wide Flange1: W18X40: 1 | 37.68 35.48 2.87 38
 | 37.68 051223753500

 | W18x40 E5
 | 960 0.083 L.F. \$
 | 68.31 \$ 5.20 \$

 | 2.15 \$ 75.66 \$ | 2,573.92 \$
 | 195.94 \$ | 81.01 \$
 | 2.850.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$
 | 2,827.51 \$ | 338.74 \$ | 89.30 S | 3,255.55 STD Year 2009 100-102
 |
| W-Wide Flange1: W21X50
W-Wide Flange1: W21X50: 7 | 219 213.26 21.42 219
 | 219 051223754300

 | W21x50 E5
 | 1054 0.075 L.F. S
 | 85.39 \$ 4.70 \$

 | 1.94 \$ 92.03 \$ | 18,700.41 S
 | 1,029.30 \$ | 424.86 S
 | 20.154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$
 | 20,627.61 \$ | 1,782.66 \$ | 468.66 S | 22.878.93 STD Year 2009 100-102
 |
| W-Wide Flange: W10X26 | -
 | 40.17 061222760720

 | W10-26 E2
 | 600 0.0931 E K
 | 11 61 8 6 76 8

 | 2.20 8 62.46 8 | 1707.07 8
 | 230.62 5 | 100 64 8
 | 9 10 13 9 10 1 1 10 1 10 1 10 1 10 10 1 10 1
 | 1064.07 | 205.27 | 111.10 | 2 400 04 STD Vest 2009 100.102
 |
| W-Wide Flange: W10X26: 4
W-Wide Flange: W12X19 | 40.17 37.83 1.59 40
 | 40.17 051223750720

 | VI 10/20
 | 600 0.035 L.F. \$
 | 44.51 3 5.75 3

 | 3.20 9 53.40 9 | 1,767.97 5
 | 230.20 \$ | 120.04 3
 | 2,147,42 3 40.00 3 3,04 3 3,52 3 92,01 3
 | 1,004.27 9 | 335.21 9 | 141,40 3 | 2,430,34 310 1441 2003 100-102
 |
| W-Wide Flange: W12X19: 8
W-Wide Flange: W14X22 | 46.11 41.23 1.58 46
 | 46.11 051223751100

 | W12x19 E2
 | 880 0.064 L.F. S
 | 32.57 \$ 3.92 \$

 | 2.18 \$ 38.67 \$ | 1,501.80 \$
 | 180.75 \$ | 100.52 \$
 | 1,783.07 \$ 36.65 \$ 6.71 \$ 2.40 \$ 44.76 \$
 | 1,643.82 \$ | 309.40 S | 110.66 S | 2,063.88 STD Year 2009 100-102
 |
| W-Wide Flange: W14X22: 3
W-Wide Flange: W14X42 | 90 87.64 3.87 90
 | 90 051223751900

 | W14x22 E2
 | 990 0.057 L.F. \$
 | 44.51 \$ 3.48 \$

 | 1.94 \$ 49.93 \$ | 4,005.90 \$
 | 313.20 \$ | 174.60 \$
 | 4,493.70 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$
 | 4,378.50 \$ | 536.40 \$ | 191.70 \$ | 5,106.60 STD Year 2009 100-102
 |
| W-Wide Flange: W14X43: 2 | 7.33 6.42 0.55 7
 | 7.33 051223752320

 | W14x43 E2
 | 810 0.059 L.F. \$
 | 73.49 \$ 4.26 \$

 | 2.37 \$ 80.12 \$ | 538.68 S
 | 31.23 \$ | 17.37 \$
 | 587.28 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$
 | 591.75 S | 53.44 S | 19.06 S | 664.24 STD Year 2009 100-102
 |
| W-Wide Flange: W14X398
W-Wide Flange: W14X398; 2 |
 | 39 051223752500

 | W14x398 E2
 | 720 0.078 L.F. S
 | 679.69 \$ 4.80 \$

 | 2.67 \$ 687.16 \$ | 26,507.91 \$
 | 187.20 \$ | 104.13 \$
 | 26.799.24 \$ 748.34 \$ 8.21 \$ 2.93 \$ 759.48 \$
 | 29,185.26 \$ | 320.19 \$ | 114.27 \$ | 29,619.72 STD Year 2009 100-102
 |
| W-Wide Flange: W14X500 | 70 74 47 75 44
 | 78 024999729200

 | W14v500 50
 | 720 0.0791 5 4
 | 863.88 6 4.84

 | 267 6 864 34 8 | 66 600 64
 | 374.40 | 208.25
 | 67 105 20 S 040 12 S 0 4 F 0 4 F 0 4 F
 | 73 330 44 4 | 640.94 | 228 64 8 | 74 500 0£ STD Very 2008 400 502
 |
| W-Wide Flange: W14X500: 4
W-Wide Flange: W18X35 | /8 /1.13 /2.41 /8
 | 10 051223752500

 | W14X500 E2
 | 720 0.070 C.F. 5
 | 853.88 \$ 4.80 \$

 | 2.67 3 861.35 3 | 66,602.64 5
 | 3/4.40 5 | 208.26 8
 | 6/,185.30 \$ 940.13 \$ 8.21 \$ 2.93 \$ 951.27 \$
 | 73,330.14 8 | 640.38 5 | 228.54 8 | 74,199.06 (51D) 114ar 2009 100-102
 |
| W-Wide Flange: W18X35: 21
W-Wide Flange: W18X40 | 579.73 521 36.82 580
 | 579.73 051223753300

 | W1bx35 E5
 | 960 0.083 L.F. \$
 | 60.03 \$ 5.20 \$

 | 2.15 \$ 67.38 \$ | 34,801.19 \$
 | 3,014.60 \$ | 1,246.42 \$
 | 39,062.21 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$
 | 38,099.86 \$ | 5,211.77 \$ | 1,373.96 \$ | 44,685.59 STD Year 2009 100-102
 |
| W-Wide Flange: W18X40: 3 | 90 88.25 7.13 90
 | 90 051223753500

 | W18x40 E5
 | 960 0.083 L.F. \$
 | 68.31 \$ 5.20 \$

 | 2.15 \$ 75.66 \$ | 6,147.90 \$
 | 468.00 \$ | 193.50 \$
 | 6.809.40 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$
 | 6,753.60 \$ | 809.10 \$ | 213.30 \$ | 7,776.00 STD Year 2009 100-102
 |
| W-Wide Flange: W18X46
W-Wide Flange: W18X46: 2 | 60 58.83 5.48 60
 | 60 051223753520

 | W18x46 E5
 | 950 0.083 L.F. \$
 | 78.66 \$ 5.20 \$

 | 2.15 \$ 86.01 \$ | 4,719.60 S
 | 312.00 \$ | 129.00 \$
 | 5.160.60 \$ 86.42 \$ 8.99 \$ 2.37 \$ 97.78 \$
 | 5,185.20 \$ | 539.40 \$ | 142.20 \$ | 5,866.80 STD Year 2009 100-102
 |
| W-Wide Flange: W18X55
W-Wide Flange: W18X55: 2 |
 | 9.47 051223753920

 | W18x55 E5
 | 900 0.089 L.F. S
 | 93.71 \$ 6.66 \$

 | 2 29 5 101 55 5 | 887.43 5
 | 12 16 5 | 21.69 5
 | 961 68 5 103 34 5 9 63 5 2 62 5 116 49 5
 | 978.63 \$ | 91.20 \$ | 21.86 \$ | 1 093 69 STD Year 2009 100-102
 |
| W-Wide Flange: W18X65 |
 |

 |
 |
 |

 | | 001740
 | | 21.05
 |
 | 510.05 | | 20.00 |
 |
| W-Wide Flange: W18X65: 10
W-Wide Flange: W18X76 | 45.87 34.42 4.54 46
 | 45.87 051223753920

 | W18x65 E5
 | 900 0.089 L.F. \$
 | 110.75 \$ 5.55 \$

 | 2.29 \$ 118.59 \$ | 5,080.10 \$
 | 254.58 \$ | 105.04 \$
 | 5,439.72 \$ 122.13 \$ 9.63 \$ 2.52 \$ 134.28 \$
 | 5,602.10 \$ | 441.73 \$ | 115.59 \$ | 6,159.42 STD Year 2009 100-102
 |
| W-Wide Flange: W18X76: 6 | 183 169 25.96 183
 | 183 051223753940

 | W18x76 E5
 | 900 0.089 L.F. \$
 | 129.38 \$ 5.55 \$

 | 2.29 \$ 137.22 \$ | 23,676.54 \$
 | 1,015.65 \$ | 419.07 S
 | 25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$
 | 26,137.89 \$ | 1,762.29 \$ | 461.16 \$ | 28,361.34 STD Year 2009 100-102
 |
| W-Wide Flange: W18X106
W-Wide Flange: W18X106: 6 | 127.33 119.45 25.72 127
 | 127.33 051223753980

 | W18x106 E5
 | 900 0.089 L.F. \$
 | 181.13 \$ 5.55 \$

 | 2.29 \$ 188.97 \$ | 23,063.28 \$
 | 706.68 \$ | 291.59 \$
 | 24,061.55 \$ 198.72 \$ 9.63 \$ 2.52 \$ 210.87 \$
 | 25,303.02 \$ | 1,226.19 \$ | 320.87 \$ | 26,850.08 STD Year 2009 100-102
 |
| W-Wide Flange: W21X44 |
 | 180 061223764100

 | W21v44 E5
 | 1054 0.075 E \$
 | 76.04 5 4.70 5

 | 104 8 9169 8 | 13 607 20 8
 | 846.00 8 | 310.20 8
 | 14 702 40 E 02 00 E 0 14 E 2 14 E 02 00 E
 | 11 001 00 5 | 1 466 20 8 | 286.20 8 | 16 764 40 STD Vast 2009 100-102
 |
| W Wide Hange. Weinweit |
 | 100 001220104100

 | 1121044
 | 0.010 0.1.
 | 10.00 0 0.10 0

 | 1.04 4 01.00 4 | 10,001.80
 | 010.00 | 343.20 3
 | 14,102,40 3 02,00 3 0,14 3 2,14 3 30,00 3
 | 14,004.00 | 1,400,50 4 | 000.60 4 | 10,104,40 010 1441 2002 100-102
 |
| 0.311805556 | 4707.51 4306.98 857.07
 | lotal

 |
 |
 |

 | \$ | 385,527.74 \$
 | 21,937.49 \$ | 10,215.71 \$
 | 417,680.95 \$
 | 423,449.55 \$ | 37,812.04 \$ | 11,244.97 \$ | 472,505.55
 |
| 0.311805550
5
Concrete, Rectangular Beam: Michh | 4707.51 4366.98 857.67
 | Total

 |
 |
 |

 | \$ | 385,527.74 \$
 | 21,937.49 \$ | 10,215.71 \$
 | 417,580.95 \$
 | 423,449.55 \$ | 37,812.04 \$ | 11,244.97 \$ | 472,506.55
 |
| 5
Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30: 6 | 60 60 450
 | 60 033105350412

 | Concrete Rectangular Beam: 36'x30"
 | L.F. S
 | 62.26 \$ - \$

 | - \$ 62.26 \$ | 385,527.74 \$
3,735.60 \$
 | 21,937.49 \$ | 10,215.71 \$
 | 417,680.95 \$
3,735.60 \$ 68.61 \$ · \$ 5 68.61 \$
 | 423,449.55 \$
4,116.60 \$ | 37,812.04 \$ | 11,244.97 \$
- S | 4/2,509.55
4.116.60 STD Year 2009 100-401
 |
| 5
Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30: 6
HSS-Hollow Structural Section: HSS402X1/8
HSS-Hollow Structural Section: HSS402X1/8: 8 | 60 60 450
15.42 11.26 0.11
 | 60 033105350412
15.42 051223750360

 | Concrete Rectangular Beam: 36%30"
 | L.F. S
 | 62.26 \$ · \$

 | \$ 62.26 \$ 3.49 \$ 14.30 \$ | 385,527.74 \$
3.735.60 \$
70.01 \$
 | 21,937.49 \$ | - \$
 | 417,580.55 \$
3,775.60 \$ 60.61 \$ - \$. \$ 60.61 \$
200.61 \$.00 \$ 10.76 \$ 3.83 \$ 19.99 \$
 | 423,449.55 \$
4,116.60 \$
77.10 \$ | 37,812.04 \$ | - S | 4/72309.53
4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
 |
| S Concrete-Rectangular Beam: 36x39 Concrete-Rectangular Beam: 36x39 Concrete-Rectangular Beam: 36x36 HS5-Hollow Structural Section: HS56422X//8 HS5-Hollow Structural Section: HS56422X/8 HS5-Hollow Structural Section: HS5642X/8 | 400/31 406.36 57.47 60 60 450 15.42 11.76 6.11
 | 60 033105350412

 | Concrete Rectangular Beam: 36'x30'
HSS4x2x1/8 E2
 | L.F. \$
 | 62.26 \$ · \$

 | \$ 62.26 3.49 \$ 14.30 \$ | 385,527.74 \$
3,735.60 \$
70.01 \$
 | 21,937.49 \$ | 10,215.71 \$
 | 417,689.95 \$
 | 423,449.55 \$
4,116.60 \$
77.10 \$ | - S
165.92 S | 11,244.97 \$ | 4/2,509,55
4,116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
 |
| 5
Concrete-Rectangular Beam: 36(3)
Concrete-Rectangular Beam: 36(3)
Concrete-Rectangular Beam: 36(3)
H55 Hollow Structural Section: H5540XX1/8
H55 0H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
H5540H540X1/8
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H5540X1/8
H5540X1/8
H5540X1/8
H5540X1/8
H5540X1/8
H5540X1/8
H5540X1/8 | 400/31 406.56 57.27 60 60 450 15.42 11.76 0.11 191.56 170.83 7.66
 | 60 033106350412 15.42 054223750360 191.98 051223750360

 | Concrete Rectangular Beam: 36'x30'
HSS4x2x1/8 E2
HSS6x4x3/8 E2
 | L.F. \$
550 0.102 L.F. \$
550 0.102 L.F. \$
 | 62 26 \$. \$
4 54 \$ 6 27 \$
40 88 \$ 6 27 \$

 | \$ 62.26 \$ 3.49 \$ 14.30 \$ 3.49 \$ 50.64 \$ | 385,527.74 \$ 3,735.60 \$ 70.01 \$ 7,848.14 \$
 | 21,937.49 \$ - \$ 96.68 \$ 1,203.71 \$ | 10,215.71 \$
 | 417,689.95 5 3,735.60 5 68.61 5 5 5 68.61 5 220.51 5 5.00 5 10.76 5 3.83 5 19.59 5 5,721.87 5 45.62 5 3.63 5 59.61 5
 | 423,449.55 \$ 4,116.60 \$ 77.10 \$ 0,642.94 \$ | 37,812.04 \$ | 11,244.97 \$ - \$ - \$ - 9.06 \$ 735.28 \$ | 4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11,443.93 STD Year 2009 100-102
 |
| 5 ULTERSON
Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30
Concrete-Rectangular Beam: 36x30
Hist-Hollow Structural Section: HISSA0XXI/B
HISS-Hollow Structural Section: HISSA0XXI/B
HISS-Hollow Structural Section: HISSA0XXI/B
HISS-Hollow Structural Section: HISSA0XXI/B
HISS-HOLDW Structural Section: HISSA0XXI/B
W-Wider Franget: W100X2
W-Wider Franget: W100X2 | 400/31 4060.05 5/2/2 60 60 450 15.42 11.76 0.11 391.86 170.33 7.66 52.60 48.88 1.13 53
 | 60 033105360412 15.42 051223750360 191.98 051223750360 52.69 051223750600

 | Concrete Rectangular Beam 30's07 HSS4x2x16 E2 HSS6x4x36 E2 WHbx12 E2
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 600 0.033 L.F. S
 | 62 26 \$ · \$
4 54 \$ 6 27 \$
40.88 \$ 6 27 \$
20.49 \$ 5.75 \$

 | s 62.26 5 3.49 \$ 14.30 \$ 3.49 \$ 50.64 \$ 3.20 \$ 29.44 \$ | 385,527,74 \$
3,736.60 \$
70.01 \$
7,848.14 \$
1,079.62 \$
 | 21,937,49 \$. \$. \$. \$. \$. 1,203,71 \$. 302,97 \$ | 10,215.71 \$
- \$
53.82 \$
670.01 \$
168.61 \$
 | 417,689.95 5 5 5 5 68.61 5 200,61 5 5 68.61 5 200,61 5 5 68.61 5 200,61 5 5 68.61 5 5 68.61 5 5 68.61 5 5 7 7 7 64.61 5 3.83 5 9.61 5 9 5 9 5 9 5 9 5 9 6 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 1
 | 423,449.55 \$ 4,116.60 \$ 77.10 \$ 0.642.94 \$ 1,199.75 \$ | 37,812.04 \$ - \$ 165.92 \$ 2,065.70 \$ 518.47 \$ | 11,244.97 \$ 59.06 \$ 735.28 \$ 185.47 \$ | 4/2,296-59
4,116.60 STD Vear 2009 100-401
302.08 STD Vear 2009 100-102
11,443.93 STD Vear 2009 100-102
1,903.69 STD Vear 2009 100-102
 |
| ULTIMOSO ULTIMOSO Concrete-Rectangular Beam: 36(3) Concrete-Rectangular Beam: 36(3) Concrete-Rectangular Beam: 36(3) (5) | 40/7/51 4060-36 87/27 60 60 450 15:42 13.76 0.11 191.98 370.83 7.68 52.69 46.88 1.17 53 65.63 63.70 2.04 66
 | Octa 60 033105560412 15.42 051223750360 191.98 051223750360 52.69 051223750600 66.63 051223750100

 | Concrete Rectangular Beam: 30°30° E2 H/SS6x4218 E2 H/SS6x4238 E2 W10x12 E2 W12x16 E2
 | L.F. S
550 0.102[LF. S
550 0.102[LF. S
600 0.030[LF. S
0004[LF. S
 | 62 26 \$. \$ 4 54 \$ 6 27 \$ 40 88 \$ 6 27 \$ 20 49 \$ 5 .75 \$ 27 43 \$ 3 92 \$

 | · S 62.26 S 3.49 S 43.00 S 3.49 S 90.64 S 3.20 S 29.44 S 2.16 S 33.53 S | 385,527,74 \$ 3,735.60 \$ 7,001 \$ 7,848.14 \$ 1,079.62 \$ 1,800.23 \$
 | 21,937.49 \$ | 10,215,71 \$
 | 417,689.95 5 5 5 5 6 6 7 5 . 5 6 6 1 . 5 . 5 6 6 6 5 . 5 . 5 6 6 6 5 . 5 . 5 . 5 . 1 . . 1 . 1 . 1
 | 423,449.55 \$ 4,116.60 \$ 77.10 \$ 0,642.94 \$ 1,199.75 \$ 1,970.21 \$ | 37,812.04 \$ | 11,244.97 \$
- \$
59.06 \$
735.28 \$
105.47 \$
157.51 \$ | 4/2308-59
4.116.60 STD Vear 2009 190-401
302.08 STD Vear 2009 190-102
11.443.93 STD Vear 2009 190-102
1.903.69 STD Vear 2009 190-102
2.568.10 STD Vear 2009 190-102
 |
| Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Soft State Stat | 400/31 406.36 57/27 60 60 450 15.42 13.76 0.31 191.58 120.83 7.66 52.69 48.88 1.17 53 65.53 63.26 2.04 66 122.29 151.44 6.24 127
 | Instant Instant 60 033105550412 15.42 051222750390 191.58 051222750390 52.69 051222750390 66.63 051222750600 65.63 051222751100 172.09 051222751100

 | Concrete Rectangular Beam: 30'x30' H/SS4x2x1/8 E2 H/SS6x4x38 E2 W19x12 E2 W19x16 E2 W19x16 E2
 | LF \$
550 0.102[LF \$
550 0.003[LF \$
600 0.003[LF \$
880 0.044[LF \$
 | 62 26 \$. \$ 4 54 \$ 6 27 \$ 40 86 \$ 6 27 \$ 20 49 \$ 6 75 \$ 27 43 \$ 3 92 \$
 | S 62.26 S 3.49 S 4.30 S 3.49 S 9.064 S 3.20 S 29.44 S 2.16 S 35.33 S 2.16 S 9.674 S
 | 385,527.74 \$ 3,735.60 \$ 70.01 \$ 7,848.14 \$ 1,079.62 \$ 1,009.23 \$ 6,604.67 \$
 | 21,337.49 \$ | 10,215,71 \$
 | 417,689.95 \$ | 423,449.55 \$ 4,116.60 \$ 77.10 \$ 8,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,535.01 \$
 | 37,812.04 \$ | 11,244.97 \$ | 4/2306.39
4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11.443.93 STD Year 2009 100-102
1.903.69 STD Year 2009 100-102
2.6561.10 STD Year 2009 100-102
7.707.75 STD Year 2009 100-102 |
| Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Concrete Rectangular Beam: 36(3) Soft State Stat | 400/31 406.36 57/27 60 60 450 1542 13.76 0.31 193.98 170.83 7.68 52.60 48.88 1.17 65.63 63.36 2.04 172.09 163.84 6.24 172 - -
 | Instant Instant 60 033105350412 15.42 051223750360 191.98 051223750360 52.69 051223750600 66.63 051223751100 172.69 051223751100

 | Concrete Rectangular Beam: 36'x30' HSS4x2x10 E2 HSS4x2x10 E2 W19x12 E2 W12x16 E2 W12x16 E2 W12x16 E2
 | LF S 550 0.102 L.F. S 550 0.102 L.F. S 600 0.033 L.F. S 0800 0.044 L.F. S 0000 0.046 L.F. S
 | 6226 \$. \$ 4.54 \$ 6.27 \$ 4086 \$ 6.27 \$ 2049 \$ 5.75 \$ 27.43 \$ 3.92 \$ 32.57 \$ 3.92 \$
 | S 6226 S 3.49 S 430 S 3.49 S 90.64 S 3.20 S 90.64 S 2.18 S 33.53 S 2.18 S 30.47 S 2.19 S 30.47 S
 | 345,527.74 \$ 3.735.60 \$ 7.041 \$ 1.079.62 \$ 1.000.23 \$ 5.004.97 \$
 | 21,337.49 \$ | 10,215,71 \$
 | 417,689.95 5 5 5 5 5 5 5 5 66.61 5 3.735.60 5 5.600 5 10.76 5 3.03 5 19.59 5 22051 5 5.600 5 10.76 5 3.03 5 19.59 5 9,721.87 5 45.620 5 10.76 5 3.03 5 59.61 5 1.551.19 5 22.77 5 9.84 5 3.62 5 36.13 5 2.200.57 5 30.02 5 6.77 5 2.40 5 39.13 5 6.654.72 5 3.65 5 6.77 5 44.76 5 44.76 5 | 42),449.55 \$
4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$
1,970.21 \$
6,135.01 \$
 | 37,812.04 \$ | 11,244.97 \$ | 412396.39
4.116.60 STD Year 2009 100-401
302.08 STD Year 2009 100-102
11.443.93 STD Year 2009 100-102
1.903.69 STD Year 2009 100-102
2.568.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
2.568.10 STD Year 2009 100-102 |
| Concrete-Rectangular Beam: 36430 Solidow Structural Section: 1655400X1/8 ISS Indiow Structural Section: 1655400X1/8 ISS Indiow Structural Section: 1655400X1/8 Wider Inaget: W10012 WIder Inaget: W100 | 400/31 406.08 5/2/ 60 60 450 15.42 11.76 0.11 191.68 170.83 7.68 52.40 48.88 1.13 53 65.83 63.36 172.99 193.84 6.24 172 197.82 815.76
 | 10000 0033106360412 15.42 051223760360 191.98 051223750360 52.69 051223750400 66.63 051223750400 172.09 051223751100 172.09 051223751100 878.21 051223751900

 | Concrete Rectangular Beam 30%07 MSS4x2x10 E2 MSS6x1x00 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W12x16 E2 W12x19 E2 W14x22 E2
 | L.F. S
550 0.102 L.F. S
550 0.102 L.F. S
600 0.030 L.F. S
800 0.040 L.F. S
800 0.044 L.F. S
990 0.047 L.F. S
 | 6226 \$. \$ 4.54 \$ 6.27 \$ 40.86 \$ 6.27 \$ 20.49 \$ 5.75 \$ 27.43 \$ 3.92 \$ 32.67 \$ 3.92 \$ 44.51 \$ 3.48 \$
 | \$ 6226 \$ 3.49 \$ 1430 \$ 3.49 \$ 5.064 \$ 3.20 \$ 2944 \$ 2.49 \$ 3353 \$ 2.49 \$ 3353 \$ 2.49 \$ 3053 \$ 2.49 \$ 3053 \$ 2.49 \$ 3053 \$ 2.49 \$ 3053 \$ 2.49 \$ 3057 \$ 2.49 \$ 3053 \$
 | 385,527.74 \$ 3.735.60 \$ 70.01 \$ 7,048.14 \$ 1,079.62 \$ 1,000.23 \$ 5,604.97 \$ 29,089.13 \$
 | 21,537,49 \$. 5 . 5 . 666 \$. 1,203,71 \$. 257,27 \$. 674,59 \$. 3,066,17 \$ | 10,215,71 \$
 | 417,689.95 5 68 5 6 5 5 6 6 5 3.735.60 5 68.61 5 5 5 5 66.61 5 22051 5 5 68 5 10.76 5 3.83 5 19.59 5 9.721.07 5 45.62 5 3.63 5 5.961 5 1.551.19 5 22.277 5 9.84 5 3.62 5 3.613 5 2.200.97 5 30.02 5 6.71 5 2.40 5 39.13 5 6.654.72 5 35.65 5 7.71 5 2.40 5 44.76 5 43.849.03 \$ 44.65 \$ 5.65 \$ 2.13 \$ 56.74 \$ | 423,449.55 \$
4,116.60 \$
77.10 \$
8,642.94 \$
1,199.75 \$
1,970.21 \$
6,155.01 \$
42,724.92 \$
 | 37,812.04 \$ | 11,244.97 \$ - \$ 59.06 \$ 735.28 \$ 185.47 \$ 157.51 \$ 413.02 \$ 1,870.59 \$ | 41/2398-35
4.116.60 STD Vear 2009 100-401
302.08 STD Vear 2009 100-102
11.443.93 STD Vear 2009 100-102
1.903.69 STD Vear 2009 100-102
2.568.10 STD Vear 2009 100-102
7.702.75 STD Vear 2009 100-102
49.629.64 STD Vear 2009 100-102 |
| Concrete-Rectangular Beam: 36(30) Concrete-Rectangular Beam: 36(30) Concrete-Rectangular Beam: 36(30) Concrete-Rectangular Beam: 36(30) Solutions Ventural Section: 1555400X1/8 IsS5-tellow Structural Section: 1555400X1/8 IsS5-tellow Structural Section: 1555400X1/8 IsS5-tellow Structural Section: 1555400X1/8 Wide Flanget: W10122 W. Wide Flanget: W10122 W. Wide Flanget: W10123 W. Wide Flanget: W10124 W. Wide Flanget: W1014 | 40/2/31 4060.05 87/2/3 60 60 450 15.42 11.76 0.11 191.98 170.83 7.68 52.60 46.88 1.17 51 65.63 63.36 2.04 66 172.09 163.04 6.24 172 878.21 815.76 36.42 172 26.33 24.31 3.98 26
 | 10000 0033105550412 15.42 051223750360 191.96 051223750360 52.69 051223750360 66.63 051223750400 172.69 051223751100 172.69 051223751100 172.69 051223751100 172.69 051223751900 26.33 051223751900

 | Concrete Rectangular Beam: 30°x30° HrSS4x2x16 E2 HrSS6x4x36 E2 W1%x12 E2 W1%x16 E2 W1%x19 E2 W14x22 E2 W14x22 E2 W14x22 E2 W14x22 E2
 | L.F. \$ 550 0.102 [L.F. \$ 550 0.102 [L.F. \$ 600 0.093 [L.F. \$ 880 0.064 [L.F. \$ 990 0.057 [L.F. \$ 740 0.076 [L.F. \$
 | 62.26 S S 4.54 S 6.27 S 4.54 S 6.27 S 20.49 S 6.27 S 20.49 S 5.75 S 27.43 S 3.92 S 32.57 S 3.92 S 44.51 S 3.48 S 154.22 S 4.67 S
 | S 62.26 S 3.69 \$ 14.30 \$ 3.69 \$ 50.64 \$ 3.20 \$ 29.44 \$ 2.16 \$ 33.53 \$ 2.16 \$ 30.67 \$ 1.94 \$ 49.92 \$ 2.16 \$ 30.67 \$ 2.18 \$ 49.92 \$ 1.94 \$ 49.92 \$ 2.59 \$ 161.48 \$
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53.02 \$
670.01 \$
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68.19 \$
 | 417,680.95 5 5 5 5 6 6461 5 3.755.60 5 6.861 5 5 5 5 6661 5 22051 5 5.00 5 10.76 5 3.83 5 1959 5 5,721.87 5 45.02 5 10.76 5 3.83 5 5961 5 1,551.19 5 2277 5 9.84 5 3.62 5 3.613 5 2,200.57 5 3.022 5 6.71 5 2.40 5 39.13 5 6,654.72 5 3.65 5 6.71 5 2.40 5 34.76 5 43,849.01 5 3.665 5 6.71 5 2.40 5 44.76 5 42,547.71 5 160.71 5 2.405 5 173.56 5 | 42),483.5 \$ 4,116.60 \$ 771.0 \$ 0,642.94 \$ 1,199.75 \$ 1,997.5 \$ 1,970.21 \$ 6,155.01 \$ 42,724.92 \$ 4,442,13 \$
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4.116.60 STD Vear 2009 150-401
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1.903.69 STD Vear 2009 150-162
2.568.10 STD Vear 2009 150-162
7.762.75 STD Vear 2009 150-162
49.829.64 STD Vear 2009 150-162
4.727.81 STD Vear 2009 150-162 |
| Concrete Rectangular Beam: 36:30 Concrete Rectangular Beam: 36:30 Concrete Rectangular Beam: 36:30 Concrete Rectangular Beam: 36:30 Sistement Structural Section: INSOCX1/8 ISS: Hollow Structural Section: INSOCX1/8 ISS: Hollow Structural Section: INSOCX1/8 ISS: Hollow Structural Section: INSOCX1/8 Wide Flange: W10X12 W.Wide Flange: W10X2 Wide Flange: W10X2 WWide Flange: W10X2 WIde Flange: W10X2 WWide Flange: W10X2 Flange: W10X2 Flange: W10X2 WWide Flange: W10X2 Flange: W10X2 WWide Flange: W10X2 WIde Flange: W10X2 Flange: W1 | 400/31 406.56 87/27 60 60 450 15.42 11.76 0.11 191.58 170.33 7.68 52.69 46.88 1.17 53 65.63 61.36 2.04 66 172.09 163.04 6.24 172 878.22 855.76 56.92 876 26.33 24.13 3.38 26 177.67 36.66 7.39 38
 | Form 60 033105560412 15.42 051223750360 191.98 051223750360 52.69 051223750360 66.63 051223750400 66.63 051223751100 172.09 051223751100 876.21 051223751900 26.33 051223751900 26.33 051223752380 37.67 051223752500

 | Concrete Rectangular Beam: 30°x30° HrSS4x2x109 E2 HrSS5x4x218 E2 W19x12 E2 W19x15 E2 W19x19 E2 W14x2 E2 W14x2 E2 W14x2 E2 W14x2 E2 W14x2 E2 W14x2 E2
 | LF \$ 550 0.102 LF \$ 550 0.102 LF \$ 600 0.033 LF \$ 680 0.064 LF \$ 980 0.064 LF \$ 990 0.057 LF \$ 740 0.076 LF \$ 720 0.078 LF \$
 | 62.26 S - S 4.54 S 627 S 40.08 S 627 S 20.49 S 575 S 20.49 S 575 S 27.43 S 3.92 S 22.47 S 3.92 S 44.51 S 3.48 S 154.22 S 4.67 S 20.43 S 4.00 S
 | \$ 6226 \$ 3.49 \$ 14.30 \$ 3.49 \$ 5064 \$ 3.20 \$ 2944 \$ 2.16 \$ 33.53 \$ 2.16 \$ 33.67 \$ 1.49 \$ 49.93 \$ 2.59 \$ 161.48 \$ 2.67 \$ 2124.0 \$
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 | 417,689.95 5 5 5 6 6 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 7 5 6 6 6 7 <th7< th=""><th>42),49:55 \$ 4,116:60 \$ 77:10 \$ 8,642:94 \$ 1,199:75 \$ 1,199:75 \$ 1,197:21 \$ 6,515:01 \$ 42,724:92 \$ 4,442:13 \$ 8,499:48 \$</th><th>37,812,04 \$
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4,40,38 \$
1,154,72 \$
5,224,13 \$
2,210,64 \$
3,09,27 \$</th><th>11,244.97 \$
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51.57.51 \$
410.02 \$
1.870.59 \$
5.75.54 \$
110.37 \$</th><th>4/2306.35
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302.08 STD Year 2009 100-102
11.443.93 STD Year 2009 100-102
1.903.66 STD Year 2009 100-102
2.568.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
4.829.64 STD Year 2009 100-102
4.727.81 STD Year 2009 100-102
8.919.13 STD Year 2009 100-102</th></th7<> | 42),49:55 \$ 4,116:60 \$ 77:10 \$ 8,642:94 \$ 1,199:75 \$ 1,199:75 \$ 1,197:21 \$ 6,515:01 \$ 42,724:92 \$ 4,442:13 \$ 8,499:48 \$
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2.568.10 STD Year 2009 100-102
7.702.75 STD Year 2009 100-102
4.829.64 STD Year 2009 100-102
4.727.81 STD Year 2009 100-102
8.919.13 STD Year 2009 100-102 |
| Concrete Rectangular Beam: 36:30 Concrete Rectangular Beam: 36:30 Concrete Rectangular Beam: 36:30 Soft Statement State Statement | 400/31 406.36 57/27 60 60 450 15.42 11.76 0.31 191.98 170.83 7.68 52.69 48.88 1.17 53 65.53 69.26 2.04 66 1722.99 153.04 6.24 172 878.23 815.76 56.52 677 26.33 24.13 3.58 26 17.42 16.66 7.59 34 65.64 0.401 1.3 66
 | Form 60 033105550412 15.42 051223750360 191.98 051223750360 52.69 051223750360 52.69 051223750400 66.33 051223750400 172.09 051223751100 172.09 051223751100 878.21 051223751900 26.33 05122375280 37.67 05122375200 46.512272700 05122377200

 | Concrete Rectangular Beam: 30'x30' HSS4x2x119 E2 HSS6x4x38 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x16 E2 W10x19 E2 W14x102 E2 W14x109 E2 W14x109 E2
 | LF \$ 550 0.102 LF. \$ 550 0.102 LF. \$ 600 0.033 LF. \$ 880 0.044 LF. \$ 990 0.057 LF. \$ 740 0.076 LF. \$ 740 0.076 LF. \$ 920 0.078 LF. \$
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 | S 6226 S 3.49 \$ 14.30 \$ 3.49 \$ 9.064 \$ 3.20 \$ 29.44 \$ 2.18 \$ 30.67 \$ 2.18 \$ 30.67 \$ 1.54 \$ 49.33 \$ 2.59 \$ 161.48 \$ 2.67 \$ 21.40 \$ 2.67 \$ 24.40 \$
 | 345,527.74 \$ 3.735.60 \$ 7.70.61 \$ 7.7,848.14 \$ 1.079.62 \$ 1.009.627 \$ 1.009.627 \$ 3.90.091.13 \$ 4.006.61 \$ 7.719.71 \$ 2.901.91 \$
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4.116.60 STD Year 2009 100-401
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7.702.75 STD Year 2009 100-102
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10.042 |
| C.0.1180556 C.0000004 Retain(36430 C.0000004 Retain(36430 C.0000004 Retain(36430 C.0000004 Retain(36430 C.0000004 Retain(36430 C.000004 Retain(36430 C.000004 Retain(36430 Ret | 407/31 406.05 87/27 60 60 456 15.42 11.76 0.11 191.80 170.83 7.58 52.46 44.88 1.17 51.62 2.04 66 122.09 193.04 6.24 172 878.21 855.76 86.32 2.63 2.63 26.33 24.33 3.88 26.54 6.03 3.3
 | form 60 033166360412 16.42 051223750360 1 19.90 051223750360 1 52.69 051223750400 1 66.63 051223750400 1 712.69 051223750400 1 86.63 051223751100 1 878.21 05122375100 1 878.21 05122375100 1 26.33 051223752380 1 37.67 051223752500 1 66.63 051223752700 1

 | Concrete Rectangular Bram. 30%30* MSS4x2x10 E2 MSS6x1x10 E2 MSS6x1x10 E2 MS10x12 E2 MV10x12 E2 MV10x12 E2 MV10x12 E2 MV10x12 E2 MV10x12 E2 MV10x2 E2 MV10x2 E2 MV10x2 E2 MV10x2 E2 MV10x10 E2 MV10x100 E2 MV10x100 E2 MV10x10 E2 MV10x10 E2 MV10x10 E2 MV10x10 E2
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 600 0.033 L.F. S 800 0.042 L.F. S 900 0.041 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 720 0.078 L.F. S 1000 0.066 L.F. S
 | 62.26 5
 | S 6226 S 3.49 \$ 6226 \$ 3.49 \$ 430 \$ 3.29 \$ 9064 \$ 3.20 \$ 9064 \$ 2.10 \$ 3033 \$ 2.10 \$ 3047 \$ 1.94 \$ 4933 \$ 2.10 \$ 3047 \$ 1.94 \$ 4933 \$ 2.95 \$ 16148 \$ 2.67 \$ 21240 \$ 1.92 \$ 49.89 \$
 | 345,527.74 \$ 3.735.60 \$ 7.70.61 \$ 7.7646.14 \$ 1.079.62 \$ 1.009.62 \$ 5.6664.97 \$ 20.009.13 \$ 4.060.61 \$ 7.719.71 \$ 2.921.19 \$
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1 | 417,689.95 5 5 5 6 6 1 3.735.60 5 68.61 5 5 5 68.61 5 22051 5 5 60.61 5 3.83 5 195.99 5 9,721.87 5 45.62 5 10.76 5 3.83 5 195.91 5 1,551.19 5 227.77 5 9.84 5 3.62 5 3.61.3 5 2,200.57 5 3.02 5 6.77.4 5 2.40 5 3.61.3 5 2,200.57 5 3.66 5 6.77 5 2.40 5 3.61.3 5 2,200.57 5 3.66 5 5.77 5 2.40 5 3.61.3 5 4,30490.01 5 4.66 5 5.96 5 171 5 56.77 5 4,251.77 5 160.71 5
 | 42),483.5 \$ 4,116.60 \$ 77.10 \$ 6,642.34 \$ 1,199.75 \$ 1,997.5 \$ 1,970.21 \$ 6,135.01 \$ 42,724.92 \$ 4,442.13 \$ 6,499.48 \$ 3,192.99 \$ | 37,812.04 \$
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4,116,60 STD Year 2009 100-401
302,00 STD Year 2009 100-102
11,443,93 STD Year 2009 100-102
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2,568,10 STD Year 2009 100-102
7,702,75 STD Year 2009 100-102
4,929,64 STD Year 2009 100-102
4,727,81 STD Year 2009 100-102
8,919,13 STD Year 2009 100-102
8,919,13 STD Year 2009 100-102
1,719,25 STD Year 2009 100-102
1,719,25 STD Year 2009 100-102 |
| Concrete-Rectangular Beam: 36430 ISS-Indibut Structural Section: InSSADX1/B Wide Frange1: VM0022 Wide Frange1: VM0023 Wide Frange1: VM0033 Wide Frange1: V | 407.51 406.58 57.27 60 60 450 15.42 11.76 0.11 191.68 170.83 7.68 52.66 48.88 1.13 53 66.63 61.36 2.06 66 172.09 161.06 6.22 122 1978.21 895.76 16.92 873 28.33 24.13 3.98 26 122.69 66.66 7.83 33 65.63 0.03 1.3 66 131.19 146.66 9.42 151
 | Normal 00 033105360412 1 16 051223750360 1 <td< th=""><th>Concrete Rectangular Beam 30%30* HSS64x2x16 E2 HSS64x2x16 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x16 E2 W19x29 E2 W19x22 E2 W19x23 E2 W19x24 E2 W19x25 E2 W19x26 E2 W19x27 E2 W19x28 E2 W19x29 E2 W19x21 E2 W19x24 E2 W19x25 E2 W19x26 E2 W19x21 E2 W19x24 E2</th><th>L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.013 L.F. S 660 0.013 L.F. S 660 0.043 L.F. S 660 0.044 L.F. S 980 0.042 L.F. S 990 0.047 L.F. S 740 0.076 L.F. S 1000 0.046 L.F. S 990 0.047 L.F. S 990 0.042 L.F. S</th><th>62.26 5 - 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.92 5 32.57 5 3.92 5 44.51 5 3.48 5 154.22 5 4.67 5 204.93 5 4.67 5 204.51 5 3.48 5 5 3.94 5 5 44.51 5 3.48 5 52.79 5 3.48 5</th><th>S 62.26 S 3.49 \$ 14.30 \$ 3.49 \$ 5.0.64 \$ 3.20 \$ 5.9.44 \$ 3.20 \$ 5.9.44 \$ 3.20 \$ 3.53 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.647 \$ 2.16 \$ 3.647 \$ 2.16 \$ 3.647 \$ 2.10 \$ 1.990 \$ 2.59 \$ 1.61.46 \$ 2.67 \$ 2.42.40 \$ 1.92
\$ 49.89 \$ 2.13 \$ 69.76 \$</th><th>345,527,74 \$ 3,735,60 \$ 70,01 \$ 7,640,14 \$ 1,079,62 \$ 1,000,23 \$ 5,604.97 \$ 29,049,13 \$ 4,040,61 \$ 7,719,71 \$ 2,921,19 \$ 2,921,19 \$ 7,943,32 \$</th><th>21.507.40 \$
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4,116,60 STD Vear 2009 100-401
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3,719,25 STD Vear 2009 100-102
10,186,65 STD Vear 2009 100-102</th></td<> | Concrete Rectangular Beam 30%30* HSS64x2x16 E2 HSS64x2x16 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x16 E2 W19x29 E2 W19x22 E2 W19x23 E2 W19x24 E2 W19x25 E2 W19x26 E2 W19x27 E2 W19x28 E2 W19x29 E2 W19x21 E2 W19x24 E2 W19x25 E2 W19x26 E2 W19x21 E2 W19x24 E2

 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.013 L.F. S 660 0.013 L.F. S 660 0.043 L.F. S 660 0.044 L.F. S 980 0.042 L.F. S 990 0.047 L.F. S 740 0.076 L.F. S 1000 0.046 L.F. S 990 0.047 L.F. S 990 0.042 L.F. S
 | 62.26 5 - 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.92 5 32.57 5 3.92 5 44.51 5 3.48 5 154.22 5 4.67 5 204.93 5 4.67 5 204.51 5 3.48 5 5 3.94 5 5 44.51 5 3.48 5 52.79 5 3.48 5
 | S 62.26 S 3.49 \$ 14.30 \$ 3.49 \$ 5.0.64 \$ 3.20 \$ 5.9.44 \$ 3.20 \$ 5.9.44 \$ 3.20 \$ 3.53 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.63 \$ 2.16 \$ 3.647 \$ 2.16 \$ 3.647 \$ 2.16 \$ 3.647 \$ 2.10 \$ 1.990 \$ 2.59 \$ 1.61.46 \$ 2.67 \$ 2.42.40 \$ 1.92 \$ 49.89 \$ 2.13 \$ 69.76 \$
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 | 417,680.95 5 5 5 5 5 6 6 7 3.755.60 5 6.86.11 5 5 5 5 5 9 5 9 2205.11 5 5 5 3.83 5 195.91 5 3.725.60 5 5 5 3.83 5 195.91 5 3.721.07 5 4.502 5 10.76 5 3.83 5 59.61 5 1.651.19 5 2.207.71 5 9.64 5 5.92 5 3.61.13 5 2.200.57 5 3.002 5 6.71 5 2.40 5 3.91.13 5 6.664.72 5 3.66 5 5.67 5 2.40 5 4.476 5 4.251.77 5 160.71 5 2.40 5 5.71 5 2.40 5 2.477 5 4.251.77
 | 42),449.55 \$ 4,116.60 \$ 77.10 \$ 0,662.94 \$ 1,199.75 \$ 1,970.21 \$ 6,135.01 \$ 42,724.92 \$ 4,442.13 \$ 0,449.48 \$ 3,192.90 \$ 0,841.90 \$ | 37,812.04 \$
. S
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4,116,60 STD Vear 2009 100-401
302,08 STD Vear 2009 100-102
11,443,93 STD Vear 2009 100-102
1,903,69 STD Vear 2009 100-102
2,566,10 STD Vear 2009 100-102
7,702,75 STD Vear 2009 100-102
49,829,64 STD Vear 2009 100-102
4,727,81 STD Vear 2009 100-102
8,919,13 STD Vear 2009 100-102
3,719,25 STD Vear 2009 100-102
3,719,25 STD Vear 2009 100-102
10,186,65 STD Vear 2009 100-102
 |
| Concrete Rectangular Beam: 38(4)
Concrete Rectangular Beam: 38(4)
Concrete Rectangular Beam: 38(4)
Concrete Rectangular Beam: 38(4)
18(5): Hollow Structural Section: 18(5): ACCM/B
18(5): Hollow Structural Section: 18(5): ACCM/B | 40/3.1 406.58 57.27 60 60 459 15.42 11.3% 0.11 191.98 170.83 7.68 52.66 46.88 1.17 65.63 63.36 2.04 66 63.36 2.04 67.27 163.04 6.24 172.09 163.04 6.24 172 878.31 835.56 26.33 24.13 3.38 26.53 64.03 1.3 66.64 61.03 1.3 65.51 131.9 146.66 1151.19 146.68 9.12 1136.75 1946.35 73.94
 | Instant Instant 60 033105350412 15.42 051223750360 191.96 051223750360 52.69 051223750360 65.63 051223750100 172.69 051223751100 172.69 051223751100 172.69 051223751900 26.33 051223752300 37.67 051223752500 165.19 051223752600 151.19 051223752900 1196.75 051223753300

 | Concrete Rectangular Beam 30%30* HSS6x42x16 E2 HSS6x42x16 E2 W15x12 E2 W15x16 E2 W15x16 E2 W15x12 E2 W15x16 E2 W15x2 E2 W15x2 E2 W15x2 E2 W15x2 E2 W15x2 E2 W15x62 E2 W15x65 E2 W15x65 E2 W15x65 E2 W15x65 E3
 | L.F. \$ 550 0.102 [L.F. \$ 550 0.102 [L.F. \$ 600 0.093 [L.F. \$ 800 0.064 [L.F. \$ 990 0.057 [L.F. \$ 740 0.076 [L.F. \$ 720 0.070 [L.F. \$ 9900 0.062 [L.F. \$
 | 62.26 5 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.48 5 5.75 5 20.49 5 3.92 5 20.41 5 3.92 5 20.42 5 3.92 5 20.43 5 3.40 5 154.22 5 4.61 5 20.493 5 4.61 5 20.493 5 4.61 5 4.51 5 3.64 5 4.51 5 3.64 5 60.93 5 3.04 5
 | S 62.26 S 3.69 \$ 14.30 \$ 3.69 \$ 5.064 \$ 3.20 \$ 29.44 \$ 3.20 \$ 29.44 \$ 3.20 \$ 29.44 \$ 2.16 \$ 33.53 \$ 2.18 \$ 36.67 \$ 1.54 \$ 49.59 \$ 2.59 \$ 161.48 \$ 2.50 \$ 161.48 \$ 2.50 \$ 161.48 \$ 2.50 \$ 49.89 \$ 1.92 \$ 49.89 \$ 1.92 \$ 49.89 \$ 2.13 \$ 5.61.76 \$ 2.15 \$ 67.30 \$
 | 345,527,74 \$ 3,735,60 \$ 70,01 \$ 7,848,14 \$ 1,079,62 \$ 1,000,23 \$ 5,604,97 \$ 30,009,13 \$ 4,060,61 \$ 7,719,71 \$ 2,921,19 \$ 7,969,12
\$ 7,969,12 \$ 7,969,12 \$ 7,969,12 \$ 7,969,12 \$ 7,969,12 \$ 7,969,12 \$ | 21.507.49 \$. 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5 | 10,215,71 5 . \$
 | 417,689.95 5 5 5 5 5 5 5 6 6 1 5 5 5 5 6 6 6 5 5 5 5 5 6 6 6 5 3 5 10 10 <th10< th=""> <th10< th=""></th10<></th10<> | 423,449.55 \$ 4,116.60 \$ 771.10 \$ 0,642.94 \$ 1,199.75 \$ 1,997.21 \$ 6,155.01 \$ 42,724.92 \$ 4,442,13 \$ 0,442,13 \$ 0,449.48 \$ 3,192.90 \$ 0,841.59 \$ 78,659.41 \$
 | 37,812.04 \$
. S
. S | 11,244.97 \$
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4,116,60 STD Vest/2009 109-401
302,06 STD Vest/2009 109-102
11,443,93 STD Vest/2009 109-102
1,903,66 STD Vest/2009 109-102
2,566,10 STD Vest/2009 109-102
7,702,75 STD Vest/2009 109-102
49,829,64 STD Vest/2009 109-102
4,727,81 STD Vest/2009 109-102
4,727,81 STD Vest/2009 109-102
4,727,81 STD Vest/2009 109-102
3,719,25 STD Vest/2009 109-102
3,719,25 STD Vest/2009 109-102
10,188,69 STD Vest/2009 109-102
10,188,69 STD Vest/2009 109-102
10,188,69 STD Vest/2009 109-102 |
| Concrete Rectangular Beam: 38:30 Concrete Rectangular Beam: 38:30 Concrete Rectangular Beam: 38:30 Concrete Rectangular Beam: 38:30 Sourcete Rectangular Beam: 38:30 Source | 40/7.51 406.56 87/27 60 60 450 15.42 13.76 0.31 191.98 170.33 7.68 52.69 46.88 1.17 65.63 63.26 2.04 65.63 63.26 2.04 172.09 163.04 6.24 177 878.27 855.76 16.92 879 26.33 24.33 3.98 26 175.57 36.66 7.93 38 65.63 61.03 1.3 66 151.19 146.06 9.12 151 1196.75 1066.25 75.94 1.177 137.68 55.48 2.87 38
 | Form 60 033105560412 16 023105560412 1 16 051223750360 1 191 98 051223750360 1 52 69 051223750360 1 66 63 051223750100 1 172 09 051223751100 1 172 09 051223751900 2 26 33 051223752380 1 37 67 051223752380 1 151 19 051223752900 1 151 19 051223752900 1 151 19 051223752300 1 37 60 051223753300 1 37 60 051223753500 1

 | Concrete Rectangular Beam: 30'30' HSS6x4210 E2 HSS6x4210 E2 W19412 E2 W19412 E2 W1942 E2 W1943 E2 W1944109 E2 W1963 E5 W19040 E5
 | LF S 550 0.102 LF S 550 0.102 LF S 660 0.013 LF S 680 0.064 LF S 980 0.064 LF S 990 0.057 LF S 740 0.076 LF S 1000 0.063 LF S 990 0.052 LF S 900 0.052 LF S 900 0.052 LF S 900 0.052 LF S 996 0.033 LF S
 | 62.26 5 - 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.49 5 5.75 5 27.43 5 3.92 5 24.51 5 3.92 5 24.51 5 3.92 5 24.51 5 3.92 5 20.43 5 4.61 5 20.43 5 4.62 5 20.43 5 4.63 5 20.43 5 4.63 5 20.43 5 4.64 5 4.451 5 3.64 5 60.03 5 50 5 60.03 5 50 5
 | S 6226 S 3.49 \$ 430 \$ 3.49 \$ 5044 \$ 3.20 \$ 2944 \$ 2.10 \$ 3353 \$ 2.10 \$ 3367 \$ 2.10 \$ 3867 \$ 1.54 \$ 4933 \$ 2.20 \$ 161.48 \$ 2.27 \$ 212.40 \$ 1.52 \$ 49.89 \$ 2.213 \$ 54.76 \$ 2.23 \$ 567.76 \$ 2.25 \$ 67.38 \$
 | 345,527,74 \$ 3,735.60 \$ 7,70.01 \$ 7,7,848.14 \$ 1,079.62 \$ 1,009.62 \$ 5,664.97 \$ 29,099.13 \$ 4,000.61 \$ 7,719.71 \$ 2,921.19 \$ 7,719.71 \$ 2,921.19 \$ 7,719.72 \$ 7,18,40.90 \$ 2,573.92 \$
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5 | 16,215,71 \$ 5 53,82 \$ 53,82 \$ 670,01 \$ 543,07 \$ 543,07 \$ 755,16 \$ 1,700,73 \$ 68,19 \$ 100,58 \$ 128,60 \$ 22,570,01 \$ 22,570,01 \$
 | 417,689.95 s s s s 3.735.60 \$ 9.61 \$ | 42),49,53 \$ 4,116,60 \$ 771,10 \$ 8,642,94 \$ 1,1199,75 \$ 1,199,75 \$ 1,199,75 \$ 1,199,75 \$ 4,2724,92 \$ 4,422,13 \$ 8,499,48 \$ 3,112,99 \$ 8,841,99 \$ 78,659,41 \$ 2,827,51 \$
 | 37,812,04 \$
. 5
2,065,70 \$
5,118,77 \$
4,00,30 \$
1,154,72 \$
5,224,13 \$
2,210,64 \$
3,09,277 \$
3,07,22 \$
9,91,51 \$
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283.5 \$
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193.4 \$
103.5 | 4/2,598.55
4,116.60 STD Vest 2009 109-4011
302.08 STD Vest 2009 100-102
11,443.93 STD Vest 2009 100-102
1.903.69 STD Vest 2009 100-102
2.568.10 STD Vest 2009 100-102
7.702.75 STD Vest 2009 100-102
49.829.64 STD Vest 2009 100-102
4.727.81 STD Vest 2009 100-102
3.719.25 STD Vest 2009 100-102
10.186.69 STD Vest 2009 100-102
10.186.69 STD Vest 2009 100-102
92.265.49 STD Vest 2009 100-102
92.265.65 STD Vest 2009 100-102
3.255.65 STD Vest 2009 100-102 |
| C.0.1180559 C.0.071459 C.0071459 C.007145 C.0071 | 407.51 406.58 87.27 60 60 456 15.42 11.76 0.11 191.80 170.83 7.58 52.60 44.88 1.17 53.60 45.64 1.17 52.60 44.88 1.17 51 52.60 46.86 122.09 193.64 6.24 127.0 193.64 5.26 26.33 24.33 3.89 26.33 24.33 3.89 26.34 6.30 3.3 65.63 6.30 3.3 65.64 61.03 3.3 65.63 61.03 3.3 131.1 146.66 9.12 1.13 131.65 71.94 1.137 1.131 131.65 71.94 2.147 1.93 132.64 24.87 2.87 3.8
 | form 60 033106360412 16.42 051223750360 1 19.90 051223750360 1 52.69 051223750400 1 66.63 051223750400 1 172.69 051223750400 1 878.21 051223750400 1 878.21 051223751100 1 878.21 051223752380 1 37.67 051223752500 1 151.19 051223752400 1 1196.75 05122375300 1 37.68 05122375300 1 37.76 05122375300 1 37.69 05122374300 1

 | Concrete Rectangular Bram. 30%30* HSS4x2x10 E2 HSS6x4x20 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W14x2 E2 W14x32 E2 W14x35 E5 W19x40 E5 W19x40 E5 W19x40 E5 W19x40 E5 W19x40 E5
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 6600 0.093 L.F. S 880 0.044 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 7200 0.078 L.F. S 10000 0.066 L.F. S 9900 0.078 L.F. S 10000 0.068 L.F. S 9900 0.061 L.F. S 9900 0.062 L.F. S 9900 0.063 L.F. S 9900 0.051 L.F. S 9900 0.051 L.F. S
 | 62.26 5 . 5 4.54 5 6.27 5 4.080 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.92 5 22.47 5 3.92 5 24.51 5 3.48 5 154.22 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 3.64 5 52.77 5 3.64 5 60.03 5 5.20 5 66.31 5.20 5 5 66.31 5.20 5 5 65.30 5.20 5 5
 | S 6226 S 3.49 \$ 14.30 \$ 3.49 \$ 9.064 \$ 3.20 \$ 29.44 \$ 3.20 \$ 29.44 \$ 2.10 \$ 39.67 \$ 1.10 \$ 49.30 \$ 2.10 \$ 39.67 \$ 1.50 \$ 49.30 \$ 2.50 \$ 161.48 \$ 2.67 \$ 2124.0 \$ 1.52 \$ 49.89 \$ 2.13 \$ 67.76 \$ 2.15 \$ 67.38 \$ 2.15 \$ 75.66 \$ 2.15 \$ 92.01 \$
 | 345,527,74 \$ 3,735,60 \$ 7,70,01 \$ 7,7,84,14 \$ 1,079,62 \$ 1,009,62 \$ 1,009,023 \$ 5,664,97 \$ 20,009,13 \$ 4,060,61 \$ 7,719,71 \$ 2,921,19 \$ 7,719,71 \$ 2,921,19 \$ 7,719,71 \$ 2,921,19 \$ 7,719,71 \$ 2,921,19 \$ 2,921,10 \$ 3,921,10 \$ 3,921,1 | 21.537.49 \$ - \$ - \$ \$
 | 10,215,71 \$
5 31,82 \$
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0 1 \$ | 417,689.95 5 5 5 5 6 64.61 5 3.735.60 5 64.61 5 5 3.83 5 99.61 5 2029.51 5 5.500 5 10.76 5 3.83 5 19.69 5 9.721.87 5 45.621 5 10.76 5 3.83 5 19.69 5 1.551.18 5 222.77 5 9.84 5 3.62 5 3.613 5 2.200.57 5 2.400 5 3.613 5 5 6.64.72 5 3.614 5 4.476 5 4.3.840.01 5 4.665 5 5.96 5 1.717.85 6.64.74 5 3.677.71 5 4.2.61.77 5 9.677.71 5 0.077.71 5 5.677.71 5 3.274.242 5 4.466 5 5.97 5 7.770 5
 | 42),483.5 \$ 4,116.60 \$ 77.10 \$ 6,642.34 \$ 1,199.75 \$ 1,997.5 \$ 1,970.21 \$ 6,135.01 \$ 4,274.92 \$ 4,442.13 \$ 4,442.13 \$ 6,499.48 \$ 3,192.99 \$ 6,841.59 \$ 78,650.41 \$ 2,827.51 \$ 2,827.51 \$ 5 | 37,812.04 \$. \$
 | 11,244.97 \$ 590.66 \$ 590.66 \$ 7735.28 \$ 186.477 \$ 197.5751 \$ 413.02 \$ 1.070.99 \$ 775.04 \$ 110.377 \$ 139.144 \$ 2.036.39 \$ 2.036.39 \$ 2.036.39 \$ 30.05 \$ | 412,596,55 4,116,60 STD Year 2009 100-401 302,00 STD Year 2009 100-102 11,443,93 STD Year 2009 100-102 1,903,69 STD Year 2009 100-102 2,556,10 STD Year 2009 100-102 7,702,75 STD Year 2009 100-102 4,522,64 STD Year 2009 100-102 4,727,81 STD Year 2009 100-102 4,727,81 STD Year 2009 100-102 3,719,25 STD Year 2009 100-102 10,108,69 STD Year 2009 100-102 10,108,69 STD Year 2009 100-102 2,255,65 STD Year 2009 100-102 2,255,55 STD Year 2 |
| C.0.1180556 C.000rete-Rectangular Beam: 36450 C.000rete-Rectangular Beam: 36450 C.000rete-Rectangular Beam: 36450 ISS-1680w Structural Section: ISSA02X1/8 W Wide Franget: W10022 W Wide Franget: W1002 W W | 407.51 406.58 57.27 60 60 450 115.42 11.16 0.11 191.88 127.033 7.68 52.60 48.88 1.13 53 65.63 61.36 2.96 66 1122.09 195.06 6.24 122 878.21 815.76 356.92 577 26.33 24.13 3.98 26 137.47 36.66 7.30 38 65.53 63.93 1.3 66 135.19 166.65 7.54 1.177 1366.75 75.54 2.157 31 137.68 55.48 2.47 38 219 213.26 21.42 219
 | Notation 60 033105360412 15.42 051223750360 191.98 051223750360 52.69 051223750360 66.63 051223750400 172.09 051223750400 172.09 051223751100 172.09 051223751100 172.09 051223751900 26.33 05122375200 26.43 05122375200 151.19 05122375200 151.19 05122375300 176.6 05122375300 37.68 05122375300 37.69 05122375300 21.10 05122375300

 | Concrete Rectangular Beam 30%07 VISS4x2x16 E2 VISS6x2x16 E2 VISS6x2x16 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x62 E2 W19x63 E2 W19x031 E2 W19x04 E5 W19x04 E5 W19x05 E5 W19x06 E5 W19x07 E5 W19x07 E5
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.093 L.F. S 660 0.093 L.F. S 660 0.093 L.F. S 980 0.042 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 7200 0.078 L.F. S 9000 0.052 L.F. S 900 0.052 L.F. S 900 0.052 L.F. S 900 0.052 L.F. S 900 0.052 L.F. S 960 0.033 L.F. S 960 0.075 L.F. S 960 0.075 L.F. S
 | 62.26 5
 | S 62.26 S 3.49 S 43.00 S 3.49 S 43.00 S 3.49 S 5.0.64 S 3.20 S 254.40 S 3.20 S 254.41 S 2.10 S 33.63 S 2.10 S 30.67 S 1.194 S 49.93 S 2.59 S 161.40 S 2.67 S 242.40 S 1.192 S 49.89 S 2.13 S 60.76 S 2.13 S 67.78 S 2.15 S 75.66 S 1.192 S 92.03 S
 | 345,527,74 \$ 3,735,60 \$ 70,61 \$ 70,61 \$ 1,079,62 \$ 1,000,23 \$ 6,604,97 \$ 2,000,13 \$ 2,021,19 \$ 7,719,71 \$ 2,021,19 \$ 7,799,12 \$ 7,184,30 \$ 2,573,52 \$ 18,700,41 \$
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50 | 10,215,71 5 5 5 610,01 5 143,07 5 755,16 5 1,700,73 5 60,01 5 1,700,73 5 100,501 5 126,01 5 126,01 5 22,573,01 5 81,01 5 424,86 5 | 417,680.95 5 5 5 5 6 6 1 5 5 5 6 6 1 5 5 5 6 6 1 5 5 5 5 6 6 6 5 3 5 1 5 9 5 1 1 5 1 1 1 1 1 1 1 1 1 1 1 <th1< th=""><th>42),445.55 \$ 4,116.60 \$ 771.10 \$ 6,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,135.01 \$
42,724.92 \$ 4,442.13 \$ 8,499.48 \$ 3,192.99 \$ 8,841.99 \$ 78,650.41 \$ 2,827.61 \$ 2,827.61 \$ 2,827.61 \$</th><th>37,812.04 \$
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5</th><th>11,244.97 5 59.06 5 726.28 5 166.47 5 167.51 5 413.02 5 1.870.69 5 75.04 5 1.970.59 5 75.04 5 1.927 5 329.34 5 2.856.38 5 69.33 5 69.33 5 460.66 5</th><th>412,398,35
4,116,60 STD Vear 2009 100-401
302,06 STD Vear 2009 100-102
11,443,93 STD Vear 2009 100-102
1,903,69 STD Vear 2009 100-102
2,566,10 STD Vear 2009 100-102
4,922,95 STD Vear 2009 100-102
4,922,96 STD Vear 2009 100-102
4,127,81 STD Vear 2009 100-102
8,919,13 STD Vear 2009 100-102
3,719,25 STD Vear 2009 100-102
10,186,69 STD Vear 2009 100-102
9,245,49 STD Vear 2009 100-102
9,245,49 STD Vear 2009 100-102
3,256,65 STD Vear 2009 100-102
2,2678,93 STD Vear 2009 100-102
2,2678,93 STD Vear 2009 100-102</th></th1<> | 42),445.55 \$ 4,116.60 \$ 771.10 \$ 6,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,135.01 \$ 42,724.92 \$ 4,442.13 \$ 8,499.48 \$ 3,192.99 \$ 8,841.99 \$ 78,650.41 \$ 2,827.61 \$ 2,827.61 \$ 2,827.61 \$ | 37,812.04 \$
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 | 11,244.97 5 59.06 5 726.28 5 166.47 5 167.51 5 413.02 5 1.870.69 5 75.04 5 1.970.59 5 75.04 5 1.927 5 329.34 5 2.856.38 5 69.33 5 69.33 5 460.66 5 | 412,398,35
4,116,60 STD Vear 2009 100-401
302,06 STD Vear 2009 100-102
11,443,93 STD Vear 2009 100-102
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4,922,96 STD Vear 2009 100-102
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10,186,69 STD Vear 2009 100-102
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9,245,49 STD Vear 2009 100-102
3,256,65 STD Vear 2009 100-102
2,2678,93 STD Vear 2009 100-102
2,2678,93 STD Vear 2009 100-102 |
| Concrete-Rectangular Beam: 36:30 | 407.51 406.58 87.27 60 60 450 15.42 11.76 0.11 191.98 170.83 7.68 52.60 46.88 1.17 53 65.63 61.36 2.06 66 172.09 163.06 6.24 122 878.21 835.76 56.82 275 26.33 24.13 3.98 26 132.47 36.66 7.99 33 65.43 61.00 3.3 66 135.19 140.66 9.42 151 139.55 1946.35 75.94 1.197 139.575 1946.35 74.94 238 228 221.36 2.47 238 243 343 1.49 40
 | Notal 60 033105360412 15.42 051223750360 191.96 051223750360 52.69 051223750360 66.63 051223750400 66.63 051223750400 172.69 051223751100 172.69 051223751900 26.33 051223752300 37.67 051223752600 151.19 051223752900 151.19 051223752900 1196.75 051223752900 27.64 05122375300 27.64 05122375400 27.69 05122375300 27.64 05122375400 27.64 05122375300 27.69 05122375300 27.69 05122375300 27.64 05122375300 27.9 05122375400 40.33 051223750720

 | Concrete Rectangular Beam 30%30* HSS6x2x16 E2 HSS6x4x16 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x16 E2 W19x2 E2 W19x62 E2 W19x62 E2 W19x65 E2 W19x65 E5 W19x90 E5 W19x90 E5 W19x90 E5 W19x94 E5 W19x95 E2 W19x90 E5 W19x94 E5 W19x95 E2
 | L.F. \$ 550 0.102 [LF. \$ 550 0.102 [LF. \$ 660 0.013 [LF. \$ 980 0.046 [LF. \$ 980 0.046 [LF. \$ 990 0.057 [LF. \$ 740 0.676 [LF. \$ 720 0.670 [LF. \$ 9900 0.042 [LF. \$ 9900 0.046 [LF. \$ 9900 0.047 [LF. \$ 9900 0.042 [LF. \$ 9900 0.042 [LF. \$ 9900 0.042 [LF. \$ 9900 0.042 [LF. \$ 9900 0.043 [LF. \$ 9000 0.075 [LF. <th>62.26 5 </th> <th>S 62.26 S 3.69 \$ 14.30 \$ 3.69 \$ 5.064 \$ 3.20 \$ 29.44 \$ 3.20 \$ 29.44 \$ 2.10 \$ 30.53 \$ 2.10 \$ 30.67 \$ 2.10 \$ 49.93 \$ 2.10 \$ 49.93 \$ 2.59 \$ 161.48 \$ 2.67 \$ 212.40 \$ 1.92 \$ 49.99 \$ 2.51 \$ 67.78 \$ 2.13 \$ 64.76 \$ 2.13 \$ 64.76 \$ 2.15 \$ 75.66 \$ 2.15 \$ 75.66 \$ 2.15 \$ 20.20 \$</th> <th>345,527,74 \$ 3,735,60 \$ 70,01 \$ 7,648,14 \$ 1,079,62 \$ 1,000,23 \$ 5,664,97 \$ 30,009,13 \$ 4,060,61 \$ 7,719,71 \$ 2,921,19 \$ 7,719,72 \$ 2,921,19 \$ 7,949,32 \$ 7,18,40,90 \$ 2,573,52 \$ 18,700,41 \$ 1,735,69 \$</th> <th>21.937.49 5 . 5 </th> <th>10,215,21 5 . \$</th> <th>417,680.95 5 5 5 5 5 6 6 1 5 5 5 5 6 6 6 5 7 5 5 5 5 5 7 5 4 5 5 5 5 6 6 6 5 7 5 3 5 193 5 5,721 87 5 45 502 5 1076 5 3.63 5 961 5 1,551 19 5 22077 5 9.44 5 3.52 5 3.613 5 2,200 57 5 3.002 5 6.71 5 2.40 5 3.913 5 4,040 00 5 4.665 5 5.07 5 2.40 5 4.476 5 4,040 01 5 4.667 5 5.08 5 2.13 5 6.74 5 4,041 01 5 2.668 5 <t< th=""><th>423,445.55 \$ 4,116.60 \$ 771.10 \$ 0,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,135.01 \$ 42,724.92 \$ 4,442,13 \$ 0,499.48 \$ 3,192.90 \$ 0,841.59 \$ 78,650.41 \$ 2,827.51 \$ 2,827.51 \$ 2,0627.61 \$ 1,992.05 \$</th><th>37,812.04 \$
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| C.0.1189598 C.000rete-Retangular Beam: 30:90 C.000rete-Retangular Beam: 30:90 ISS-Bellow Structural Section: ISSA02XL/B ISSA0 | 40/3.1 406.05 87.27 60 60 450 15.42 11.76 0.31 191.98 170.83 7.68 52.60 46.88 1.17 65.53 63.36 2.264 65.53 63.36 6.24 172.09 163.36 6.24 172.09 163.36 6.24 172.09 163.36 6.24 172.09 163.36 6.24 172.09 163.30 6.32 172.09 163.30 6.32 172.09 163.30 6.32 172.09 163.30 1.3 65.63 61.03 1.3 65.64 61.03 1.3 151.19 146.66 9.12 111 1196.75 1046.25 73.34 1.177 37.68 35.48 2.87 33 219 213.36 21.42 219 40.33 37.28 1.99 40 <t< th=""><th>Notation 60 033105550412 15.42 051223750360 191.96 051223750360 52.69 051223750360 66.63 051223750100 172.69 051223751100 172.69 05122375100 172.69 05122375100 172.69 051223752300 26.33 051223752300 37.67 051223752300 151.19 051223752300 1196.75 051223752300 37.68 05122375300 37.68 051223754300 40.33 051223754300 46.11 051223751100</th><th>Concrete Rectangular Beam 30%30° HSS6x42x10 E2 HSS6x42x10 E2 W1%x12 E2 W1%x12 E2 W1%x14 E2 W1%x15 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x35 E2 W1%x36 E3 W1%x37 E3 W1%x38 E3</th><th>LF S 550 0.102 LF S 550 0.023 LF S 6600 0.033 LF S 880 0.044 LF S 980 0.044 LF S 990 0.051 LF S 740 0.076 LF S 720 0.076 LF S 900 0.062 LF S 900 0.062 LF S 900 0.062 LF S 900 0.063 LF S 960 0.032 LF S 960 0.032 LF S 960 0.037 LF S 960 0.037 LF S 960 0.037 LF S 960 0.032 LF S 960 0.032 LF S 960 0.032 LF S 960 0.042 LF S</th><th>62.26 5 5 4.64 5 6.27 5 4.08 5 6.27 5 20.49 5 5.75 5 20.49 5 5.75 5 20.49 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 4.61 5 20.45 5 4.61 5 20.45 5 3.84 5 20.45 5 5.20 5 60.03 5 5.20 5 63.31 5 5.20 5 63.39 5 7 5 44.51 5 7.5 5 32.57 5 3.92 5</th><th>S 6226 S 2.69 S 430 S 2.69 S 430 S 2.69 S 5064 S 2.79 S 29.44 S 2.78 S 3353 S 2.78 S 39.67 S 1.94 S 49.93 S 2.95 S 161.48 S 2.67 S 212.40 S 1.92 S 49.99 S 2.93 S 64.76 S 2.93 S 64.76 S 2.93 S 64.78 S 2.93 S 64.78 S 2.13 S 64.78 S 2.14 S 92.03 S 2.15 S 75.66 S 1.94 S 92.03 S 3.20 S 53.46 S </th><th>345,527,74 \$ 3,735 60 \$ 70,001 \$ 7,848,14 \$ 1,079.62 \$ 1,079.62 \$ 1,000.23 \$ 5,604.97 \$ 29,049,13 \$ 4,060.61 \$ 7,749.71 \$ 2,921.19 \$ 7,749.71 \$ 2,921.19 \$ 7,749.72 \$ 1,749.72 \$ 1,100.05 \$ 1,250.04 \$ 1,250.60 \$ 1,001.60 \$</th><th>21.937.49 5 . S </th><th>10,215,21 5 . . </th><th>417,689.95 3 3 5 95 5 5 3 5 95 5 7 5 94 5 2 5 3 3 5 95 5 7 5 96 5 7 5 96 5 7 5 96 5 7 5 96 5 7 5 96 5 7 5 96 7 5 96 7 5 96 7</th><th>423,445.55 \$ 4,116.60 \$ 771.10 \$ 6,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,155.01 \$ 4,2724.92 \$ 4,442.13 \$ 6,499.48 \$ 3,152.90 \$ 6,841.59 \$ 78,650.41 \$ 2,827.51 \$ 2,827.51 \$ 2,827.51 \$ 2,827.51 \$ 2,827.51 \$ 1,942.85 \$ 1,942.82 \$</th><th>37,812.04 \$
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7.702.75 STD Vest 2009 109-102
4.9.829.44 STD Vest 2009 109-102
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 | Concrete Rectangular Beam 30%30° HSS6x42x10 E2 HSS6x42x10 E2 W1%x12 E2 W1%x12 E2 W1%x14 E2 W1%x15 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x35 E2 W1%x36 E3 W1%x37 E3 W1%x38 E3
 | LF S 550 0.102 LF S 550 0.023 LF S 6600 0.033 LF S 880 0.044 LF S 980 0.044 LF S 990 0.051 LF S 740 0.076 LF S 720 0.076 LF S 900 0.062 LF S 900 0.062 LF S 900 0.062 LF S 900 0.063 LF S 960 0.032 LF S 960 0.032 LF S 960 0.037 LF S 960 0.037 LF S 960 0.037 LF S 960 0.032 LF S 960 0.032 LF S 960 0.032 LF S 960 0.042 LF S
 | 62.26 5 5 4.64 5 6.27 5 4.08 5 6.27 5 20.49 5 5.75 5 20.49 5 5.75 5 20.49 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 3.92 5 20.45 5 4.61 5 20.45 5 4.61 5 20.45 5 3.84 5 20.45 5 5.20 5 60.03 5 5.20 5 63.31 5 5.20 5 63.39 5 7 5 44.51 5 7.5 5 32.57 5 3.92 5

 | S 6226 S 2.69 S 430 S 2.69 S 430 S 2.69 S 5064 S 2.79 S 29.44 S 2.78 S 3353 S 2.78 S 39.67 S 1.94 S 49.93 S 2.95 S 161.48 S 2.67 S 212.40 S 1.92 S 49.99 S 2.93 S 64.76 S 2.93 S 64.76 S 2.93 S 64.78 S 2.93 S 64.78 S 2.13 S 64.78 S 2.14 S 92.03 S 2.15 S 75.66 S 1.94 S 92.03 S 3.20 S 53.46 S
 | 345,527,74 \$ 3,735 60 \$ 70,001 \$ 7,848,14 \$ 1,079.62 \$ 1,079.62 \$ 1,000.23 \$ 5,604.97 \$ 29,049,13 \$ 4,060.61 \$ 7,749.71 \$ 2,921.19 \$ 7,749.71 \$ 2,921.19 \$ 7,749.72 \$ 1,749.72 \$ 1,100.05 \$ 1,250.04 \$ 1,250.60 \$ 1,001.60 \$ | 21.937.49 5 . S | 10,215,21 5 . .
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 | form 60 033106360412 16.42 051223750360 1 19.98 051223750360 1 52.69 051223750400 1 66.63 051223750400 1 172.69 051223750400 1 878.21 051223750400 1 878.21 051223752380 1 37.67 051223752500 1 15.19 051223752500 1 15.19 051223752400 1 196.75 05122375300 1 27.60 05122375300 1 27.760 05122375300 1 27.761 05122375300 1 27.90 05122375300 1 27.91 05122375100 1 40.33 051223751100 1 46.11 051223751900 1

 | Concrete Rectangular Beam 30%07 E2 HSS4x2x10 E2 HSS6x4x38 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x12 E2 W19x29 E2 W14x22 E2 W14x23 E2 W14x29 E2 W14x20 E2 W16x3 E5 W18x45 E5 W18x45 E5 W18x45 E5 W18x46 E3 W18x47 E3 W18x48 E4 W18x49 E5 W18x49 E5 W18x49 E3 W19x49 E3 W19x29 E2 W19x29 E2 W19x29 E2 W19x29 E2
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.031 L.F. S 880 0.042 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 720 0.078 L.F. S 900 0.042 L.F. S 900 0.062 L.F. S 900 0.042 L.F. S 900 0.043 L.F. S 900 0.075 L.F. S 900 0.042 L.F. S 900 0.051 L.F. S 900 0.051 L.F. S 900 0.051 L.F. S
 | 62.26 5 . 5 4.54 5 6.27 5 4.080 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.22 5 24.51 5 3.48 5 154.22 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 60.03 5 3.64 5 60.03 5 5.20 5 65.39 5 7 5 365.39 6 7.7 5 32.27 7 5 3.22 5 32.27 5 3.28 5 7
 | S S · S 6226 S 3.49 S 430 S 3.49 S 5064 S 3.20 S 244 S 2.10 S 3353 S 2.10 S 3867 S 1.94 S 4933 S 2.10 S 16148 S 2.27 S 2124.0 S 1.92 S 46983 S 2.11 S 4989 S 2.267 S 2124.0 S 1.92 S 4989 S 2.13 S 6476 S 2.13 S 6476 S 2.15 S 7566 S 1.94 S 9203 S 3.200 S 53.46 S 2.14 S 4993 S
 | 345,527,74 \$ 3,735.60 \$ 7,7,041 4 \$ 1,079.62 \$ 1,009.62 \$ 1,009.62 \$ 5,664.97 \$ 29,049.13 \$ 4,060.61 \$ 7,719.71 \$ 2,921.19 \$ 7,719.72 \$ 7,719.12 \$ 2,921.19 \$ 7,719.12 \$ 2,921.19 \$ 1,735.09 \$ 1,501.00 \$ 1,756.09 \$ 1,501.00 \$ 4,005.50 \$
 | 21.937.49 5 . 5 96.68 5 1.203.71 5 302.97 5 227.27 5 674.49 5 3.066.17 5 100.22 5 227.68 5 400.47 5 4.223.10 5 1.009.30 5 1.009.30 5 2.21.00 5 3.055.15 5 | 10,215,71 5 5 5 51,82 5 670,011 5 143,077 5 7375,516 5 17,00,737 5 17,00,737 5 11,00,737 5 12,00,737 5 12,00,737 5 12,00,737 5 12,00,737 5 12,00,61 5 120,061 5 120,061 5 120,062 5 120,062 5 120,062 5 120,062 5
 | 417,689.95 5 5 5 5 60,611 5 3.735.60 \$ 9.041 \$ \$ \$ 3.30 \$ 19.591 \$ 2202.51 \$ 5.00 \$ 10.76 \$ 3.80 \$ 19.591 \$ 9.771.07 \$ 4.450 \$ 10.76 \$ 3.80 \$ 19.591 \$ 1.551.19 \$ 2.207 \$ 9.44 \$ 2.40 \$ 3.913 \$ 2.209.57 \$ 3.020 \$ 6.771 \$ 2.40 \$ 3.913 \$ 6.664.72 \$ 3.926 \$ 6.771 \$ 2.40 \$ 4.476 \$ 4.231.77 \$ 9.447 \$ 5.90 \$ 2.13 \$ 5.647 \$ 3.274.20 \$ 4.465 \$ 5.90 \$ 2.15 \$ 6.773 \$ 3.973 \$ | 42),445,55 \$ 4,116,60 \$ 77,10 \$ 6,642,34 \$ 1,199,75 \$ 1,970,21 \$ 6,135,01 \$ 4,274,92 \$ 4,442,13 \$ 4,442,13 \$ 6,495,48 \$ 3,1492,99 \$ 6,841,59 \$ 78,650,41 \$ 2,862,51 \$ 2,862,51 \$ 3,962,06 \$ 1,964,06 \$
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 | Concrete Rectangular Beam 30%07 VISS462x108 E2 VISS66x208 E2 WI%x12 E2 WI%x12 E2 WI%x12 E2 WI%x12 E2 WI%x12 E2 WI%x19 E2 WI%x22 E2 WI%x23 E2 WI%x24 E2 WI%x25 E2 WI%x02 E2 WI%x03 E2 WI%x04 E5 WI%x05 E5 WI%x04 E5 WI%x05 E2 WI%x06 E3 WI%x07 E2 WI%x08 E2 WI%x09 E2 WI%x04 E5 WI%x05 E2 WI%x04 E2
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| Concrete-Rectangular Beam: 36:00 Concrete-Rectangular Beam: 36:06 1555-1600ex Structural Section: 1555A0XL/B 1555-1500ex Structural Section: 1555A0XL/B 1555A0XL/B 1555A0XL/B 1555A0XL/B 1555A0XL/B 1555A0XL/B | 407.51 406.58 87.27 60 60 450 15.42 11.3% 0.31 191.98 170.83 7.68 52.60 46.88 1.17 65.63 63.36 2.06 172.69 163.06 6.24 172.69 163.06 6.24 172.69 163.06 6.28 26.33 24.13 3.98 26 26.53 24.13 3.98 26 155.19 146.66 9.32 153 1196.75 1946.35 73.94 1.197 137.48 35.46 2.27 33 265.33 24.33 1.39 40 1196.75 1946.35 73.94 1.197 37.48 35.48 2.47 33 2219 213.36 21.42 225 40.33 37.43 1.99 40 40.33 37.43 1.99 40 40.33 37.44
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 | Concrete Rectangular Beam 30%30° HSS8x2x16 E2 HSS8x2x16 E2 W1%x12 E2 W1%x12 E2 W1%x12 E2 W1%x12 E2 W1%x12 E2 W1%x19 E2 W1%x2 E2 W1%x2 E2 W1%x2 E2 W1%x62 E2 W1%x65 E3 W1%x64 E3 W1%x65 E5 W1%x66 E2 W1%x68 E2 W1%x69 E3 W1%x62 E2 W1%x64 E2 W1%x62 E2 W1%x64 E2 W1%x62 E2 W1%x63 E2 W1%x64 E2 <t< th=""><th>L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 600 0.033 L.F. S 600 0.033 L.F. S 600 0.044 L.F. S 990 0.042 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 720 0.078 L.F. S 900 0.042 L.F. S 900 0.042 L.F. S 900 0.042 L.F. S 900 0.043 L.F. S 900 0.043 L.F. S 990 0.047 L.F. S</th><th>62.26 5 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.48 5 5.75 5 20.49 5 5.75 5 20.49 5 3.92 5 20.49 5 3.92 5 20.49 5 3.92 5 20.49 5 3.92 5 20.49 5 3.92 5 20.49 5 4.61 5 20.49 5 4.61 5 60.03 5 2.05 5 60.03 5 5 5 60.31 5 5 5 65.39 5 4.70 5 64.51 5 7.5 5 32.57 5 3.92 5 4.51 5 7.6 5 32.57 5 3.92 5</th><th>S 62.26 S S 62.26 S </th><th>345,527,74 \$ 3,735.60 \$ 70,01 \$ 7,848.14 \$ 1,079.62 \$ 1,000.23 \$ 5,604.97 \$ 30,009.13 \$ 4,060.61 \$ 7,716.71 \$ 2,921.19 \$ 7,716.71 \$ 2,921.19 \$ 7,164.90 \$ 2,573.82 \$ 118,700.41 \$ 1,736.90 \$ 1,501.80</th><th>21.937.49 5 . 5 </th><th>10,215,71 5 . \$ </th><th>417,689.95 7 5</th><th>423,445.55 \$ 4,116.60 \$ 771.10 \$ 6,642.94 \$ 1,199.75 \$ 1,970.21 \$ 6,155.01 \$ 4,2724.92 \$ 4,442.13 \$ 6,499.48 \$ 3,142.90 \$ 6,849.48 \$ 3,142.90 \$ 78,650.41 \$ 2,847.51 \$ 2,847.51 \$ 2,847.51 \$ 1,942.05 \$
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| C.0.1180559 C.0.000000 C.0.000000 C.0.000000 C.0.000000 C.0.000000 C.0.000000 C.0.000000 C.0.00000 C.0.00000 C.0.00000 C.0.00000 C.0.0000 C.0.0000 C.0.0000 C.0.0000 C.0.0000 C.0.0000 C.0.0000 C.0.000 C.0.00 | 407.51 406.58 87.27 60 60 456 15.42 11.76 0.11 191.80 170.83 7.58 52.60 44.88 1.17 57.61 52.60 44.88 172.09 193.64 6.24 172.09 193.64 6.24 172.09 193.64 6.24 172.09 193.64 6.24 172.09 193.64 5.20 172.09 163.64 7.91 185.75 186.62 6.79 197.67 166.65 7.93 195.75 106.65 7.19.8 1196.75 106.65 7.19.4 1196.75 104.62 7.19.4 1196.75 104.63 7.19.4 1197 106.64 9.12 120 213.86 24.47 219 213.36 24.47 190 64.31 3.37 90 67.64 3.37
 | Verail 0 60 033106360412 15.42 051223750360 191.98 051223750360 52.69 051223750360 52.69 051223750460 66.63 051223750460 878.21 051223750400 878.21 051223750360 878.21 051223752380 37.67 051223752500 151.19 051223752500 151.19 05122375300 27.68 05122375300 27.764 05122375100 40.33 05122375100 90 05122375100 90 05122375100 7.33 051223752300 1177 051223752300 1177 051223752300

 | Concrete Rectangular Beam 30%07 E2 HSStack.10 E2 HSStack.10 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x12 E2 W10x16 E2 W10x12 E2 W10x2 E2 W10x3 E5 W10x40 E5 W10x40 E5 W10x42 E2 W10x43 E2 W10x42 E2 W10x43 E2 W10x43 E2 W10x43 E2 W10x43 E2
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.031 L.F. S 880 0.046 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 720 0.078 L.F. S 990 0.057 L.F. S 900 0.062 L.F. S 900 0.062 L.F. S 900 0.062 L.F. S 900 0.062 L.F. S 900 0.061 L.F. S 900 0.062 L.F. S 900 0.063 L.F. S 900 0.075 L.F. S 900 0.075 L.F. S 900 0.057 L.F. S 900 0.057 L.F. S 900 0.057 L.F. S 900 0.057 L.F. S 901 0.069 L.F. S 902 0.078 L.F.
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 | Notation 60 033106360412 15.42 051223750360 191.98 051223750360 52.69 051223750400 66.63 051223750400 172.09 051223750400 172.09 051223751100 172.09 051223751100 172.09 051223751900 26.33 051223752800 37.67 05122375200 151.19 05122375200 151.19 05122375000 19.6522753000 1 19.6522375100 1 40.33 05122375100 46.11 05122375100 90 0512237500 17.7 0512237500 17.7 0512237500 17.7 0512237500 17.7 0512237500 17.7 0512237500

 | Concrete Rectangular Beam 30%07 VISS462/16 E2 VISS664/38 E2 WI%12 E2 WI%2 E2
 | L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.093 L.F. S 660 0.093 L.F. S 680 0.045 L.F. S 990 0.047 L.F. S 740 0.076 L.F. S 720 0.78 L.F. S 900 0.062 L.F. S 900 0.062 L.F. S 900 0.061 L.F. S 900 0.062 L.F. S 960 0.031 L.F. S 960 0.032 L.F. S 960 0.031 L.F. S 960 0.031 L.F. S 960 0.031 L.F. S 960 0.064 L.F. S 960 0.067 L.F. S
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 | S 62.26 S 3.49 S 4.30 S 3.49 S 4.30 S 3.49 S 5.044 S 3.20 S 2.944 S 2.19 S 3.957 S 2.19 S 3.967 S 1.194 S 4.930 S 2.19 S 1.144 S 2.10 S 4.980 S 2.11 S 4.980 S 2.13 S 6.766 S 2.13 S 6.781 S 2.13 S 6.781 S 2.14 S 7.260 S 2.15 S 7.566 S 1.194 S 4.930 S 2.145 S 3.467 S 2.145 S 4.930 S 2.145 S 4.930 S 2.
 | 345,527,74 \$ 3,735,60 \$ 70,61 \$ 70,61 \$ 1,079,62 \$ 1,000,23 \$ 6,604,97 \$ 2,001,13 \$ 4,000,61 \$ 7,719,71 \$ 2,921,19 \$ 7,941,32 \$ 7,1840,30 \$ 2,973,32 \$ 16,700,41 \$ 1,796,69 \$ 1,501,60 \$ 4,005,50 \$ 1,501,60 \$ 3,795,522,73 \$ 2,933,60 \$ 3,30,601,19 \$ 3,400, | 21.937.49 \$
 | 10,215,71 5 5 5 670,01 5 670,01 5 148,07 5 725,56 5 1,709,77 5 98,19 5 100,66 5 22,203 5 22,273 5 424,86 5 100,62 5 100,62 5 100,62 5 11,746,60 5 12,245,42 5 12,245,42 5
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 | Concrete Rectangular Beam 30%30° PISS462x10 E2 PISS66x308 E2 W19x12 E2 W19x12 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x16 E2 W19x21 E2 W19x23 E2 W19x24 E2 W19x25 E2 W19x26 E2 W19x05 E5 W19x06 E5 W19x07 E2 W19x08 E5 W19x09 E2 W19x03 E5 W19x04 E5 W19x05 E5 W19x04 E2 W19x05 E2 W19x04 E2 W19x03 E2 W19x04 E2 W19x05 E3 W19x04 E5 W19x05 E3 W19x04 E2
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 | 62.26 5 . 5 4.54 5 6.27 5 4.0.80 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.92 5 32.57 5 3.92 5 45.15 5 3.92 5 45.21 5 3.92 5 20.49 5 4.67 5 20.451 5 3.44 5 60.03 5 3.04 5 60.03 5 5.00 5 60.03 5 5.00 5 60.03 5 5.00 5 32.27 5 3.92 5 44.51 5 5.75 5 32.27 5 3.92 5 44.51 5 3.40 5 73.49 5 4.26 5 <t< th=""><th>S 62.26 S 3.40 S 44.30 S 3.40 S 44.30 S 3.40 S 50.64 S 3.20 S 24.44 S 3.20 S 24.44 S 2.10 S 33.53 S 2.10 S 34.67 S 2.10 S 34.67 S 2.10 S 34.67 S 2.10 S 49.90 S 2.11 S 49.89 S 2.121 S 49.89 S 2.13 S 47.75 S 2.13 S 47.86 S 2.14 S 92.03 S 2.15 S 75.66 S 1.14 S 92.03 S 2.15 S 34.67 S 2.16 S 34.67 S 2.16</th><th>345,527,74 \$ 3,735,60 \$ 70,01 \$ 7,648,14 \$ 1,079,62 \$ 1,000,23 \$ 5,664,97 \$ 2,001,13 \$ 4,060,61 \$ 7,719,71 \$ 2,021,19 \$ 2,021,19 \$ 7,719,71 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 1,010,00 \$ 2,073,32 \$ 11,010,00 \$ 2,073,32 \$ 11,010,00 \$ 1,001,00 \$ 1,001,00 \$ 1,001,00 \$ 3,000,00 \$ 79,523,73 \$ 3,000,15 \$
3,000,15 \$ 3,000,15</th><th>21.937.49 \$. \$. \$. \$. \$. \$. \$. \$. \$. \$.</th><th>10,215,71 5 - \$ 5,33,82 \$ 670,01 \$ 143,07 \$ 143,07 \$ 1709,73 \$ 1709,73 \$ 1709,73 \$ 1709,73 \$ 190,68 \$ 126,01 \$ 22203 \$ 22203 \$ 22030 \$ 22031 \$ 22032 \$ 2100,02 \$ 1200,02 \$ 1200,02 \$ 1700,72 \$ 1700,72 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$ 1200,02 \$</th><th>417,680.95 15 15 15 15 15 15 15 15 15 15 15 15 10 5 200 5 373 5 363 5 373 5 361 5 373 5 361 5 373 5 361 5 373 5 361 5 373 5 361 5 373 5 361 3 361 361 361 361 361 361 361</th><th>42),445.55 \$ 4,116.60 \$ 771.10 \$ 0,662.94 \$ 1,199.75 \$ 1,199.75 \$ 1,197.75 \$ 4,2724.92 \$ 4,442.13 \$ 4,442.13 \$ 4,442.13 \$ 0,449.48 \$ 3,192.90 \$ 0,841.93 \$ 2,842.51 \$</th><th>37,812.04 \$
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 | 345,527,74 \$ 3,735,60 \$ 70,01 \$ 7,648,14 \$ 1,079,62 \$ 1,000,23 \$ 5,664,97 \$ 2,001,13 \$ 4,060,61 \$ 7,719,71 \$ 2,021,19 \$ 2,021,19 \$ 7,719,71 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 2,021,19 \$ 1,010,00 \$ 2,073,32 \$ 11,010,00 \$ 2,073,32 \$ 11,010,00 \$ 1,001,00 \$ 1,001,00 \$ 1,001,00 \$ 3,000,00 \$ 79,523,73 \$ 3,000,15 | 21.937.49 \$. \$. \$. \$. \$. \$. \$. \$. \$. \$. | 10,215,71 5 - \$ 5,33,82 \$ 670,01 \$ 143,07 \$
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 | Concrete Rectangular Beam 30%00" E2 HSS462x10 E2 HSS66x200 E2 W19x12 E2 W19x20 E2 W19x21 E2 W19x22 E2 W19x23 E2 W19x24 E2 W19x25 E3 W19x26 E3 W19x29 E3 W19x29 E2 W19x29 E2 W19x29 E2 W19x29 E2 W19x29 E2 W19x29 E2 W19x29 E3 W19x29 E3 </th <th>L.F. S 550 0.102 L.F. S 550 0.102 L.F. S 660 0.031 L.F. S 660 0.031 L.F. S 680 0.041 L.F. S 990 0.057 L.F. S 740 0.076 L.F. S 720 0.078 L.F. S 900 0.042 L.F. S 900 0.043 L.F. S 900 0.042 L.F. S 900 0.043 L.F. S 900 0.043 L.F. S 900 0.043 L.F. S 900 0.043 L.F. S 990 0.057 L.F. S 990 0.057 L.F. S 990 0.057 L.F. S 990 0.057 L.F. S</th> <th>62.26 5 . 5 4.54 5 6.27 5 4.080 5 6.27 5 20.49 5 6.27 5 20.49 5 5.75 5 27.43 5 3.22 5 20.49 5 3.40 5 20.47 5 3.40 5 20.431 5 4.67 5 20.432 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 20.433 5 4.67 5 6.633 5 5 6633 5 4.70 5 4.451 5 3.28 5 4.451 5 4.20 5 7.445 5 4.20 5 7.504</th> <th>S 6 62.26 S 3.40 5 4.30 5 3.40 5 5.0.44 5 3.20 5 2.9.44 5 3.20 5 2.9.44 5 3.20 5 2.9.44 5 3.20 5 2.9.44 5 3.20 5 2.9.44 5 2.10 5 3.9.67 5 3.20 5 2.9.93 5 2.20 5 1.9.44 5 2.21 5 4.9.80 5 2.21 5 6.7.38 5 2.15 5 7.56.66 5 2.16 5 3.9.27 5 3.20 5 3.46.1 5 2.16 5 9.20.3 5 3.20 5 3.46.1 5 3.21 5 3.9.2 5 3.21 5 3.9.2 5</th> <th>345,527,74 \$ 3,735 60 \$ 70,01 \$ 7,7,881 44 \$ 1,079 62 \$ 1,070 62 \$ 1,070 62 \$ 1,070 62 \$ 1,070 62 \$ 2,070 71 \$ 2,020 13 \$ 7,749 71 \$ 2,020 13 \$ 7,749 71 \$ 2,020 13 \$ 7,749 71 \$ 2,021 19 \$ 7,749 71 \$ 2,021 19 \$ 7,749 71 \$ 2,021 19 \$ 7,749 71 \$ 2,021 19 \$ 7,1840 90 \$ 2,573 92 \$ 140,700 41 \$ 1,726 69 \$ 1,001 60 \$ 1,001 6</th> <th>21.937.49 5 . 5 96.60 5 1.203.71 5 302.97 5 227.27 5 674.49 5 3.066.77 5 100.22 5 100.22 5 227.60 5 4.223.10 5 100.93 5 100.93 5 100.93 5 313.02 5 30.14.60 5 312.02 5 312.02 5 312.02 5</th> <th>10,215,71 5 5 5 5 1,22 670,011 5 140,071 5 7255,61 5 17,00,73 5 17,00,73 5 17,00,73 5 17,00,73 5 120,00 5 120,00 5 120,00 5 120,00 5 120,00 5 122,23 5 12,246,42 5 133,23 5 12,246,42 5 12,246,42 5 12,246,42 5
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 | Concrete Rectangular Beam 30%00" E2 VISSL2/10 E3 VISSL2/10
 | LF S 550 0.102 LF S 550 0.102 LF S 660 0.030 LF S 660 0.030 LF S 980 0.041 LF S 990 0.07 LF S 740 0.076 LF S 720 0.076 LF S 900 0.042 LF S 900 0.040 LF S 900 0.043 LF S 990 0.057 LF S 990 0.057 LF S 990 0.057 LF S 990 0.057 </th <th>62.26 5 . 5 4.54 5 6.27 5 4.08 5 6.27 5 20.49 5 5.75 5 27.43 5 3.22 5 22.47 5 3.22 5 21.451 5 3.48 5 21.42 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 60.03 5 5.20 5 66.31 5 5 5 66.31 5 5 5 22.47 5 3.20 5 7.44 5 5 5 7.45 5 4.00 5 6.79 5 4.00 5 <td< th=""><th>S 6 62.26 S 3.40 S 4.30 S 3.40 S 5.04.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 3.94.67 S 3.20 S 3.94.67 S 3.20 S 1.94.41 S 2.20 S 1.91.40 S 2.21 S 4.9.30 S 2.21 S 6.47.61 S 2.21 S 6.47.61 S 2.215 S 7.73.61 S 3.200 S 5.34.64 S 3.201 S 5.34.64 S 3.202 S 5.34.67 S 3.217 S 6.97.30 S 2.215 S 6.73.38<!--</th--><th>345,527,74 \$ 3,735,60 \$ 70,61 \$ 7,640,14 \$ 1,079,62 \$ 1,000,22 \$ 6,664,97 \$ 30,009,13 \$ 4,000,61 \$ 7,719,71 \$ 2,921,19 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 1,756,00 \$ 2,573,32 \$ 14,070,41 \$ 1,756,00 \$ 1,524,00 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 3,4,001,19 \$ 6,147,90 \$ 4,719,60 \$ 4,719,60 \$ 4,719,60 \$ 1,51,10 \$
1,51,10 \$ 1</th><th>21.937.49 5 . 5 96.60 5 1.203.71 5 3.029.71 5 227.271 5 624.591 5 3.066.71 5 1.122.56 5 1.102.27 5 6.24.591 5 3.066.77 5 1.022.86 5 2.27.60 5 2.27.60 5 2.27.60 5 2.27.60 5 1.002.930 5 2.227.60 5 1.002.930 5 1.002.930 5 3.014.05 5 3.014.06 5 3.022.15 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.224.83 5</th><th>10,215,71 5 5 5 5 5 600.01 5 108.61 5 143.07 5 7255.61 5 1,700.73 5 68.19 5 128.04 5 128.04 5 120.05 5 120.06 5 120.06 5 120.06 5 122.39 5 122.40 5 122.90 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5</th><th>417,680.95 10 5 5 5 10 5 5 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 10 5 10 10 5 10 <</th><th>423,445.55 \$ 4,116.60 \$ 77.10 \$ 8,642.34 \$ 1,199.75 \$ 1,270.21 \$ 6,125.01 \$ 4,274.92 \$ 4,442.13 \$ 4,442.13 \$ 3,192.99 \$ 8,841.59 \$ 2,827.51 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,978.05 \$ 3,999.06 \$ 5,982.10 \$ <th>37,812.04 5 . . </th><th>11,244.97 5 . 5 </th><th>41/2006.35 Year 2009 100-401 302.06 STD Year 2009 100-102 11.44.3.93 STD Year 2009 100-102 1.903.69 STD Year 2009 100-102 2.568.19 STD Year 2009 100-102 7.702.75 STD Year 2009 100-102 4.8292.64 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.266.88 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD</th></th></th></td<></th> | 62.26 5 . 5 4.54 5 6.27 5 4.08 5 6.27 5 20.49 5 5.75 5 27.43 5 3.22 5 22.47 5 3.22 5 21.451 5 3.48 5 21.42 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 20.43 5 4.67 5 60.03 5 5.20 5 66.31 5 5 5 66.31 5 5 5 22.47 5 3.20 5 7.44 5 5 5 7.45 5 4.00 5 6.79 5 4.00 5 <td< th=""><th>S 6 62.26 S 3.40 S 4.30 S 3.40 S 5.04.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 3.94.67 S 3.20 S 3.94.67 S 3.20 S 1.94.41 S 2.20 S 1.91.40 S 2.21 S 4.9.30 S 2.21 S 6.47.61 S 2.21 S 6.47.61 S 2.215 S 7.73.61 S 3.200 S 5.34.64 S 3.201 S 5.34.64 S 3.202 S 5.34.67 S 3.217 S 6.97.30 S 2.215 S 6.73.38<!--</th--><th>345,527,74 \$ 3,735,60 \$ 70,61 \$ 7,640,14 \$ 1,079,62 \$ 1,000,22 \$ 6,664,97 \$ 30,009,13 \$ 4,000,61 \$ 7,719,71 \$ 2,921,19 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 1,756,00 \$ 2,573,32 \$ 14,070,41 \$ 1,756,00 \$ 1,524,00 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 3,4,001,19 \$ 6,147,90 \$ 4,719,60 \$ 4,719,60 \$ 4,719,60 \$ 1,51,10 \$
1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1</th><th>21.937.49 5 . 5 96.60 5 1.203.71 5 3.029.71 5 227.271 5 624.591 5 3.066.71 5 1.122.56 5 1.102.27 5 6.24.591 5 3.066.77 5 1.022.86 5 2.27.60 5 2.27.60 5 2.27.60 5 2.27.60 5 1.002.930 5 2.227.60 5 1.002.930 5 1.002.930 5 3.014.05 5 3.014.06 5 3.022.15 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.224.83 5</th><th>10,215,71 5 5 5 5 5 600.01 5 108.61 5 143.07 5 7255.61 5 1,700.73 5 68.19 5 128.04 5 128.04 5 120.05 5 120.06 5 120.06 5 120.06 5 122.39 5 122.40 5 122.90 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5</th><th>417,680.95 10 5 5 5 10 5 5 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 10 5 10 10 5 10 <</th><th>423,445.55 \$ 4,116.60 \$ 77.10 \$ 8,642.34 \$ 1,199.75 \$ 1,270.21 \$ 6,125.01 \$ 4,274.92 \$ 4,442.13 \$ 4,442.13 \$ 3,192.99 \$ 8,841.59 \$ 2,827.51 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,978.05 \$ 3,999.06 \$ 5,982.10 \$ <th>37,812.04 5 . . </th><th>11,244.97 5 . 5 </th><th>41/2006.35 Year 2009 100-401 302.06 STD Year 2009 100-102 11.44.3.93 STD Year 2009 100-102 1.903.69 STD Year 2009 100-102 2.568.19 STD Year 2009 100-102 7.702.75 STD Year 2009 100-102 4.8292.64 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.266.88 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD</th></th></th></td<> | S 6 62.26 S 3.40 S 4.30 S 3.40 S 5.04.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 2.94.41 S 3.20 S 3.94.67 S 3.20 S 3.94.67 S 3.20 S 1.94.41 S 2.20 S 1.91.40 S 2.21 S 4.9.30 S 2.21 S 6.47.61 S 2.21 S 6.47.61 S 2.215 S 7.73.61 S 3.200 S 5.34.64 S 3.201 S 5.34.64 S 3.202 S 5.34.67 S 3.217 S 6.97.30 S 2.215 S 6.73.38 </th <th>345,527,74 \$ 3,735,60 \$ 70,61 \$ 7,640,14 \$ 1,079,62 \$ 1,000,22 \$ 6,664,97 \$ 30,009,13 \$ 4,000,61 \$ 7,719,71 \$ 2,921,19 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 1,756,00 \$ 2,573,32 \$ 14,070,41 \$ 1,756,00 \$ 1,524,00 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 3,4,001,19 \$ 6,147,90 \$ 4,719,60 \$ 4,719,60 \$ 4,719,60 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$ 1,51,10 \$
1,51,10 \$ 1</th> <th>21.937.49 5 . 5 96.60 5 1.203.71 5 3.029.71 5 227.271 5 624.591 5 3.066.71 5 1.122.56 5 1.102.27 5 6.24.591 5 3.066.77 5 1.022.86 5 2.27.60 5 2.27.60 5 2.27.60 5 2.27.60 5 1.002.930 5 2.227.60 5 1.002.930 5 1.002.930 5 3.014.05 5 3.014.06 5 3.022.15 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.224.83 5</th> <th>10,215,71 5 5 5 5 5 600.01 5 108.61 5 143.07 5 7255.61 5 1,700.73 5 68.19 5 128.04 5 128.04 5 120.05 5 120.06 5 120.06 5 120.06 5 122.39 5 122.40 5 122.90 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5</th> <th>417,680.95 10 5 5 5 10 5 5 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 10 5 10 10 5 10 <</th> <th>423,445.55 \$ 4,116.60 \$ 77.10 \$ 8,642.34 \$ 1,199.75 \$ 1,270.21 \$ 6,125.01 \$ 4,274.92 \$ 4,442.13 \$ 4,442.13 \$ 3,192.99 \$ 8,841.59 \$ 2,827.51 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,978.05 \$ 3,999.06 \$ 5,982.10 \$ <th>37,812.04 5 . . </th><th>11,244.97 5 . 5 </th><th>41/2006.35 Year 2009 100-401 302.06 STD Year 2009 100-102 11.44.3.93 STD Year 2009 100-102 1.903.69 STD Year 2009 100-102 2.568.19 STD Year 2009 100-102 7.702.75 STD Year 2009 100-102 4.8292.64 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 3.719.25 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.65 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.265.86 STD Year 2009 100-102 2.266.88 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD Year 2009 100-102 2.666.86 STD</th></th> | 345,527,74 \$ 3,735,60 \$ 70,61 \$ 7,640,14 \$ 1,079,62 \$ 1,000,22 \$ 6,664,97 \$ 30,009,13 \$ 4,000,61 \$ 7,719,71 \$ 2,921,19 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 7,941,32 \$ 1,756,00 \$ 2,573,32 \$ 14,070,41 \$ 1,756,00 \$ 1,524,00 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 5,538,40 \$ 3,4,001,19 \$ 6,147,90 \$ 4,719,60 \$ 4,719,60 \$ 4,719,60 \$ 1,51,10 \$ 1
 | 21.937.49 5 . 5 96.60 5 1.203.71 5 3.029.71 5 227.271 5 624.591 5 3.066.71 5 1.122.56 5 1.102.27 5 6.24.591 5 3.066.77 5 1.022.86 5 2.27.60 5 2.27.60 5 2.27.60 5 2.27.60 5 1.002.930 5 2.227.60 5 1.002.930 5 1.002.930 5 3.014.05 5 3.014.06 5 3.022.15 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.024.05 5 3.224.83 5 | 10,215,71 5 5 5 5 5 600.01 5 108.61 5 143.07 5 7255.61 5 1,700.73 5 68.19 5 128.04 5 128.04 5 120.05 5 120.06 5 120.06 5 120.06 5 122.39 5 122.40 5 122.90 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5 122.00 5
 | 417,680.95 10 5 5 5 10 5 5 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 5 10 10 5 10 10 5 10 < | 423,445.55 \$ 4,116.60 \$ 77.10 \$ 8,642.34 \$ 1,199.75 \$ 1,270.21 \$ 6,125.01 \$ 4,274.92 \$ 4,442.13 \$ 4,442.13 \$ 3,192.99 \$ 8,841.59 \$ 2,827.51 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,982.05 \$ 3,978.05 \$ 3,999.06 \$
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6													
Concrete-Rectangular Beam: 36x30 Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F. 5 6226 5 . 5	5 62 26 5	3 735 60 5	. 5		373560 5 6861 5 . 5 . 5 6861 5	4 116 60 5			4 116 60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40c2X1/8		46.40 0054202760360	10004-0-4-10 10004-0-4-10 1000	550 0 400 E E 454 E 507 E	240 6 44 20 6	70.01	0.00	(202) 6		77.00	11/ 02 0	(0.05 8	200 00 CTD Vest 2000 100 100
HSS-Hollow Structural Section1: HSS4ACA1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	10005.4.00 E2	550 0.102 L.F. 5 4.54 5 6.27 5	3.47 5 14.30 5	70.01 5	30.00	53.02 3	220.51 5 5.00 5 10.76 5 3.63 5 19.59 5	77.10 \$	100.32 3	53.05 5	302.05 STD Tear 2005 100-102
HSS-Hollow Structural Section1: HSS6X4X378: 20 W-Wide Flange1: W10X12	191.98 170.83 7.68	191.36 051223750360	H550X4X3/0 E2	550 0.102 L.P. 5 40.88 5 6.27 5	3.49 5 50.64 5	7,848.14 5	1,203.71 5	6/0.01 5	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 5	2,065.70 3	735.28 3	11,443.93 51D Tear 2009 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 48.88 1.17 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X42	1028.21 989.93 43.73 1,028	1028.21 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,765.63 \$	3,578.17 \$	1,994.73 S	51.338.53 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	50,022.42 \$	6,128.13 \$	2,190.09 \$	58,340.64 STD Year 2009 100-102
W-Wide Flange1: W14043; 16	71.21 55.97 4.8 71	71.21 051223752320	W14x43 E2	810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.13 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	17.67 16.06 7.91 18	37.67 051223752500	W14x109 F2	720 0.078LF 5.204.93 5.4.80 5	2.67 5 212.40 5	7 719 71 5	180.82 5	100.58 \$	8 001 11 5 225 63 5 8 21 5 2 93 5 236 77 5	8 499 48 5	309.27 5	110.37 5	8 919 13 STD Year 2009 100-102
W-Wide Flange1: W16X26		CC C2 014000770700	1000 F2				44.44				447.64		8 848 95 0TD 14 0900 400 400
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	95.03 93.03 3.3 00	00.00 001220102100		1000 0.000 L.F. 3 44.51 3 3.45 3	1.32 3 49.03 3	2,321.13	221.00 \$	120.01 0	3,2/12,0 0 40,00 0 0.37 0 21.2 0 30,01 0	3,122.99 3	301.22 3	133.14 8	3,113,25 510 1481 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.25 1399.69 98.92 1,444	1444.25 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,698.33 \$	7,510.10 \$	3,105.14 \$	97,313.57 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,916.11 \$	12,983.81 \$	3,422.87 \$	111,322.79 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 315.21 25.47 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.26 21.42 219	219 051223754300	W21x50 E5	1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22.878.93 STD Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 S	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X198 W-Wide Flange: W14X198: 6		117 051223752500	W14x398 F2	720 0.0781 F 5 679 69 5 4.80 5	2.67 \$ 687.16 \$	79.523.73 \$	551.60 \$	312 39 5	80 397 72 \$ 748 34 \$ 8 21 \$ 2 93 \$ 759 48 \$	87 555 78 \$	960.57 \$	342.81 \$	88 859 16 STD Year 2009 100-102
W-Wide Flange: W18X76											- 244 04		
W-Wide Hange: W18X76: 6 0.390972222	4373.3 4157.5 725.46	Total	WI0X/0 ED	340 0.003 C.F. 5 123.38 5 555 5	2.29 § 13/.22 §	330,341.27 \$	20,000.89 \$	9,512.28 \$	25,111.26 5 142.63 5 9.63 5 2.52 5 154.36 5 359,854.45 \$	362,777.24 \$	34,443.60 \$	10,468.63 \$	28,351.34 510 Tear 2009 100-102 407,689.48
7 Concrete-Rectangular Beam: 36x 30													
Concrete-Rectangular Beam: 36x30: 6	60 60 397.92	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- S	- S	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- S	- S	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS482X1/8 HSS-Hollow Structural Section1: HSS482X1/8: 8	13.55 9.89 0.09	13.55 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.52 \$	84.96 \$	47.29 \$	193.77 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.75 \$	145.80 \$	51.90 \$	265.44 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 172.33 7.74	193.49 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 S	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2		52.69 051223750500	W10x12 E2	600 0.093 L.F. 5 20.49 5 5.75 5	3 20 5 29.44 5	1.079.62 5	302.97 \$	168.61 \$	1 551 19 5 22 77 5 9.84 5 3.52 5 36.13 5	1 199 75 5	518.47 \$	185.47 \$	1 903 69 STD Year 2009 100-102
W-Wide Flange1: W12X16		66.62	1000 E				012.07					100.01	0.000 44 0TD 1/0-0000 400 400
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	05.03 05.20 Z.04 00	65.63 051223751100	W12X10 E2	000 0.004 C.F. 5 27.43 5 3.92 5	2.16 5 33.53 5	1,800.23 5	251.21 5	143.07 5	2,200.57 5 30.02 5 6.71 5 2.40 5 39.13 5	1,9/0.21 5	440.38 5	157.51 \$	2,558.10 510 Tear 2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.054 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 991.4 43.8 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.42 5.18 71	71.21 051223752320	W14x43 E2	810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 S	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 S	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14882 2 W-Wide Flange1: W14882 2: 1	26.33 24.16 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 S	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8.919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3	65.61 61.01 1.1 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. S 44.51 S 3.46 S	1.92 5 49.89 5	2 921 19 5	227.08 5	126.01 \$	3 274 28 5 48 65 5 5 90 5 2 12 5 56 67 5	3 192 90 5	387.22 5	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31		161.10 061222762000	M46-34 E2		2.02 0 00 00 0	2 646 55 6	(40.(7) *	202.02			00101	2// 22 4	10 100 00 CTD Vor 0000 100 100
W-Wide Flange1: W18X51: 4 W-Wide Flange1: W18X35	151.19 149.89 9.30 151	151.19 051223752300	23	340 0.002 L.F. 5 52.13 5 3.84 5	2.13 3 58.76 3	1,961.32 3	560.57 3	322.03 \$	6,883.32 a 26.46 a 6.26 a 2.35 a 67.37 a	6,641.53 a	991.61 3	355.34 3	10,105.63 510 1448 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.25 1410.88 99.71 1,444	1444.25 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,698.33 \$	7,510.10 \$	3,105.14 \$	97.313.57 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,916.11 \$	12,983.81 \$	3,422.87 \$	111.322.79 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 320.95 25.93 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 213.3 21.43 219	219 051223754300	W21x50 E5	1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X398 W-Wide Flange: W14X398: 6		117 051223752500	W14x398 E2	720 0.078 L.F. \$ 679.69 \$ 4.80 \$	2.67 \$ 687.16 \$	79,523.73 \$	561.60 S	312.39 \$	80.397.72 \$ 748.34 \$ 8.21 \$ 2.93 \$ 759.48 \$	87,555.78 \$	960.57 \$	342.81 \$	88,859.16 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183 169.4 26.03 183	183 051223753940	W18x76 E5	900 0.089 L.F. 5 129 38 5 5.55 5	2 29 5 137 22 5	23.676.54 \$	1.015.65 \$	419.07 5	25 111 26 5 142 83 5 9 63 5 2 52 5 154 98 5	26 137 89 5	1 762 29 5	461.16 \$	28.361.34 STD Year 2009 100-102
0.432638889	4372.4 4184.76 753.93	Total			S	330,369.58 \$	19,996.69 \$	9,509.93 \$	359,876.20 \$	362,808.62 \$	34,436.39 \$	10,466.06 \$	407,711.07
8 Concrete-Rectangular Beam: 36x30													
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS402X1/8	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3.735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40(2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS644C3/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.91 1.17 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3		65.63 051223751100	W12x16 E2	880 0.054 L.F. 5 27.43 5 3.92 5	2.18 \$ 33.53 \$	1.800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1.970.21 \$	440.38 S	157.51 \$	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 265	266.26 051223751100	W12v19 E2	880 0.054 L.F. \$ 32.67 \$ 3.02 \$	2 18 5 38 67 5	8.672.09 \$	1.043.74 8	680.45 \$	10 20 27 k 26 2 17 3 2 33 31 2 70 200 01	9,452 17 5	1 786 60 \$	619.02 \$	11 917 80 STD Year 2009 100-102
W-Wide Flange1: W14022	20020 24027 200		1112007 EE		1.10 0 50.07 0	0,012.05	1,040.14			5,452.17	1,100.00	000.02	
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.05 992.12 43.83 1,028	1027.66 051223751900	W14X22 E2	990 0.057 L.F. 5 44.51 5 3.48 5	1.94 5 49.93 5	45,740.70 5	3,576.22 8	1,993.64 5	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 8	6,124.79 5	2,188.89 5	58,308.86 (510) Tear 2009 100-102
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82 2	71.21 60.42 5.18 71	71.21 051223752320	W14x43 E2	810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.16 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
w-wide Hange1: W15825 W-Wide Flange1: W16826: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1496.13 09.37 1.445	1444.74 051223753300	W18x35 F4	960 0.083 L.F. \$ 60.03 \$ 6.90 \$	2.15 \$ 67.38 \$	86.727.74 \$	7.512.65	3,105,19 \$	97 346 58 \$ 65 72 \$ 8 99 \$ 2 37 \$ 77 na e	94.948.31 \$	12.988.21 \$	3.424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40	200142 27527 1/483	107.68	Withuth Pro-	000 0.000 E E C CO C C	0.45 6 75.55 6	00.000 00 0	4.722.04	202.04		01 000 01	14,000,00	0.00.00	
w-wide Flange1: W18840: 11 W-Wide Flange1: W21X50	337.68 320.95 25.93 338	337.68 [051223753500	v/16x40 E5	300 0.063 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 [STD Year 2009 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219 213.3 21.43 219	219 051223754300	W21x50 E5	1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4 W-Wide Flange: W14X342	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2.147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342: 2 W Wide Flange: W14X342: 2	39 35.48 24.73 39	39 051223752500	W14x342 E2	720 0.078 L.F. \$ 584.05 \$ 4.80 \$	2.67 \$ 591.52 \$	22,777.95 \$	187.20 \$	104.13 \$	23,069,28 \$ 643.05 \$ 8.21 \$ 2.93 \$ 654.19 \$	25,078.95 \$	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 169.4 26.03 183	183 051223753940	W18x76 E5	900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28.361.34 STD Year 2009 100-102
W-Wide Flange: W21X182 W-Wide Flange: W21X182: 4	78 71.57 26.53 78	78 051223754780	W21x182 E5	1000 0.08 L.F. \$ 310.35 \$ 5.00 \$	2.07 \$ 317.42 \$	24,207.30 \$	390.00 \$	161.46 \$	24,758.76 \$ 341.24 \$ 8.64 \$ 2.27 \$ 352.15 \$	26,616.72 \$	673.92 \$	177.05 \$	27,467.70 STD Year 2009 100-102
A	4171 33 4177 37 401 44	Yotal				207 007 27 8	20.017.00 8	0 405 44 8	222.200.04	222.022.08	24 479 20 8	40.447.44	374 847 43

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9														
Concrete-Rectangular Beam: 36x30	(a) (a) (b) (a)	60 033105350413	Canada Dastana da Basar 30-20		6 mm 6	1 775 60 6				(0.04				4.445.60 PTD View 2000 100.401
Concrete-Rectangular Beam: 30x301 6 HSS-Hollow Structural Section1: HSS40X2X1/8	60 60 371.88	60 033105350412	Concrete Rectangular beam: 36 x30	L.F. 5 62.26 5 · 5	· 5 62.26 5	3,735.60 5	. 5	. 5	3,735.60 \$ 68.61 \$ - \$ - \$	66.61 3	4,116.60 5	. 5	. 5	4,116.60 510 Tear 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 \$	77.10 \$	165.92 \$	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 S	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.91 1.17 53	52.69 051223750600	W10x12 E2	600 0.093 LF. S 20.49 S 5.75 S	3 20 5 29 44 5	1.079.62 \$	302.97 \$	168.61 \$	1 551 19 5 22 77 5 9.84 5 3 52 5	36.13 5	1 199 75 5	518.47 \$	185.47 5	1 903 69 STD Year 2009 100-102
W-Wide Flange1: W12X16														
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 5	257.27 \$	143.07 5	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$	39.13 S	1,970.21 5	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 265	266.26 051223751100	W12x19 E2	880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$	44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 990.83 43.77 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43		74 24 064223762325	W14-13 E2	810 0.000 E c 75.40 c 4.90 c	0.07 E 00.40 E	6 030 00 6	3 20 000	420 77 6	5 705 2 5 00 72 5 7 00 5 2 0 5	90.62 S	6 740 70 C	540.42 S	a 24 204	6 452 05 PTD Vest 2005 100.102
W-Wide Flange1: W14043: 10 W-Wide Flange1: W14082.2	/1.21 00.42 5.18 /1	1121 001220106320	11 14/43	010 0.003 L.F. 3 73.43 3 4.20 3	2.51 3 00.12 3	5,233.22 9	303.35 8	100.77 3	5,105.35 a 00.73 a 7.23 a 2.00 a	30.02 3	5,140.10 3	513.12 9	100.10 0	6,653.05 510 146i 2009 100-102
W-Wide Flange1: W14082 2: 1 W-Wide Flange1: W140109 2	26.33 24.16 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 S	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$	179.56 S	4,442.13 \$	210.64 S	75.04 \$	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 S	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$	236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700	W16x26 E2	1000 0.056 L.F. S 44.51 S 3.46 S	1.92 5 49.89 5	2 921 19 5	227.08 5	126.01 \$	3 274 28 5 48 65 5 5 90 5 2 12 5	56.67 \$	3.192.90 \$	387.22 5	139.14 5	3 719 25 STD Year 2009 100-102
W-Wide Flange1: W16X31						2,72,177			0,214,20 0 40,00 0 0,00 0 4,12 0	00.01	0,176.07			0,119,29 010 102 2009 102 102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 \$	8.841.59 \$	991.81 \$	355.30 \$	10.188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1406.13 99.37 1,445	1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$	77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 320.95 25.93 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$	86.40 \$	25,339.51 \$	3,035.74 S	800.30 S	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50		010 071000771000	404-66 66					101.05						00 075 02 070 No. 0000 100 100
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219 213.3 21.43 219	219 051223754300	W21x50 E5	1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147,49 \$ 48.65 \$ 9.84 \$ 3.52 \$	62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342: 2	39 35.48 24.73 39	39 051223752500	W14x342 E2	720 0.078 L.F. \$ 584.05 \$ 4.80 \$	2.67 \$ 591.52 \$	22,777.95 \$	187.20 S	104.13 \$	23,069.28 \$ 643.05 \$ 8.21 \$ 2.93 \$	654.19 \$	25,078.95 \$	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X76	100 100 100 100	103 061223763040	W10-74 E4	3 33 3 9 90 901 9 3 1000 0 000	2.20 5 427.22 5	22.676.64	1.015.55 8	419.07 5	3 63 6 3 53 6 3 59 54 3 30 444 30	154.00	06 437 00 E	1 762 00 6	101 10 5	20 351 34 STD Very 2008 100.102
W-Wide Flange: W18076-0 W-Wide Flange: W218182	105/4 20/03 105	165 051225155540	1110/10	540 0.005 L.F. a 123.30 a 5.55 a	2.27 9 131.22 9	23,070.54 3	1,015/65 \$	413.07 3	e 36.3 e 60.6 e 60.241 e 05.111.63	104.20 9	20,137.03	1,702.23 5	401.10 3	20,301,34 310 1481 2003 100-102
W-Wide Flange: W21X182: 4 0.515972222	78 71.57 26.53 78	78 051223754780 Total	W21x182 E5	1000 0.08 L.F. \$ 310.35 \$ 5.00 \$	2.07 \$ 317.42 \$	24,207.30 \$	390.00 S	161.46 S	24.758.76 \$ 341.24 \$ 8.64 \$ 2.27 \$	352.15 \$	26,616.72 \$	673.92 S	177.05 \$	27,467.70 STD Year 2009 100-102
10						en jour er ja	1000 C				and an	addition a		
Concrete-Rectangular Beam: 36x30	00 00 00	60 033106360412	Concrete Rectangular Beam: 36%/30*	1 F C 25 12 C	5 60.00 E	3 735 50 6	e	e	3 735 60 8 60 64 6 6 6	e 1 a 8a	4 116 60 6	e	e	4 115 50 STD Yes 2000 100.401
HSS-Hollow Structural Section1: HSS4X2X1/8	00 00 371.88	99 00010000412	pownerere reectangular (204m), 30 X30	L.F. 3 02.20 3 - 3	- 9 02.20 \$	3,735.60 3	- 3	. ,	a,raa.oo a oo.o1 a - a - 5	00.01 3	4,110.00 3	- 3	. ,	4,110,00 010 1481 2003 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 \$	77.10 \$	165.92 \$	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 S	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.60 48.01 118 51	52.69 051223750600	W10x12 F2	600 0.093 F \$ 20.49 \$ 5.75 \$	3 20 5 29.44 5	1.079.62 \$	312.47 \$	168.61 \$	1 551 19 5 22 77 5 9.84 5 3.52 5	36.13 8	1 199 75 \$	518.47 \$	185.47 \$	1 903 69 STD Year 2009 100-102
W-Wide Flange1: W12X16	38.49 40.19 10.20 55				0.00 0 0.000 0					00.10	1,100.10	010.47		1,992,09 0.00 1.00 1.00 1.00
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$	39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.054 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$	44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W140222 W-Wide Flange1: W140222: 33	1028.14 992.12 43.83 1,028	1028.14 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,762.51 \$	3,577.93 \$	1,994.59 \$	51,335.03 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	50,019.01 S	6,127.71 \$	2,189:94 \$	58.335.66 STD Year 2009 100-102
W-Wide Flange1: W14X43		74.04 041999769305	W14-13 E2	810 0.000 E 5 73 40 5 4.00 5	0.07 6 00.40 6	6 000 00 6	202.25	469.77 6	5 TOS 25 5 00 T2 5 7 20 5 2 50 5	00.60 K	6 740 70 6	510.10		6 (F2 05 PTD Very 2008 100.100
W-Wide Flange1: W14X82 2	/1.21 00.42 5.18 //1	11.21 051223152320	TT 14343	010 0.003 L.F. 5 13.43 5 4.20 5	2.37 5 00.12 5	5,233.22 3	343.35 \$	100.77 3	5,705.35 \$ 00.73 \$ 7.23 \$ 2.00 \$	30.62 3	5,140.10 3	513.12 9	100.10 3	6,653,05 51D 1488 2003 100-102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X100 2	26.33 24.18 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$	179.56 \$	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 S	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$	236.77 S	8,499.48 \$	309.27 S	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700	W16x26 F2	1000 0.0561 F S 44.51 S 3.46 S	192 5 49.89 5	2 921 19 5	227.08 \$	126.01 \$	3 274 28 5 48 65 5 6 90 5 2 12 5	56.67 5	3 192 90 5	387.22 5	139.14 \$	3 719 25 STD Year 2009 100-102
W-Wide Flange1: W16X31	0.00 0.00 0.0			1000 0.000 0.1. 4 100,01 4 0.00 4	1.02 0 0.00 0	2,021.10	22.30	20.01	0.214.20 0 40.00 0 00.04 0 0.214.20	50.07	0,100.00		100.14	0,119,29 010 1481 2009 149-142
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 \$	8,841.59 \$	991.81 S	355.30 \$	10.188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1406.21 99.38 1,445	1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$	77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18040 W-Wide Flange1: W18040: 11		337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23.056.92 \$	1.755.94 \$	725.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$	86.40 \$	25.339.51 \$	3.035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50		010 07 1000 1000	1404.64											
W-Wide Flange1: W2DX50: 7 W-Wide Flange: W10X26	219 213.33 21.43 219	219 051223754300	W21X50 E5	1064 0.075 L.P. \$ 85.39 \$ 4.70 \$	1.94 5 92.03 5	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104,47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878,93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$	62.01 S	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342 W-Wide Flange: W14X342: 2	39 35.64 24.84 39	39 051223752500	W14x342 E2	720 0.078 L.F. \$ 584.05 \$ 4.80 \$	2.67 \$ 591.52 \$	22,777.95 \$	187.20 \$	104.13 \$	23,069.28 \$ 643.05 \$ 8.21 \$ 2.93 \$	654.19 \$	25,078.95 \$	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X76	142 140 77 26 08 102	183 051223753940	W19-76 E5	900 0.029 E 4 120.20 4 6.66 4	2 25 8 137 22 8	27 676 64 8	1.016.66 8	419.07 5	3 63 6 3 63 6 3 69 64 3 3 6 66 30	164.68	26 137 85 8	1 762 25 8	461.16 8	98 364 34 STD Vear 2009 100.102
W-Wide Flange: W20X76.0	103 109.11 20.00 103	103 03 122 31 33 300			2.27 9 131.22 9	23,010.54 9	1,015.05	412.07 3	20,111,20 9 142,00 9 0,00 9 2.02 9	104.00 0	20,151.05	1,102.23	401.10 0	20,301.34 310 1481 2009 100-102
W-Wide Flange: W21X182: 4	78 71.83 26.63 78	78 051223754780 Total	W21x182 E5	1000 0.08 L.F. \$ 310.35 \$ 5.00 \$	2.07 \$ 317.42 \$	24,207.30 \$	390.00 S	161.46 S	24.758.76 \$ 341.24 \$ 8.64 \$ 2.27 \$	352.15 \$	26,616.72 \$	673.92 S	177.05 \$	27,467.70 STD Year 2009 100-102
11		10.00					20,010.00	5,000.05	011,01420				10,410.10	an the star
Concrete-Rectangular Beam: 36x30	60 60 971 99	60 013106360412	Concute Dectangular Beam: 10x10*		5 co oc 5	2 735 60 6	6		2 725 60 8 69 64 8 8 8	59.54 6	1 116 50 5			4 515 50 PTD Vest 2009 100-001
Concrete-Rectangular Beam: 30x30: 6 HSS-Hollow Structural Section1: HSS40(2X1/8	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36 x30	L.F. 3 62.26 3 - 3	- \$ 62.26 \$	3,735.60 \$	- 3	- >	3,735.60 \$ 68.61 \$ - \$ - \$	66.61 \$	4,116.60 \$. 3	- >	4,116.60 SID 148/2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 \$	77.10 \$	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS644C3/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52,69 48,93 1.18 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1.079.62 \$	302.97 S	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$	36.13 \$	1,199.75 \$	518.47 S	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16														
W-Wide Flange1: W12X10: 3 W-Wide Flange1: W12X19	05.03 03.26 2.04 00	65.63 051223751100	W12x19 E2	880 0.064 L.F. 5 27.43 5 3.92 5	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 5	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$	39.13 \$	1,970.21 \$	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 265	266.26 051223751100	W12x19 E2	880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$	44.76 S	9,492.17 \$	1,786.60 \$	639.02 \$	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 992.93 43.87 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3.576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	49.995.17 \$	6,124.79 \$	2,188.89 \$	58.308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	21 21 60 42 5 46 7	71.21 064223762336	W14x43	810 0.059 F C 7340 C 4 70 C	2 37 5 00 49 6	5 233 23 e	3 30 0/6	169 77 ¢	570535 5 9073 6 730 6 000 e	90.62	5.749.70 ¢	510.10	195 42 C	6.453.05 STD Yest 2000 100.102
W-Wide Flange1: W14X82 2	71.21 00.42 5.18 71	11.21 051223/52320	EZ	0.00011.1. \$ 73.49 \$ 4.26 \$	2.31 3 80.12 3	5,233.22 \$	343.35 \$	100.77 3	0,700.30 0 00.73 5 7.29 5 2.60 S	30.02 3	5,146,78 \$	519.12 \$	100.10 5	9,453,05 [31D 168/2009 100-102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.18 3.98 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$	179.56 S	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$	236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65 63 051222752700	W16v26 E2	1000 0.056 L.F. & 44.65 & 3.46	192 \$ 46.80 €	2 921 10 6	227.68 6	126.01 6	3 274 28 \$ 49 55 \$ 50 \$ 3 50 \$	66.67 e	3 192 00 8	387.99 6	110 14 6	3 719 26 STD Year 2009 100.102
W-Wide Flange1: W16X28: 3 W-Wide Flange1: W16X31	05.03 03.03 3.5 66	00.03 001223/52/00	EZ	0.000[L.F. 3 44.51 3 3.46 \$	1.52 8 49.69 8	2,321.19 3	227.08 8	125.01 3	3,214.20 8 48.60 8 5.90 8 2.12 S	6 10.00	3,192.90 3	367.22 S	133.14 3	3,113.25 [310]168/2007 [100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18A35 W-Wide Flange1: W18X35: 36	1444.74 1406.23 99.38 1,445	1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$	77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	227.68 220.08 35.62	117 68 DE1221763605	W18v40 F4	960 0.0031 F C 2034 C 200 C	2 16 5 76 66 6	23.044.62	1765.04 5	726.04	26.648.97 6 76.04 6 9.60 6 9.77 6	86.40 ¢	26 339 64 6	3 026 74 6	810 20 6	29 175 55 STD Year 2009 100-102
W-Wide Flange1: W21X50	337.00 320.00 25.95 355	331.4W [J31223133300		0.000 0.000 0.01 3 5.20 3	2.10 0 /5.00 3	23,000.32 a	1,100.34 3	120.01 3	20,040.07 0 10.04 0 0.33 0 2.37 5	6 VP.00	20,003.01 0	3,030.74 a	010.37 8	2.2, 110, 00 UTU 1148 2007 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219 213.33 21.43 219	219 051223754300	W21x50 E5	1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$	62.01 S	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342 W-Wide Flange: W14X342: 2		39 051223752500	W14x342 E2	720 0.078 L.F. S 584.05 S 4.80 S	2.67 \$ 591.52 \$	22.777.95 S	187.20 S	104.13 5	23.069.28 \$ 643.05 \$ 8.21 \$ 2.93 \$	654.19 \$	25.078.95 S	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X76	27 2200 20.09 37		12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		6.91 9 001.06 9	66,777,972 Q	141.64 4		20.007.00 0 0.00 0 0.01 0 0.03 0		20,010,32 0			ALCONTRACTOR AND A THE AND A THE AND A
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 169.77 26.08 183	183 051223753940	W18x76 E5	900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.62 \$	154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 4	78 71.83 17.82 78	78 051223754780	W21x182 E5	1000 0.08 L.F. \$ 310.35 \$ 5.00 \$	2.07 \$ 317.42 \$	24,207.30 \$	390.00 \$	161.46 \$	24,758.76 \$ 341.24 \$ 8.64 \$ 2.27 \$	352.15 \$	26,616.72 \$	673.92 \$	177.05 \$	27,467.70 STD Year 2009 100-102
0.599305556	4373.22 4179.08 683.14	Total			5	297,807.27 \$	20,017.09 \$	9,465.44 \$	327,289.81	\$	326,922.08 \$	34,478.20 \$	10,417.11 \$	371,817.42

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12												
Concrete-Rectangular Beam: 36x30 Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412 Concrete Rectangular 6	leam: 36*x30* L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3.735.60 \$	- S	. s	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4.116.60 \$	- S	- 5	4.116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8		16-10 A6199976966 NDD1-0-10			70.04		(2 m) 4		77.42	477.00		262.62 070 More 2000 403.500
HSS-Hollow Structural Section1: HSS4X2X1/8:8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360 11334328116	E2 330 0.102 L.F. 3 4,54 3 0,27 3	3,47 5 14,30 5	70.01 5	30.00 3	53.02 9	220.51 5 5.00 5 10.76 5 3.65 5 19.59 5	77.10 \$	100.32 3	53.06 3	302.05 31D Tear 2005 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 S	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 48.93 1.18 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.054 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 S	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 S	157.51 S	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19	-	266.26 061222761100 W/12v19	E2 800 0.0641 E 5 22.57 5 2.02 5	0.40 € 20.67 €	9,673,00 5	101274 \$	200.46	40 200 27 6 20 00 F 6 7 4 6 2 40 6 44 70 6	9.492.47 5	1 795 60 5	639.02 5	11 917 90 STD Very 2009 100-102
W-Wide Flange1: W12X19: 30 W-Wide Flange1: W14X22	200.20 240.33 3.44 200	200.20 001223701100 0012210	Le 000 0.000 LT. 3 32.37 3 3.32 3	2.10 a 30.07 a	0,072.03 a	1,043.74 3	500.45 3	10,230,27 a 30.03 a 0.71 a 2.40 a 44.70 a	3,432.17 3	1,100.00 3	633.02 a	11,311.00 310 100 100 100 100
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 992.93 43.87 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.42 5.18 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.18 3.98 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2		27.67 064222762600 M/44u400	E2 720 0.070 E F 204.02 F 4.00 F	2.67 6 202.0	7 740 74	100.00	100.00	8 AA 44 8 AY 63 8 8 34 8 3 63 8 AT 77 8	0.000.00	200.07	110.37	8 040 43 CTD Ven 2008 400 402
W-Wide Flange1: W16X26	31.01 36.00 1.93 35	37.07 001623702000 11100	Le 140 0.010 L.F. 3 204.33 3 4.00 3	2.07 8 212.40 8	7,719.71	100.02 3	100.56 8	0,001.11 a 225.03 a 0.21 a 2.33 a 2.30.77 a	0,433.40 3	303.21 8	110.37 8	0,313.13 010 100 100 100 102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36		1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86.727.74 S	7,512.65 \$	3,106.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12.988.21 \$	3.424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40		997.68 AC 59977.97.06 M/18-16		041 6 77.00 6		17/2.04	705.04		01 000 04	2022 24	010.00	20 474 47 PTD V 2400 400 400
W-Wide Flange1: W18040: 11 W-Wide Flange1: W21X50	337.68 320.98 25.93 335	337.06 051223753500 9718040	E5 390 0.003 L.F. \$ 66.31 \$ 5.20 \$	2.15 \$ 75.00 \$	23,096.92 5	1,700.94 3	720.01 5	25,548.67 \$ 15.04 \$ 0.39 \$ 2.37 \$ 00.40 \$	25,339.51 \$	3,035.74 \$	800.30 5	29,175.55 STD Tear 2009 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange- W10X26	219 213.33 21.43 219	219 051223754300 W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17 37,49 1.97 40	40.17 051223750720 W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342 W-Wide Flange: W14X342; 2	39 35.64 24.84 39	39 051223752500 W14x342	E2 720 0.078 L.F. \$ 584.05 \$ 4.80 \$	2.67 \$ 591.52 \$	22,777.95 \$	187.20 \$	104.13 \$	23.069.28 \$ 643.05 \$ 8.21 \$ 2.93 \$ 654.19 \$	25.078.95 \$	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X76	-	101 AC 19937/ SALA 14/10, 74		0.00 6 407.00 6	20.020.04	1015.05	440.07		AT 477 00 4	4 700 00 0	101.10	00.004.04 (PTD) V 0000 400.000
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 109.77 26.08 183	163 051223753940 9416X/6	E5 300 0.009 L.P. 5 129.38 5 5.55 5	2.29 8 13/.22 8	23,676.54 3	1,015.65 \$	419.07 5	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.38 \$	26,137.89 8	1,762.29 8	461.16 8	28,361.34 510 Tear 2009 100-102
W-Wide Flange: W21X122: 4 0.640972222	78 71.83 17.82 78	78 051223754780 W21x182	E5 1000 0.08 L.F. \$ 310.35 \$ 5.00 \$	2.07 \$ 317.42 \$	24,207.30 \$	390.00 \$ 20.017.09 \$	161.46 \$ 9.465.44 \$	24,758.76 \$ 341.24 \$ 8.64 \$ 2.27 \$ 352.15 \$	26,616.72 \$ 326,922.08 \$	673.92 \$ 34.478.20 \$	177.06 \$ 10.417.11 \$	27,467.70 STD Year 2009 100-102
13	497762 427769 407.24	1 U CAR							320,322.00			37 1,0 11 Ma
Concrete-Rectangular Beam: 36x30	60 60 371 88	60 033105350412 Coverate Destanced or	eam: 36"x30" L.F. Is at the le	. \$ 62.26 s	3 735 60 5	, Is		3735.60 \$ 68.61 \$, \$. \$. \$	4 116 60 8			4 116 60 STD Year 2009 100.401
HSS-Hollow Structural Section1: HSS402201/8		to ce la construction la construction de la constru	6 ² 6 02.20 6 100			- 0	- 0			- 0		
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	13.56 9.89 0.09	13.56 051223750360 HSS4x2x1/6	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 S	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 172.33 7.74	193.49 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.93 1.18 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 S	168.61 S	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 S	518.47 S	185.47 S	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.064 LF. 5 27.43 5 3.92 5	2 18 5 33 53 5	1.800.23 \$	257.27 \$	143.07 5	2 200 57 5 30 02 5 6 71 5 2 40 5 39 13 5	1.970.21 \$	440.38 \$	157.51 \$	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19	0000 0000 2000 000											
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 S	10.296.27 \$ 36.66 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 992.91 43.87 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.62 5.2 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1		26.33 051223752380 W/14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4.050.61 \$	122.96 \$	68.19 \$	4 251 77 \$ 168 71 \$ 8.00 \$ 2.85 \$ 179 56 \$	4.442.13 \$	210.64 \$	75.04 S	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2												
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.06 7.93 38	37.67 051223752500 W/14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1406.32 99.39 1.445	1444 74 051223753300 W18x35	E5 950 0.083 LF. \$ 60.03 \$ 6.20 \$	2 15 5 67 38 5	86 727 74 5	7.512.65 \$	3 106 19 5	97 346 68 5 66 72 5 8 99 5 2 37 5 77 68 5	94.948.31 \$	12 988 21 \$	3 424 03 \$	111 360 66 STD Year 2009 100-102
W-Wide Flange1: W18X40	1000132 33033 1,000					1,012.00				12,000.21	5,424.05	
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 321.06 25.94 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 S	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 213.33 21.43 219	219 051223754300 W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720 W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 S	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W14X342 W-Wide Flange: W14X342: 2	39 35.76 24.92 39	39 051223752500 W14x342	E2 720 0.078 L.F. \$ 584.05 \$ 4.80 \$	2.67 \$ 591.52 \$	22.777.95 S	187.20 \$	104.13 S	23,069,28 \$ 643,05 \$ 8,21 \$ 2,93 \$ 654,19 \$	25.078.95 \$	320.19 \$	114.27 \$	25.513.41 STD Year 2009 100-102
W-Wide Flange: W18X97												
W-Wide Flange: W18X97: 2 W-Wide Flange: W18X119	61 56.59 11.15 61	61 051223753940 W18x97	E5 900 0.089 L.F. \$ 165.13 \$ 5.55 \$	2.29 \$ 172.97 \$	10,072.93 \$	338.55 \$	139.69 \$	10,551.17 \$ 182.29 \$ 9.63 \$ 2.52 \$ 194.44 \$	11,119.69 \$	587.43 \$	153.72 \$	11,860.84 STD Year 2009 100-102
W-Wide Flange: W18X119: 4	122 113.4 27.57 122	122 051223753980 W18x119	E5 900 0.089 L.F. \$ 203.34 \$ 5.55 \$	2.29 \$ 211.18 \$	24,807.48 \$	677.10 S	279.38 \$	25,763.96 \$ 223.09 \$ 9.63 \$ 2.52 \$ 235.24 \$	27,216.98 \$	1,174.86 \$	307.44 \$	28,699.28 STD Year 2009 100-102
W-Wide Flange: W21X122: 4	78 71.93 17.85 78	78 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	16,227.12 \$	390.00 S	161.46 S	16,778.58 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	17,841.72 \$	673.92 \$	177.06 S	18,692.70 STD Year 2009 100-102
0.682638889	4372.88 4179.51 695.97	Total		\$	301,084.24 \$	20,014.90 \$	9,464.21 \$	330,563.36 \$	330,404.54 \$	34,474.44 S	10,415.77 \$	375,294.77
Concrete-Rectangular Beam: 36x30												
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS4X2X1/8	60 60 371.88	60 033105360412 Concrete Rectangular B	leam: 36'x30" L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.64 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.93 1.18 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1.079.62 \$	302.97 \$	168.61 \$	1 551 19 5 22 77 5 9 84 5 3 52 5 36 13 5	1.199.75 \$	518.47 S	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16												
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 65	65.63 051223751100 W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 5	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 5	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,785.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 993.56 43.89 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51.310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 60.62 5.2 71	71.21 051223752320 W14x43	E2 810 0.059 LF. S 73.49 S 4.26 S	2.37 \$ 80.12 \$	5.233.22 S	303.35 \$	168.77 S	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 S	519.12 S	185.15 \$	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2												
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.18 3.98 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 S	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 5	75.04 \$	4,727.81 S1D Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W10X20 W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 S	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31.4	151.10 146.06 0.12	151.19 051223752900 0016-231	E2 900 0.0621 E e 6576 e 564 #	2 13 5 68 76 5	7 981 32 6	680.67 s	322.03 E	1 AP 75 3 3 C 6 3 3 3 3 8 43 3 2 60 688 8	8 841 65 6	001 01 e	366.35	10 108 69 STD Y+++ 2009 100.102
W-Wide Flange1: W18X35	231.12 240.00 7.12 131	101110 001060106000 11110601	tue ever v.V92[t,F; 3 52.13 3 3.84 5	2.13 0 00.70 3	1,201.22 3	000.51 a	SEE.03 3	www.ac.ac. e 20.40 e 0.50 e 2.55 e 01.59 e	0,0+1.07 3	221.01 3	335.34 3	
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1406.32 99.39 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 321.06 25.94 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.33 21.43 219	219 051223754300 W/21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22.878.93 STD Year 2009 100-102
W-Wide Flange: W10X26	40 17 37 40 4 67	40.17 05122750720 14140-25	E2 500 0.0021 E # 1111 # 515	3 20 8 62 40 8	1 707 07 0	210 64 6	120 / 4	2147.40 8 40.65 8 0.44 8 40.0 8 40.44	1064.07	307.07		2 400 04 STD V+++ 0000 400 400
W-Wide Flange: W18X97	940.17 37/49 1.97 40	THE IS DECIDENT OF THE PARTY OF	Lee 000 0.000 L.F. 3 44.51 3 5.75 \$	3.6V 0 53.40 0	1,101.31 \$	230.30 3	120.04 3	40,00 0 3,04 0 3,52 0 52,01 0	1,304.27 3	335.21 3	141.40 5	2,400.04 010 1108 2007 100-102
W-Wide Flange: W18X97: 2 W-Wide Flange: W18X119	61 56.59 11.15 61	61 051223753940 W18x97	E5 900 0.089 L.F. \$ 165.13 \$ 5.55 \$	2.29 \$ 172.97 \$	10,072.93 \$	338.55 \$	139.69 S	10.551.17 \$ 182.29 \$ 9.63 \$ 2.52 \$ 194.44 \$	11,119.69 \$	587.43 \$	153.72 \$	11,860.84 STD Year 2009 100-102
W-Wide Flange: W18X119: 4	122 113.4 27.57 122	122 051223753980 W18x119	E5 900 0.089 L.F. \$ 203.34 \$ 5.55 \$	2.29 \$ 211.18 \$	24,807.48 \$	677.10 \$	279.38 \$	25.763.96 \$ 223.09 \$ 9.63 \$ 2.52 \$ 235.24 \$	27,216.98 \$	1,174.86 \$	307.44 \$	28,699.28 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 4	78 71.93 17.85 78	78 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	16,227.12 \$	390.00 S	161.46 S	16,778.58 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	17,841.72 \$	673.92 \$	177.06 \$	18,692.70 STD Year 2009 100-102
W-Wide Flange: W21X182	70 10 10 10 10 10 10 10 10 10 10 10 10 10	90 015000714700			10.100.00							
w-wide Hange: W21X182: 2 0.724305556	39 35.70 13.26 39 4373.22 4180.54 684.28	39 051223754700 WV21X182 Total	ED 1000 0.08 LP. \$ 310.35 \$ 5.00 \$	2.07 5 317.42 5	290,356.66 \$	20,024.89 \$	9,442.04 \$	14,379,38 \$ 341,24 \$ 8,64 \$ 2,27 \$ 352,15 \$ 319,823,60 \$	318,575.27 \$	336.96 S 34,494.97 S	10,391.37 \$	363,461.64

15														
Concrete-Rectangular Beam: 36x30			00 000105050440	County Destant in Dest										1 510 50 OTD View 0000 100 104
Concrete Rectanguiar Beam: 30x30: 6 HSS-Hollow Structural Section1: HSS4X2X1/8	60	60 371.88	60 033105350412	Concrece Rectangular beam: 5	0 X30 C.F. 3 62.26 5 - 5	· 5 62.26 5	3,735.60 8	. 5	. 5	3,735.60 5 68.61 5 - 5 - 5 68.61 5	4,116.60 5	. 5	. 5	4,116.60 510 1487 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42	11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98	170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
HSS-Hollow Structural Section: HSSSXSX/8 HSS-Hollow Structural Section: HSSSXSX/8: 28	247.29	225.3 10.12	247.29 051223750360	HSS5x5x3/8	E2 550 0.102 L.F. \$ 42.58 \$ 6.27 \$	3.49 \$ 52.34 \$	10,529.61 \$	1,550.51 \$	863.04 \$	12,943.16 \$ 46.89 \$ 10.76 \$ 3.83 \$ 61.48 \$	11,595.43 \$	2,660.84 \$	947.12 \$	15,203.39 STD Year 2009 100-102
HSS-Hollow Structural Section: HSS12X12X5/8 HSS-Hollow Structural Section: HSS12X12X5/8: 16	241.95	228.7 42.22	241.95 051223750360	HSS12x12x5/8	E2 550 0.102 L.F. \$ 408.80 \$ 6.27 \$	3.49 \$ 418.56 \$	98,909.16 \$	1,517.03 \$	844.41 \$	101,270,59 \$ 450,20 \$ 10,76 \$ 3,83 \$ 464,79 \$	108,925.89 \$	2,603.38 \$	926.67 \$	112,455.94 STD Year 2009 100-102
W-Wide Flange1: W10X12	53.60		£2.59 051222760600	W40-42	E2 E00 0.0021 E E 20.40 E E 75 E	202 6 2044 6	1.070.62	202.07 6	100.00	1//1.10 0 00.77 0 0.04 0 0.00 0 0.00 0	1 100 76 8	610.67 8	106.47	1 003 00 STD Vast 2009 100 102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.09	46.93 1.16 53	02.00 001223100000	TT INA IS	L2 000 0.000 L7. a 20.49 a 5.15 a	3.20 0 22.44 0	1,013.02 3	502.51 8	100.01	1,551.17 9 22.77 9 3.04 9 3.52 9 30.13 9	1,133.75	510.47 3	100.47 0	1,503.65 510 14812007 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63	63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 16	172.09	162.7 6.23 172	172.09 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	5,604.97 \$	674.59 \$	375.16 \$	6,654.72 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	6,135.01 \$	1,154.72 \$	413.02 \$	7,702.75 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 15	468.62	452.63 20 469	468.62 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	20,858.26 S	1,630.80 S	909.12 S	23,398.20 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	22,798.36 \$	2,792.98 \$	998.16 S	26,589.50 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 3	13.08	11.12 0.95 13	13.08 051223752320	W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	961.25 \$	55.72 \$	31.00 S	1.047.97 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	1,055.95 \$	95.35 \$	34.01 S	1,185.31 STD Year 2009 100-102
W-Wide Flange1: W14X82 2			06 00 00 00 00 00 00 00 00 00 00 00 00 0	1441-02	E2 740 0.076 E & 464.00 & 4.67 &		1444.41	100.64	(3.16 A			212.64	76.64	4 303 84 CTD View 9308 460 460
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	20.55	24.18 5.98 26	20.33 051223152300	VY HX02	EZ 740 0.070 C.F. 3 154.22 3 4.67 3	2.59 3 161.48 3	4,060.61 5	122.95 3	66.19 3	4,251.77 3 166.71 3 6.00 3 2.65 3 179.56 3	4,442.13 3	210.64 5	75.04 3	4,727.81 510 1487.2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67	36.06 7.93 38	37.67 051223752500	W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63	63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 S	126.01 S	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19	146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10.188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 10	340	327.58 23.15 340	340 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	20.410.20 S	1.768.00 \$	731.00 S	22,909,20 \$ 65,72 \$ 8,99 \$ 2,37 \$ 77,08 \$	22.344.80 \$	3.056.60 \$	805.80 \$	26.207.20 STD Year 2009 100-102
W-Wide Flange1: W18X40														
W-Wide Flange1: W18X40: 1 W-Wide Flange1: W21X50	37.68	35.53 2.87 38	37.66 051223753500	VY15X40	E5 960 0.083 L.P. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	2,573.92 \$	195.94 \$	81.01 5	2,850.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	2,827.51 \$	338.74 \$	89.30 \$	3,255.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W12X19	219	116.17 11.67 219	219 051223754300	W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W12X19: 10	47.08	40.7 1.56 47	47.08 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	1,533.40 \$	184.55 \$	102.63 \$	1,820.58 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	1,678.40 \$	315.91 \$	112.99 \$	2,107.30 STD Year 2009 100-102
W-Wide Flange: W14X22 W-Wide Flange: W14X22: 5	150	146.25 6.46 150	150 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	6,676.50 \$	522.00 S	291.00 \$	7,489.50 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	7,297.50 \$	894.00 S	319.50 \$	8.511.00 STD Year 2009 100-102
W-Wide Flange: W14X43 W-Wide Flange: W14X43: S	22.5		22.5 051223752320	W14x43	E2 810 0.059 LF. 5 73.49 5 4.26 5	2.37 5 80.12 5	1.653.53 \$	95.85 \$	53.33 \$	180270 5 8073 5 7 29 5 2 60 5 90 62 5	1.816.43 \$	164.03 S	58.50 \$	2 038 95 STD Year 2009 100-102
W-Wide Flange: W18X46			610 T7 0100070700	10140-12		0.6 0 00.00	10.0000	2.247	100100		100000			
W-Wide Flange: W18X46: 16 W-Wide Flange: W18X76	642.77	622.6 57.97 643	642.77 051223753520	W18x46	E5 3950 0.083 L.F. \$ 78.66 \$ 5.20 \$	2.15 \$ 86.01 \$	50,560.29 S	3,342.40 \$	1,381.96 \$	55,204.65 \$ 86.42 \$ 8.99 \$ 2.37 \$ 97.78 \$	55,548.18 \$	5,778.50 \$	1,523.36 \$	62,850.05 STD Year 2009 100-102
W-Wide Flange: W18X76: 8 W-Wide Flange: W21X50	241	225.13 34.59 241	241 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	31,180.58 \$	1,337.55 \$	551.89 \$	33,070.02 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	34,422.03 \$	2,320.83 \$	607.32 \$	37,350.18 STD Year 2009 100-102
W-Wide Flange: W21X50: 7	220	182.96 18.38 220	220 051223754300	W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,785.80 \$	1,034.00 \$	426.80 \$	20,245.60 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,721.80 \$	1,790.80 \$	470.80 \$	22,983.40 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 4	78	71.93 17.85 78	78 051223754780	W21x122	E5 1000 0.08 L.F. S 208.04 S 5.00 S	2.07 \$ 215.11 \$	16,227.12 \$	390.00 S	161.46 S	16,778.58 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	17,841.72 \$	673.92 \$	177.05 \$	18,692.70 STD Year 2009 100-102
W-Wide Flange: W21X182 W-Wide Flange: W21X182: 2	39		39 051223754780	W21x182	E5 1000 0.08LF. \$ 310.35 \$ 5.00 \$	2.07 5 317.42 5	12.103.65 \$	195.00 \$	80.73 5	12 379 38 5 341 24 5 8 64 5 2 27 5 352 15 5	13.308.36 \$	336.96 \$	88.53 \$	13.733.85 STD Year 2009 100-102
0.764583333	3846.6	3528.37 676.12	Total			5	354,485.10 \$	18,495.30 \$	8,961.72 S	381,942.11 \$	389,927.68 \$	31,849.63 \$	9,857.97 \$	431,635.28
16 Concrete-Rectangular Beam; 36x30														
Concrete-Rectangular Beam: 36x30: 6	60	60 371.88	60 033105350412	Concrete Rectangular Beam: 3	6"x30" L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42	11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98	170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8.642.94 \$	2,065.70 S	735.28 \$	11,443,93 STD Year 2009 100-102
W-Wide Flange1: W10X12	53.60		£2.50 054222750500	WH0-42	E2 500 0.0021 E # 20.40 # 5.75 #	202 6 2044 6	1070 62	202.67	100.01	1//1.16 P 00.77 P 0.04 P 3/0 P 3/19 P	1 100 77 1	610.17 0	101 17 0	1 002 00 0TD Value 2000 100 102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.09	48.97 1.18 53	52.69 051223750900	WTWATZ	E2 000 0.003 C.P. 5 20.49 5 5.75 5	3.20 5 29.44 5	1,079.62 5	302.97 \$	160.61 3	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 3	518.47 \$	165.47 3	1,903.69 510 Tear 2009 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63	63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26	246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.054 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1028.14	994.33 43.93 1,028	1028.14 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,762.51 \$	3,577.93 \$	1,994.59 \$	51,335.03 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	50,019.01 \$	6,127.71 S	2,189.94 \$	58,336.66 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21	60.93 5.23 71	71.21 051223752320	W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2			26 22 064222762390	WH4.02	E2 740 0.0251 E # 454.22 # 4.67 #	250 5 151 10 5	1000.01	100.05	C2.10 E	1.521.77 8 150.71 8 0.50 8 5.05 8 170.58 8	440.00	210.64	71.01	4 297 84 STD Vass 2008 100 102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.55	24.22 3.99 26	20.33 051223152300	VY 14X02	E2 740 0.070 C.P. 5 154.22 5 4.67 5	2.59 8 161.48 8	4,060.61 5	122.96 8	66.19 5	4,251.77 5 168.71 5 8.00 5 2.85 5 179.56 5	4,442.13 5	210.64 5	75.04 5	4,727.81 510 1487.2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67	36.06 7.93 38	37.67 051223752500	W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63	63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19	146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 S	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74	1406.8 99.42 1.445	1444.74 051223753300	W18x35	E5 960 0.083 L.F. 5 60.03 5 5.20 5	2.15 \$ 67.38 \$	86.727.74 S	7.512.65 \$	3.105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94.948.31 \$	12.988.21 \$	3.424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40			227.68 00422276260	1//10-/10				17/641	205.04					05 434 55 0TD View 0000 400 400
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68	521.52 25.96 358	331.00 051223153500	VY10X40	E5 980 0.003 C.F. 5 68.31 5 5.20 5	2.15 8 /5.66 8	23,096.92 3	1,755.94 3	726.01 5	25,548.87 \$ 15.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 3	3,035.74 5	800.30 5	29,175.55 510 148F2009 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219	213.38 21.44 219	219 051223754300	W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17	37.49 1.97 40	40.17 051223750720	W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183	170.2 26.15 183	183 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28.361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117		117 051223754780	W21x122	E5 1000 0.08 L.F. S 208.04 S 5.00 S	2.07 \$ 215.11 \$	24.340.68 S	585.00 \$	242.19 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26.762.58 \$	1.010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102
0.807638889	4373.72	4182.95 667.52	Total			s	275,184.51 \$	20,026.60 \$	9,442.99 \$	304,654.11 \$	302,012.83 \$	34,497.89 \$	10,392.42 \$	346,903.16
17 Concrete-Rectangular Beam; 36x30														
Concrete-Rectangular Beam: 36x30: 6	60	60 371.88	60 033105350412	Concrete Rectangular Beam: 3	65x30" L.F. \$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS482X1/8 HSS-Hollow Structural Section1: HSS482X1/8:8	15.42	11.76 0.11	15.42 051223750360	H\$\$4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 S	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 S	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98	170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. 5 40.88 5 6.27 5	3.49 \$ 50.64 \$	7.848.14 \$	1.203.71 \$	670.01 S	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8.642.94 \$	2.065.70 S	735.28 \$	11.443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12	53.69		50.50 051000750500	1440-42		2.00 6 .00 44 6	1 070 62	212.67			1 10 27 4	(10.17) 6	101.17	1 003 00 CTD View 2005 100 102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.09	48.97 1.18 55	52.69 051225750900	WY IVX IZ	E2 000 0.033 C.F. 3 20.49 3 5.15 3	3.20 8 29.44 8	1,079.62 5	342.91 3	160.61 3	1,551.19 \$ 22.17 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,133.75 3	518.47 3	105.47 3	1,903.69 510 1481 2009 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63	63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26	246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65	993.83 43.91 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 S	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21	60.93 5.23 71	71.21 051223752320	W14x43	E2 810 0.059 L.F. 5 73.49 5 4.26 5	2.37 5 80.12 5	5 233 22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 \$	519.12 \$	185.15 \$	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2	71.61						0,000.00				0,140,10	010.12	100.10	
w-wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33	24.22 3.99 26	20.33 051223752380	vv14x8Z	EZ 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 3 168.71 5 8.00 5 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 (510) Year 2009 (100-102)
W-Wide Flange1: W14X109 2: 1	37.67	36.06 7.93 38	37.67 051223752500	W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63	63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19	146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 16	1444.74	1405 8 99.42	1444 74 051223753305	W18x35	E6 950 0.000 E 5 50.0 5 500 F	2 15 5 67 30 6	86 727 74 C	7 512 55 6	3 105 10 6	97 345 58 5 55 77 5 8 66 5 3 77 5 77 6 F	Q1 Q19 34 6	12 989 04 6	3.424.03 6	111 360 56 STD Vary 2009 100-102
W-Wide Flange1: W18X40	1444.74	1,445	051223753300	11 103.32	Lo 200 0.003 LF. \$ 60.03 \$ 5.20 \$	2.10 0 0/.38 0	00,121.14 \$	1,012.65 \$	3,109.19 3	er.,	24,246,31 \$	14,300.21 \$	3,424,03 \$	111,300,30 [010] [10812003 [100-102]
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68	321.32 25.96 338	337.68 051223753500	W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219	213.38 21.44 219	219 051223754300	W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 S	20.154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17	37.49 1.97 40	40.17 051223750720	W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2.147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1.954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183	- 170.2 26.15 183	183 051223753940	W18x76	E5 900 0.039 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111,26 \$ 142,83 \$ 9,63 \$ 2,52 \$ 154,98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122		107.06 36.78	117 0640002764785	W21v122		2.07 6.045.44 6	24 240 50 6	595 AD 8	949 46 6	05 167 07 6 010 74 6 8 4 4 0 17 6 010 4	26 762 54 5	1.010.00 0	955 50 8	20.030.05 STD V 20.05 140.142
W-WIGE FRIERE: WEINLES: 0 0.849305556	4373.22	4182.45 667.5	Total	112 13 122	Lo 1000 0.00[LT. \$ 205.04 \$ 5.00 \$	2.07 3 215.11 3	275,162.70 \$	20,024.89 \$	9,442.04 \$	239.65 \$	301,988.99 \$	34,494.97 \$	10,391.37 \$	346,875.36

18													
Concrete-Rectangular Beam: 36x30													
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS4X2X1/8	60 60 371.88	60 033105350412 Con	crete Rectangular Beam: 36'x30"	L.F. \$ 62.26 \$ -	\$ - \$ 62.26 \$	3,735.60 \$	- 5	- S	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- 5	- 5	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS	4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.	27 \$ 3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360 HSS	6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.	27 \$ 3.49 \$ 50.64 \$	7,848.14 S	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.97 1.18 53	52.69 051223750600 W10	x12 E2	600 0.093 L.F. \$ 20.49 \$ 5.	75 \$ 3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 S	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 S	185.47 S	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 1	65.63 61.26 2.04 66	65.63 051223751100 W12	X16 E2	880 0.054 L.F. S 27.43 S 3	92 \$ 2.18 \$ 33.53 \$	1.800.23 \$	257.27 \$	143.07 S	2 200 57 5 30 02 5 6 71 5 2 40 5 39 13 5	1.970.21 S	440.38 S	157.51 S	2.568.10 STD Vear 2009 100-102
W-Wide Flange1: W12X19			L40 E0	000 0.004 5 4 00.47 4 0				(m) (f			1 344 04		44 643 66 CTD Mass 2005 400 600
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	200.20 240.55 9.44 200	206.20 051223751100 0412	X17 C2	000 0.004 L.P. 5 32.57 5 3.	92 3 2.16 3 38.67 3	8,672.09 5	1,043.74 5	580.45 3	10,296.27 5 35.65 5 6.71 5 2.40 5 44.76 5	9,492.17 5	1,785.60 3	639.02 5	11,917.80 510 Tear 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 993.83 43.91 1.028	1027.65 051223751900 W14	E2	990 0.057 L.F. \$ 44.51 \$ 3.	48 \$ 1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51.310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.93 5.23 71	71.21 051223752320 W14	1x43 E2	810 0.069 L.F. \$ 73.49 \$ 4.	26 \$ 2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2: 1	26.33 24.22 3.99 26	26.33 051223752380 W14	1x82 E2	740 0.076 L.F. S 154.22 S 4.	57 \$ 2.59 \$ 161.48 \$	4,060.61 S	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500 W14	1x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.	80 \$ 2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499,48 \$	309.27 \$	110.37 \$	8,919,13 STD Year 2009 100-102
W-Wide Flange1: W16X26		65.63 051223752700 W46	v26 F2	1000 0.0551 F S 44.61 S 3	2 01 01 2 201 2 34	2 021 10 6	227.08 5	126.01 5	3 274 28 6 48 45 6 6 6 7 7 2 12 6 66 47 6	3 192 00 6	387.22 6	110 14 5	3 719 25 STD Veer 2009 100-102
W-Wide Flange1: W16X31		00.00 001020102100				2,021.10	227.00	120.01	0,214.20 0 40.00 0 0.00 0 2.12 0 50.01 0	5,122.50	501.22	133.14	5,115.25 075 746 2405 747 748
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900 Write	0031 EZ	900 0.062 L.F. \$ 52.79 \$ 3.	54 \$ 2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1406.8 99.42 1,445	1444.74 051223753300 W18	b/35 E5	950 0.083 L.F. \$ 60.03 \$ 5.	20 \$ 2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 321.32 25.96 338	337.68 051223753500 W18	5x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.	20 \$ 2.15 \$ 75.66 \$	23,066.92 S	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 S	800.30 S	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.38 21.44 219	219 051223754300 W21	1x50 E5	1054 0.075 L.F. \$ 85.39 \$ 4.	70 \$ 1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20.154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720 W10	x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.	75 \$ 3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 S	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183 120 2 26 15 183	183 051223753940 W18	N76 E5	900 0.089 LF 5 129 38 5 5	55 5 2 29 5 137 22 5	23.676.54 \$	1.015.65 5	419.07 5	25 111 26 5 142 83 5 9 63 5 2 52 5 154 98 5	26 137 89 5	1 752 29 5	451.15 5	28 361 34 STD Year 2009 100-102
W-Wide Flange: W21X122		117 0E19327E4700 M/24	1490 E6	1000 0.001 5 5 200 04 5 6		21 210 52	101.00	212.12		01 200 (P	1010.00	2011 00 0	28 434 45 CTD Vass 2009 100 102
0.890972222	4373.22 4182.45 667.5	Total	14122 EV	1000 0.00 L11 0 200.04 0 0.	v a 2.07 a 215.11 a	275,162.70 \$	20,024.89 \$	9,442.04 \$	304,629.64 S	301,988.99 \$	34,494.97 \$	10,391.37 \$	346,875.36
19 Concrete-Rectangular Beam; 36x30													
Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412 Con	crete Rectangular Beam: 36"x30"	L.F. \$ 62.26 \$	\$ · \$ 62.26 \$	3,735.60 \$	· \$	· \$	3.735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	· \$	- S	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4XCX1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	13.56 9.89 0.09	13.56 051223750360 HSS	4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.	27 \$ 3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 172.33 7.74	193.49 051223750360 HSS	6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.	27 \$ 3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 48.99 1.18 53	52.69 051223750600 W10	x12 E2	600 0.093 L.F. S 20.49 S 5	75 \$ 3.20 \$ 29.44 \$	1.079.62 \$	302 97 S	168.61 \$	1 551 19 5 22 77 5 9 84 5 3 52 5 36 13 5	1.199.75 \$	518.47 S	185.47 S	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16		66.63 061933761100 W413			0 6 0 6 0 70 6	4 000 00 6	017.07	443.07		1070.01 5	440.30	117.14	2 550 40 ETD Var 2008 100 100
W-Wide Flange1: W12X19	0.03 0.20 2.04 00	0.00 0.000			2.10 0 33.03 0	1,000.23	20121 9	143,07	2.200.07 0 30.02 0 0.71 0 2.00 0 30.13 0	1,070,21		101.01	2,000,10 010 14912000 1001102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	206.20 246.33 9.44 256	206.26 051223751100 0412	X19 E2	880 0.094 L.P. 5 32.57 5 3.	32 5 2.18 5 38.67 5	8,672.09 \$	1,043.74 5	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 3	1,786.60 \$	639.02 \$	11,917.80 [S1D] Tear 2009 100-102
W-Wide Flange1: W140(22: 33 W-Wide Flange1: W140(43	1027.65 993.95 43.91 1,028	1027.65 051223751900 W14	IX22 E2	990 0.057 L.F. \$ 44.51 \$ 3.	48 \$ 1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82.2	71.21 60.98 5.23 71	71.21 051223752320 W14	ix43 E2	810 0.069 L.F. \$ 73.49 \$ 4.	26 \$ 2.37 \$ 80.12 \$	5.233.22 \$	303.35 \$	168.77 S	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1	26.33 24.24 3.99 26	26.33 051223752380 W14	1×82 E2	740 0.076 L.F. \$ 154.22 \$ 4.	67 \$ 2.59 \$ 161.48 \$	4,060.61 S	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500 W14	1x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.	80 \$ 2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700 W16	x26 E2	1000 0.056 L.F. \$ 44.51 \$ 3.	46 \$ 1.92 \$ 49.89 \$	2,921.19 \$	227.08 S	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3.192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31 4	-	151 19 051223752900 W/16	5/31 E2	900 0.062 F 5 52.79 5 3	24 5 2 13 5 58 76 5	7 981 32 5	580 57 S	322.03 \$	2 27 5 3 3 5 5 3 3 3 3 9 14 24 3 2 6 5 5 8 2 9	8 841 59 \$	991.81 \$	365.30 \$	10 188 69 STD Year 2009 100-102
W-Wide Flange1: W18X35						1,001.00				0.001.00			
W-Wide Flange1: W18X15: 36 W-Wide Flange1: W18X40	1444.74 1406.88 99.43 1,445	1444.74 051223753300 Write	835 E5	960 0.083 L.P. \$ 60.03 \$ 5.	20 \$ 2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 5	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.05 \$	94,948.31 5	12,988.21 \$	3,424.03 \$	111,360.56 SID Tear 2009 100-102
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 321.33 25.96 338	337.68 051223753500 W18	3x40 E5	960 0.083 L.F. \$ 68.31 \$ 5.	20 \$ 2.15 \$ 75.66 \$	23,056.92 \$	1,755.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 213.4 21.44 219	219 051223754300 W21	1x50 E5	1064 0.075 L.F. \$ 85.39 \$ 4.	70 \$ 1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.17 37.49 1.97 40	40.17 051223750720 W10	0x26 E2	600 0.093 L.F. \$ 44.51 \$ 5.	75 \$ 3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 \$	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183 170.43 26.18 183	183 051223753940 W18	x76 E5	900 0.089 L.F. \$ 129.38 \$ 5.	55 \$ 2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 \$	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 S	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6		117 051223754780 W/21	x122 E5	1000 0.08 L.F. \$ 208.04 \$ 5.	00 \$ 2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
0.932638889	4372.88 4182.86 667.66	Total			\$	275,215.98 \$	20,022.70 \$	9,440.81 \$	304,679.50 \$	302,047.67 \$	34,491.21 \$	10,390.03 \$	346,928.93
Concrete-Rectangular Beam: 36x30													
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS4022X1/8	60 60 371.88	60 033105350412 Con	crete Rectangular Beam: 36"x30"	L.F. \$ 62.26 \$ -	\$ - \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6XX23/8	15.42 11.76 0.11	15.42 051223750360 HSS	4x2x1/8 E2	550 0.102 L.F. \$ 4.54 \$ 6.	27 \$ 3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360 HSS	6x4x3/8 E2	550 0.102 L.F. \$ 40.88 \$ 6.	27 \$ 3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 48.99 1.18 53	52.69 051223750600 W10	x12 E2	600 0.093 L.F. \$ 20.49 \$ 5.	75 \$ 3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12	bx16 E2	880 0.054 L.F. \$ 27.43 \$ 3.	92 \$ 2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12	x19 E2	880 0.054 L.F. \$ 32.57 \$ 3.	92 5 2.18 5 38.67 5	8.672.09 S	1.043.74 \$	580.45 S	10.296.27 S 35.65 S 6.71 S 2.40 S 44.76 S	9.492.17 \$	1.786.60 \$	639.02 S	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22	1027.65 003.05 43.04 1.025	1027.65 051223751400 W44	v22 E2	940 0.0571 F S 44.61 S 3	2 00 01 2 10 1 2 01	46 740 70 5	3.676.22 6	1 003 64 5	61 310 62 C 40 62 C 6 6 6 C 2 13 C 62 6 7 C	40.00E 17 E	6 124 79 6	2 100 00 5	68 308 85 STD Veer 2009 100-102
W-Wide Flange1: W14X43	1023.03 995.93 43.91 1,020					45,740.70	5,516.22	1,555.04		45,555.17	0,124.75	2,100.05	
W-Wide Flange1: W14043: 16 W-Wide Flange1: W140482.2	71.21 60.98 5.23 71	71.21 051223752320 W14	EZ	810 0.069 L.F. \$ 73.49 \$ 4.	26 \$ 2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.24 3.99 26	26.33 051223752380 W14	Ix82 E2	740 0.076 L.F. \$ 154.22 \$ 4.	57 \$ 2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.06 7.93 38	37.67 051223752500 W14	1x109 E2	720 0.078 L.F. \$ 204.93 \$ 4.	80 \$ 2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 W16	5x26 E2	1000 0.056 L.F. \$ 44.51 \$ 3.	46 \$ 1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900 W16	ix31 E2	900 0.062 L.F. \$ 52.79 \$ 3.	84 \$ 2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300 W18	x35 E5	960 0.083 L.F. \$ 60.03 \$ 5.	20 \$ 2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 321.33 25.96 338	337.68 051223753500 W18	8x40 E5	960 0.083 L.F. \$ 68.31 \$ 4	20 \$ 2.15 \$ 75.66 \$	23,066.92 S	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25.339.51 \$	3.035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7		219 051223764300	x50 F.C.	1054 0.075 LF. C. 85.30 C.4	70 \$ 194 \$ 92.03 €	18 700 41 5	1 029 30 5	424.86 5	20 154 57 5 94 19 5 8 14 5 2 14 5 104 47 5	20.627.61 \$	1782.66	458.55 5	22 878 93 STD Year 2009 100.102
W-Wide Flange: W10X26				000 0.000 E 4 000.00 8 4	1.04 0 32.00 0	10,700.41 a	1,023.30 0	424.00 0	Autoria a contra a contra a contra a contra a contra a	4.051.01	1,102.00 3	+00.00 a	
W-Wroe Hange: W10X26: 4 W-Wide Flange: W18X76	40.17 37.49 1.97 40	40.17 U51223750720 W10	EZ EZ	000 0.033 L.P. \$ 44.51 \$ 5.	ro a 3.20 \$ 53.46 \$	1,/87.97 \$	230,98 \$	128.54 \$	2.14/.49 3 48.80 3 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 \$	2,430,34 [S1D] [Year 2009 [100-102]
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 170.43 26.18 183	183 051223753940 W18	5x76 E5	900 0.089 L.F. \$ 129.38 \$ 5.	55 \$ 2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6 0.974305556	117 108.19 26.84 117 4373.22 4184.53 667.7	117 051223754780 W21 Total	1x122 E5	1000 0.08 L.F. \$ 208.04 \$ 5.	00 \$ 2.07 \$ 215.11 \$	24,340.68 \$ 275,162.70 \$	585.00 \$ 20,024.89 \$	242.19 \$ 9,442.04 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$ 304.629.64 \$	26,762.58 \$ 301,988.99 \$	1,010.88 \$ 34,494.97 \$	265.59 \$ 10,391.37 \$	28.039.05 STD Year 2009 100-102 346.875.36

21														
Concrete-Rectangular Beam: 36x30														
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS4X2X1/8	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F. S	62.26 \$ - \$	- \$ 62.26 \$	3,735.60 S	· \$. S	3.735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	· \$	- S	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$	4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360	HS56x4x3/8 E2	550 0.102 L.F. \$	40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7.848.14 S	1.203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8.642.94 \$	2.065.70 \$	735.28 \$	11.443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12	-	(2.02	U00.13 E3	600 0.000 E	00.40 4 4.77 4	200 6 0044 6	4 470 50 5	200.07	100.01		4 400 37 4	C10.17 C	100 17 0	4 000 CD (CTD) View 2000 100 100
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.09 48.99 1.18 53	52.63 051223750900	W1W02 E2	000 0.035 C.P. 3	20.43 5 5.75 5	3.20 8 23.44 8	1,079.62 5	392.97 \$	100.01 3	1,551.19 5 22.77 5 9.64 5 3.52 5 36.13 5	1,123./5	510.47 a	100.47 3	1,903.69 510 1488 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. \$	27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.054 L.F. \$	32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 S	1,043.74 S	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 993.95 43.91 1.028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. S	44.51 \$ 3.48 \$	1.94 5 49.93 5	45.740.70 \$	3.576.22 \$	1.993.64 5	51 310 56 5 48 65 5 5 96 5 2 13 5 56 74 5	49.995.17 \$	6.124.79 5	2.188.89 5	58 308 86 STD Year 2009 100-102
W-Wide Flange1: W14X43														
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82 2	71.21 60.98 5.23 71	71.21 051223752320	W14x43 E2	810 0.069 L.F. S	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 S	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2: 1	26.33 24.24 3.99 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. S	154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$	204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700	W16x26 E2	1000 0.056L.F. S	44.51 \$ 3.46 \$	192 5 49 89 5	2 921 19 5	227.08 \$	126.01 \$	3 274 28 5 48 65 5 6 90 5 2 12 5 66 67 5	3 192 90 5	387.22 \$	139.14 \$	3 719 25 STD Year 2009 100-102
W-Wide Flange1: W16X31														
W-Wide Flange1: W18X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16031 E2	900 0.052 C.P. \$	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,961.32 \$	580.57 \$	322.03 \$	8,865.92 5 58.46 5 6.56 5 2.35 5 67.39 5	8,841.59 \$	331.81 \$	355.30 \$	10,185,69 STD 1488 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 321.33 25.96 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. S	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 S	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.4 21.44 219	219 051223754300	W21x50 E5	1054 0.075 L.F. \$	85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26 W-Wide Flange: W10X26: 4	40.17 37.49 4.07 40	40.17 051223750720	W10x26 E2	600 0.093UF	44.51 \$ 6.76 \$	3 20 5 63 46 5	1787.97 6	210.98 6	128.64 e	214749 5 4866 5 684 6 352 6 4944 6	1 064 27 6	365.07 6	141.40 6	2.490.94 STD Year 2009 100.102
W-Wide Flange: W18X76	40													
W-Wide Flange: W18X78: 6 W-Wide Flange: W21X122	183 170.43 26.18 183	183 051223753940	VYTOX/0 E5	900 0.089[L.F. \$	129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 S	1,015.65 \$	419.07 \$	20,111,26 \$ 142,83 \$ 9,63 \$ 2,52 \$ 154,98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	20,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.19 26.84 117 4123.22 4184.51 662 2	117 051223754780	W21x122 E5	1000 0.08 L.F. \$	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
22						3	aro, marty a	entering 3		3	aastaaaraa a	3	entering a	
Concrete-Rectangular Beam: 36x30	60 60 771 80	60 033106360442	Concrete Restance for Baser 36"+30"		62.26 5	. s 62.56 e	1716 60 4			1715.60 5 69.61 5	4.116.65.1.6			4 116 60 STD Year 2009 100 401
HSS-Hollow Structural Section1: HSS402X1/8	00 00 371.88	AA 140140304415	venere nestanguar seam: 39 x30	u.r. 3	v£.£0 0 1 3	· • • •2.20 3	3,135.00 3	. 3	. 3	0,100.00 a 00.01 a 1 a 1 a 68.61 a	+,110.00 3	. 3	. 3	4, 110.00 (VIII) (VIII) (VIII)
HSS-Hollow Structural Section1: HSS40c2X1/8: 8 HSS-Hollow Structural Section1: HSS6040X3/8	13.56 9.89 0.09	13.56 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$	4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 172.33 7.74	193.49 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$	40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9,798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10012 W-Wide Flange1: W10012: 2	52.71 49 1.18 53	52.71 051223750600	W10x12 E2	600 0.093 L.F. S	20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,080.03 S	303.08 S	168.67 S	1,551.78 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,200.21 \$	518.67 S	185.54 S	1,904.41 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. S	27.43 \$ 3.92 \$	2.18 5 33.53 5	1.800.23 \$	257.27 \$	143.07 S	2 200 57 5 30.02 5 6 71 5 2 40 5 39 13 5	1.970.21 \$	440.38 5	157.51 \$	2 568 10 STD Year 2009 100-102
W-Wide Flage1: W12X19														
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12X19 E2	660 0.064 L.F. S	32.57 \$ 3.92 \$	2.16 \$ 38.67 \$	8,672.09 \$	1,043.74 5	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.64 993.97 43.91 1,028	1027.64 051223751900	W14x22 E2	990 0.057 L.F. \$	44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.26 \$	3,576.19 \$	1,993.62 \$	51,310.07 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,994.69 \$	6,124.73 \$	2,188.87 \$	58,308.29 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43 E2	810 0.059 L.F. \$	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$	154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 S	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1		37.67 051223752500	W14×109 F2	720 0.078 LF 5	204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7 719 71 5	180.82 5	100.58 5	8 001 11 5 225 63 5 8 21 5 2 93 5 236 77 5	8 499 48	309.27 \$	110.37 5	8 919 13 STD Year 2009 100-102
W-Wide Flange1: W16X26	100 100 100 100 100 100 100 100 100 100													
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. S	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.052 L.F. S	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35 E5	950 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 321.32 25.96 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 S	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50		219 061223764300	W21v60 E6	1064 0.075 LE 5	86.39 \$ 4.70 \$	101 5 02.03 5	19 700 41 5	1.029.20 5	424.96 5	00 164 67 6 04 10 6 0 14 6 0 14 6 104 47 6	20.627.61 5	1792.66 5	3 23 031	22 878 92 STD Vest 2009 100-102
W-Wide Flange: W10X26	219 2114 2154 215	215 051225154500		0.010 2.1. 9	02.55 3 4.10 3	1.54 3 32.05 3	10,700,411 3	1,023.34	424.00 3	20,100.07 3 20,13 3 0,14 3 2,14 3 100,41 3	20,021,01	1,102.00	400.00	22,070.35 010 148 2005 100-102
W-Wide Flange: W10X26: 4 W-Wide Flange: W18X76	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$	44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 \$	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 170.46 26.19 183	183 051223753940	W18x76 E5	900 0.089 L.F. S	129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W2IX122 W-Wide Flange: W2IX122: 6	117 108.28 26.86 117	117 051223754780	W21x122 E5	1000 0.08 L.F. \$	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
1.057638889	4372.88 4184.3 667.78	Total				s	275,215.95 \$	20,022.78 \$	9,440.85 \$	304,679.60 \$	302,047.65 \$	34,491.35 \$	10,390.08 \$	346,929.08
Concrete-Rectangular Beam: 36x30														
concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS40c2X1/8	60 60 371.88	60 033105350412	Concrese Rectangular Beam: 36"x30"	L.F. \$	62.26 5 - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	- \$	- 5	4,115.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS402X1/8: 8 HSS-Hollow Structural Section1: HSS602X1/8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. S	4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X1/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$	40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 49 1.18 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$	20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3		65.63 051223751100	W12x16 E2	880 0.054 L.F. S	27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1.800.23 \$	257.27 \$	143.07 5	2 200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1.970.21 \$	440.38 S	157.51 \$	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19			114.0.40											
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.064 L.F. \$	32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 SID Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 993.97 43.91 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. S	44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 S	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43 E2	810 0.059 L.F. \$	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$	154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	17.67 36.06 7.91 52	37.67 051223752500	W14x109 F2	720 0.078 L.F. S	204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7.719.71 \$	180.82 5	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499,48 \$	309.27 5	110.37 \$	8.919.13 STD Year 2009 100.102
W-Wide Flange1: W16X26														
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. \$	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.052 L.F. \$	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35 E5	950 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 321.32 25.96 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 S	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50 7		219 051223764300	W21x60	1054 0.0761 E	a 05 4 2 05 28	194 \$ 92.02 \$	18 700 /4	1 029 30 5	424.86 €	20 151 57 5 01 19 5 044 5 044 5 44 5	20.027.04 6	1 782 55 6	159 55 5	22 878 93 STD YAW 2008 600.602
W-Wide Flange: W10X26	213 213.4 21.44 219	£10 V016601040VV	CD		00.00 a 4.10 a	1.24 0 32.03 0	10,100.41 3	1,023.30 8	424.00 3	20, 124.07 0 24.13 0 0.14 0 £.14 0 104.47 5	20,021.01 3	1,102.00 3	+00.00 3	22,010.33 010 148 2003 100 102
W-Wide Flange: W10X26: 4 W-Wide Flange: W18X76	40.17 37.49 1.97 40	40.17 051223750720	W10x26 E2	600 0.093 L.F. \$	44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,787.97 \$	230.98 \$	128.54 \$	2,147.49 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	1,954.27 \$	395.27 \$	141.40 \$	2,490.94 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 170.46 26.19 183	183 051223753940	W18x76 E5	900 0.089 L.F. \$	129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.62 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.28 26.86 117	117 051223754780	W21x122 E5	1000 0.08 L.F. \$	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
1.099305556	4373.22 4184.68 667.73	Total				\$	275,162.70 \$	20,024.89 \$	9,442.04 \$	304,629.64 \$	301,988.99 \$	34,494.97 \$	10,391.37 \$	346,875.36

24															
Concrete-Rectangular Beam: 36x30															
Concrete-Rectangular Beam: 36x30: 6 HSS-Hollow Structural Section1: HSS4X2X1/8	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F.	\$ 62.26 \$ · \$	- \$ 62.26 \$	3,735.60 \$	- S	· \$	3,735.60 \$ 68.61 \$ - \$	- \$ 68.61 \$	4,116.60 \$	· \$	· \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4022X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F.	\$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$	3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F.	\$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 S	9.721.87 \$ 45.02 \$ 10.76 \$	3.83 \$ 59.61 \$	8.642.94 \$	2.065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12		(3.00 A/2007/0000	10/10-10	E2 (00 0.002) E	6 0040 6 6 7 F	200 6 00 44 6	4.070.02	200.67	400.04		200 6 200 6	4 400 75 4	510.17 A	100.17	4 003 00 PTD V 9900 100 100
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.09 49 1.18 53	52.63 051223750900	W1002	E2 600 0.035 L.F.	a 20.43 a 5.75 a	3.20 8 23.44 8	1,079.62 3	342.91 3	100.01 3	1,551.19 5 22.11 5 9.04 5	3.52 a 30.13 a	1,133.75 3	510.47 3	100.47 3	1,303.63 (510) 1148/ 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.054 L.F.	\$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$	2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.054 L.F.	\$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 S	580.45 S	10.296.27 \$ 35.65 \$ 6.71 \$	2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 993.97 43.91 1.028	1027.65 051223751900	W14x22	E2 990 0.057 L.F.	\$ 44.51 \$ 3.48 \$	194 5 49.93 5	45.740.70 \$	3.576.22 \$	1.993.64 5	51 310 56 \$ 48 65 \$ 5 96 \$	2 13 5 56.74 5	49.995.17 \$	6.124.79 5	2 188 89 5	58.308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43															
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82 2	71.21 60.98 5.23 71	/1.21 051223752320	W14x43	E2 810 0.069 L.F.	\$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$	2.60 \$ 90.62 \$	5,748.78 S	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82	E2 740 0.076 L.F.	\$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$	2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.06 7.93 38	37.67 051223752500	W14x109	E2 720 0.078 L.F.	\$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$	2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700	W16x26	E2 1000 0.056 L.F.	\$ 44.51 \$ 3.45 \$	192 5 49.89 5	2 921 19 5	227.08 \$	126.01 \$	3 274 28 5 48 65 5 6 90 5	2 12 5 56 67 5	3 192 90 \$	387.22 \$	139.14 \$	3 719 25 STD Year 2009 100-102
W-Wide Flange1: W16X31				54 444 4440 5											
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 146.06 9.12 151	151.19 051223752900	W16x31	EZ 900 0.062 L.F.	\$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$	2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,168,69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35	E5 960 0.083 L.F.	\$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$	2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 321.32 25.96 338	337.68 051223753500	W18x40	E5 960 0.083 L.F.	\$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$	2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.4 21.44 219	219 051223754300	W21x50	E5 1054 0.075 L.F.	\$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$	2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26	-	40.17 061922760730	W40-96	E2 600 0.0931 E	8 44 8 6 76 8	2.22 8 62.46 8	1 707 67 6	230.62 6	100.64	214740 8 49.65 8 0.84 8	262 8 6261 8	1064.07	205.27	111.40	2 400 04 STD Veer 2009 100 102
W-Wide Flange: W18X76		NV.11 V#1663130160		C. 000 0.033 L.F.	a aat 3 5.15 3	3.20 0 03.40 0	1,101.31 3	230.50 3	120.04 3	2,147.47 0 40.00 0 9.84 0	0.02 0 02.01 3	1,004.27 3	375.27	141.40 3	a,430.34 010 1488 2003 100-102
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 170.46 26.19 183	183 051223753940	W18x76	E5 900 0.089 L.F.	\$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 \$	25,111.26 \$ 142.83 \$ 9.63 \$	2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28.361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.28 26.86 117	117 051223754780	W21x122	E5 1000 0.08 L.F.	\$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$	2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
25	4575-22 4184.08 067.75	iotai				3	210,102.00 \$	20,024.09 \$	3,442.04 \$	304,527.54	2	301,366.99 5	34,434.97 \$	10,391.37 \$	349,673,36
Concrete-Rectangular Beam: 36x30		60 033406360449	Consulta Bastanza das Bases: 265-201			e en 20 e	1716 61 6					1 116 00 0			4 545 60 CTD Van 2000 400 401
HSS-Hollow Structural Section1: HSS40201/8	00 00 371.88	00 003/105350412	Concrete rectangular beam: 367x30"	UF.	a 02.20 S · S	· 3 62.26 3	3,735.60 3	. 2	. 5	3,735.69 8 68.61 8 5	· a 68.61 3	4,116.60 3	. 2	. 3	4,116.60 [510] 148/2009 [100-401
HSS-Hollow Structural Section1: HSS402X1/8: 8 HSS-Hollow Structural Section1: HSS604X3/8	13.56 9.89 0.09	13.56 051223750360	HSS4x2x1/8	E2 550 0.102 L.F.	\$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$	3.83 \$ 19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 172.33 7.74	193.49 051223750360	HSS6x4x3/8	E2 550 0.102 L.F.	\$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9,798.33 \$ 45.02 \$ 10.76 \$	3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.71 49 1.18 53	52.71 051223750600	W10x12	E2 600 0.093 L.F.	\$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,080.03 \$	303.08 \$	168.67 \$	1,551.78 \$ 22.77 \$ 9.84 \$	3.52 \$ 36.13 \$	1,200.21 \$	518.67 \$	185.54 S	1,904.41 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 1		65.63 051223751100	W12x16	F2 880 0.0541 F	\$ 27.43 \$ 3.92 \$	2 18 5 33 53 5	1.810.23 5	257.27 \$	143.07 5	2 200 57 5 30 02 5 6 71 5	2.40 5 39.13 5	1 970 21 5	440.38 5	157.51 \$	2 568 10 STD Year 2009 100-102
W-Wide Flange1: W12X19	0000 0000 000				• E1.40 • 0.0E •	2.10 0 00.00 0		20121		2,200,07 0 00,02 0 0,71 0	2.40 0 00.10 0	1,010.21			8,000,00
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x1a	E2 880 0.064 L.F.	\$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$	2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 S1D Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.64 993.97 43.91 1,028	1027.64 051223751900	W14x22	E2 990 0.057 L.F.	\$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.26 \$	3,576.19 \$	1,993.62 \$	51,310.07 \$ 48.65 \$ 5.96 \$	2.13 \$ 56.74 \$	49,994.69 \$	6,124.73 \$	2,188.87 \$	58,308.29 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43	E2 810 0.069 L.F.	\$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5.233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$	2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82	E2 740 0.076 L.F.	\$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4.050.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$	2.85 \$ 179.56 \$	4.442.13 \$	210.64 \$	75.04 \$	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2			14/14-140	E2 200 0.070 E		0.07 6.010 10 6		100.00					240.07	440.22	0.040.43 PTD No 0000 400 400
W-Wide Flange1: W16X109 2: 1 W-Wide Flange1: W16X26	37.67 36.06 7.93 35	37.67 051223752500	W14x109	E2 720 0.078 L.F.	\$ 204.93 \$ 4.80 \$	2.67 5 212.40 5	1,/19./1 \$	180.82 \$	100.56 \$	8,001.11 \$ 225.63 \$ 8.21 \$	2.93 \$ 236.77 \$	8,433.48 \$	309.27 \$	110.37 \$	8,919,13 STD Tear 2009 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X11	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F.	\$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$	2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.052 L.F.	\$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$	2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35	E5 960 0.083 L.F.	\$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$	2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40	-	337.68 051223753500	W18v40	E5 950 0.0831 E	2 003 2 10 83 2	2 16 8 76 66 8	23.066.92 5	1766.04 5	736.01 5	26.648.87 5 76.04 5 8.00 5	2.37 5 86.40 5	26,339,61 6	3.035.74 5	800.30	29 176 66 STD Vast 2009 100-102
W-Wide Flange1: W21X50							20,000.02 U						0,000,14		
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219 213.4 21.44 219	219 051223754300	W21x50	E5 1064 0.075 L.F.	\$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$	2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40 37.67 1.98 40	40 051223750720	W10x26	E2 600 0.093 L.F.	\$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,780.40 \$	230.00 \$	128.00 \$	2,138.40 \$ 48.65 \$ 9.84 \$	3.52 \$ 62.01 \$	1,946.00 \$	393.60 \$	140.80 \$	2,480.40 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 170.46 26.19 183	183 051223753940	W18x76	E5 900 0.089 L.F.	\$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$	2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 108.28 26.86 117	117 051223754780	W21x122	E5 1000 0.08 L.F.	\$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$	2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
25: 203	4372.72 4184.48 667.79	Total				\$	275,208.38 \$	20,021.80 \$	9,440.31 \$	304,670.51	\$	302,039.38 \$	34,489.68 \$	10,389.48 \$	346,918.54
20 Concrete-Rectangular Beam: 36x30															
Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F.	\$ 62.26 \$ - \$	- \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$	- \$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40201/8:8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F.	\$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$	3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F.	\$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$	3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 49 1.18 53	52.69 051223750600	W10x12	E2 600 0.093 L.F.	\$ 20.49 \$ 5.75 \$	3 20 5 29 44 5	1.079.62 \$	302.97 \$	168.61 \$	1 551 19 5 22 77 5 9.84 5	3.62 \$ 36.13 \$	1 199 75 5	518.47 \$	185.47 \$	1 903 69 STD Year 2009 100-102
W-Wide Flange1: W12X16			11110 10	EA 644 4441 E											
W-Wide Flange1: W12X10: 3 W-Wide Flange1: W12X19	05.63 63.26 2.04 60	65.63 051223751100	W12X19	E2 660 0.064 L.P.	\$ 27.43 \$ 3.32 \$	2.10 5 33.53 5	1,000.23 5	251.21 \$	143.07 5	2,200.57 5 30.02 5 6.71 5	2.40 5 39.13 5	1,9/0.21 5	440.35 \$	157,51 \$	2,565.10 510 1148/2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.064 L.F.	\$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$	2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 993.97 43.91 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F.	\$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$	2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43	E2 810 0.059 L.F.	\$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$	2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.25 4 24	26.33 051223752380	W14x82	E2 740 0.076L F	\$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4.050.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ p.00 €	2.85 \$ 179.56 \$	4.442 13 5	210.64 \$	75.04 \$	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2								144.00				1,112 V		10.04	
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.06 7.93 38	37.67 051223752500	wri4x109	EZ 720 0.078 L.F.	\$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$	2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F.	\$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$	2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.052 L.F.	\$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$	2.35 \$ 67.39 \$	8,841.59 \$	991.81 S	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1.445	1444.74 051223753300	W18x35	E5 960 0.083 L.F.	\$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$	2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40	337.68 331.33 37.64	337.68 051933753500	W18-40	E5 950 0.000 C	8 68 31 8 6 34 5	246 8 26 00 0	22.055.50	1746.01	205.01	26.640.07 8 74.64 8 6.65	2.37 8 46 46 8	26.330.64	3 036 24 1 4	800.20	05 174 14 STD V/ 0000 400 400
W-Wide Flange1: W21X50		001.00 004663103300		0.003 L.F.	9 00.51 9 5.20 S	£.12 9 /5.00 3	£3,000.32 B	1,100.04 3	120.01 3	20,040.07 0 70.04 0 6.99 0	a	£0,000.51 3	3,030.74 3	010.32 3	PA-112/22 ALM 1481 54A3 IAA-145
W-Wide Flange1: W21X50: 7 W-Wide Flange: W10X26	219 213.4 21.44 219	219 051223754300	W21x50	E5 1054 0.075 L.F.	\$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$	2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40 37.67 1.98 40	40 051223750720	W10x26	E2 600 0.093 L.F.	\$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	1,780.40 \$	230.00 \$	128.00 \$	2,138.40 \$ 48.65 \$ 9.84 \$	3.52 \$ 62.01 \$	1,946.00 \$	393.60 \$	140.80 \$	2,480.40 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 170.46 26.19 183	183 051223753940	W18x76	E5 900 0.089 L.F.	\$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$	2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6		117 051223754780	W21x122	E5 1000 0.08LF	\$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340,68 \$	585.00 S	242.19 5	25.167.87 \$ 228.74 \$ 8.64 \$	2.27 \$ 239.65 \$	26,762.58 \$	1.010.88 5	265.59 \$	28.039.05 STD Year 2009 100-102
26: 203	4373.06 4184.85 667.74	Total				\$	275,155.13 \$	20,023.91 \$	9,441.50 \$	304,620.55	\$	301,980.72 \$	34,493.30 \$	10,390.77 \$	346,864.82

27		_												
Concrete-Rectangular Beam: 36x30 Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"	"x30" L.F. \$ 62.26 \$ -	\$ · \$ 62.26 \$	3,735.60 \$	· \$	· \$	3,735.60 \$ 68.61 \$ - \$ -	\$ 68.61 \$	4,116.60 \$	· \$	- S	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8		16.10. 05.0000760360	uppr A.r.B			70.04		53.00 F						242 42 0TD V 2445 444 443
HSS-Hollow Structural Section1: HSS6X4X3/8: a HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223150360	H33482X1/0	E2 000 0.102 L.F. 3 4.54 3 6.27	3 3,47 3 14,30 3	70.01 5	30.00 \$	53.62 3	220.51 3 5.00 3 10.76 3 3.63	a 19.59 a	11.10 \$	100.72 3	53.06 3	302.05 310 1168 2003 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flagge1: W10X12	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27	\$ 3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83	\$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 49 1.18 53	52.69 051223750600	W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75	\$ 3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52	\$ 36.13 \$	1,199.75 \$	518.47 S	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.054 L.F. \$ 27.43 \$ 3.92	\$ 2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40	\$ 39.13 \$	1,970.21 \$	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 26	-	265.26 051223751100	W12v19	F2 880 0.0541 F \$ 32.67 \$ 3.02	5 2 10 5 30 67 5	8.672.09 \$	1043 74 5	600.46 5	10 206 27 5 26 6 5 6 71 5 2 40	\$ 44.76 \$	9,492,17 \$	1 786 60 5	2 50.053	11 917 00 STD Veer 2009 100-102
W-Wide Flange1: W14X22	200.20 240.33 3044 200		111610		· 2.10 · 30.07 ·	0,012.05	1,043.14	000.40	10,250.27 0 50.05 0 0.77 0 2.40		5,452.17	1,700.00	055.02	11,511.00 010 100 100 100 100 100
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 993.97 43.91 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48	\$ 1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13	\$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26	\$ 2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60	\$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67	\$ 2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 S	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85	\$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2		27.67 065222762600	W14-100	E2 720 0.070 E 5 004.02 5 4.00	6 0.67 6 040 40 F	7 740 74	400.00	400.00		6 0X 71 6	0.000.00	200.07	440.77	0.040.43 PTD V 0000 100.500
W-Wide Flange1: W16X26	37.67 36.06 7.93 35	31.61 051223152500	YY 14X 105	E2 720 0.070 L.F. \$ 204.93 \$ 4.60	5 2.07 5 212.40 5	7,719,711 \$	100.02 5	100.50 \$	0,001.11 5 225.63 5 0.21 5 2.33	\$ 230.11 \$	0,477.40 3	303.27 5	110.57 \$	0,919,13 310 Tear 2009 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X11	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46	\$ 1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12	\$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.052 L.F. \$ 52.79 \$ 3.84	\$ 2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35	\$ 67.39 \$	8,841.59 \$	991.81 S	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1408.17 99.52 1,445	1444.74 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20	\$ 2.15 \$ 67.38 \$	86,727.74 S	7,512.65 \$	3,106.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37	\$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424,03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40	-	227.60 06422276260	1446-46		A A46 A 36 64 A		17/641	205.04			AL 314 (4			00 535 55 0TD 1/2-2 0000 400 500
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 521.32 25.96 3355 -	337.00 051223753500	VY 10X4U	E5 390 0.003 L.F. \$ 68.31 \$ 5.20	a 2.15 a /5.66 a	23,066.92 8	1,/55.94 8	726.01 8	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37	5 86.40 5	25,339.51 3	3,035.74 5	800.30 5	29,1/5.55 510 Tear 2009 100-102
W-Wide Flange1: W21X50: 7	219 213.4 21.44 219	219 051223754300	W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70	\$ 1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14	\$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W10X26: 4	40.08 37.49 1.97 40	40.08 051223750720	W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75	\$ 3.20 \$ 53.46 \$	1,783.96 \$	230.46 \$	128.26 \$	2,142.68 \$ 48.65 \$ 9.84 \$ 3.52	\$ 62.01 \$	1,949.89 \$	394.39 \$	141.08 \$	2,485.36 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6		183 051223753940	W18x76	E5 900 0.039 L.F. \$ 129.38 \$ 5.55	\$ 2.29 \$ 137.22 \$	23.676.54 \$	1,015.65 \$	419.07 S	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52	\$ 154.98 \$	26.137.89 \$	1.762.29 \$	461.16 \$	28.361.34 STD Year 2009 100-102
W-Wide Flange: W21X122		447 0642202744780	W01-100		6 007 6 045 44 6	01010/0	100.00	010.40			00 700 00 0	1010.00	000.00	20.050 of PTD V 2000 100 100
27: 203	4373.14 4184.68 667.73	Total	11213122	LD 1000 0.08 L.P. \$ 208,04 \$ 5,00	a 2.07 5 215.11 5 \$	275,158.69 \$	20,024.37 \$	9,441.76 \$	20,107.07 9 228.74 5 8.64 5 2.27 304,624.83	* 239.65 S	301,984.61 \$	34,494.09 \$	10,391.05 \$	20,030,05 010 1082,2009 100-102 346,869,78
28														
Concrete-Rectangular Beam: 36x30 Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36*	"x30" L.F. \$ 62.26 \$ -	\$ - \$ 62.26 \$	3,735.60 \$	- \$	- \$	3,735.60 \$ 68.61 \$ - \$ -	\$ 68.61 \$	4,116.60 \$	- \$	- \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8	47.47 44.77 444	15.42 054222750360	4004-0-10	E2 550 0 1021 E F 4 54 F 537	E 346 E 4430 E	70.01	00 fb f	(202) 8	20061 6 600 6 10 76 6 202	10.00	77.66	101.00	10.05	202 02 0TD Vest 2009 100 102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15/42 051223150300	1034828110	6.2 000 0.102 L.F. 3 4.54 3 6.27	a 3.43 a 14.30 a	70.01 5	30.00 3	53.62 8	220.51 a 5.00 a 10.76 a 3.63 i	a 19.53 a	11.10 3	100.32 8	53.06 a	302.05 310 1148 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flange1: W10X12	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27	\$ 3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83	\$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 49 1.18 53	52.69 051223750600	W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75	\$ 3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52	\$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92	\$ 2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 S	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40	\$ 39.13 \$	1,970.21 \$	440.38 S	157.51 S	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19		000 00 0000000000000			6 040 6 0007 6	0.070.00	4012.74	100 IC 1			0.00.07	1 700 00 0	(10 A) A	44.047.00 PTD V 0000 400.000
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	200.20 244.43 9.30 200	266.26 051223751100	WIZKIB	E2 000 0.004 L.F. \$ 32.57 \$ 3.32	a 2.10 a 30.07 a	0.072.03 5	1,043.74 5	580.45 3	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40	3 44.70 5	3,432.17 \$	1,785.60 5	639.02 \$	11,917,80 S1D Tear 2009 100-102
W-Wide Flange1: W14X22: 21 W-Wide Flange1: W14X43	638.14 616.93 27.26 638	638.14 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48	\$ 1.94 \$ 49.93 \$	28,403.61 \$	2,220.73 \$	1,237.99 \$	31,862.33 \$ 48.65 \$ 5.96 \$ 2.13	\$ 56.74 \$	31,045.51 \$	3,803.31 \$	1,359.24 \$	36,208.06 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26	\$ 2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60	\$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67	\$ 2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85	\$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2		37.67 051223752500	W14-109	E2 720 0.0781 E € 204.03 € 4.00	E 2.67 E 212.40 E	7 740 74 6	180.82 8	100.68 \$	8 001 11 8 226 63 8 8 21 8 2 00	¢ 216.77 ¢	8 450 48 \$	200.27 8	110.37 8	8.919.13 STD Veer 2009 100.102
W-Wide Flange1: W16X26	37.07 30.00 7.33 30				0 2.01 0 2.12.40 0	1,10.11	100.02	100.00	0.001.11 0 115.00 0 011 0 1.55	. 135.11	0,0000		10.57	
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46	\$ 1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12	\$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 16	541.18 523.32 32.67 541	541.18 051223752900	W16x31	E2 900 0.052 L.F. \$ 52.79 \$ 3.84	\$ 2.13 \$ 58.76 \$	28,568.89 \$	2,078.13 \$	1,152.71 \$	31,799.74 \$ 58.48 \$ 6.56 \$ 2.35	\$ 67.39 \$	31,648.21 \$	3,550.14 \$	1,271.77 \$	36,470.12 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 8	320 310.65 21.95 320	320 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20	\$ 2.15 \$ 67.38 \$	19,209.60 S	1,664.00 S	688.00 S	21,561.60 \$ 65.72 \$ 8.99 \$ 2.37	\$ 77.08 \$	21,030.40 \$	2,876.80 \$	758.40 \$	24,665.60 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 1	17.68 15.52 2.87 18	37.68 051223753500	W18v40	F5 960 0.0331 F 5 6831 5 520	\$ 215 \$ 75.66 \$	2 573 92 5	195.94 \$	81.01 5	2850.87 \$ 75.04 \$ 8.99 \$ 2.37	\$ 86.40 \$	2 827 51 5	338.74 5	89.30 \$	3 255 55 STD Year 2009 100-102
W-Wide Flange1: W21X44														
W-Wide Flange1: W21X44: 28 W-Wide Flange1: W21X50	1124.74 1096.89 97.51 1,125	1124.74 051223754100	W21x44	E5 1064 0.075 L.F. \$ 75.04 \$ 4.70	S 1.94 S 81.68 S	84,400.49 5	5,286.28 \$	2,182.00 \$	91,868.76 \$ 82.80 \$ 8.14 \$ 2.14	\$ 93.08 \$	93,128.47 \$	9,155.38 \$	2,406.94 5	104,690.80 S1D Year 2009 100-102
W-Wide Flange1: W21X50: 13	389 369.23 37.09 389	389 051223754300	W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70	\$ 1.94 \$ 92.03 \$	33,216.71 \$	1,828.30 \$	754.66 \$	35,799.67 \$ 94.19 \$ 8.14 \$ 2.14	\$ 104.47 \$	36,639.91 \$	3,166.46 \$	832.46 \$	40,638.83 STD Year 2009 100-102
W-Wide Flange1: W30899 4	130 129.91 26.02 130	130 051223756100	W30x99	E5 1200 0.067 L.F. \$ 168.71 \$ 4.16	\$ 1.72 \$ 174.59 \$	21,932.30 \$	540.80 \$	223.60 S	22,696.70 \$ 186.30 \$ 7.22 \$ 1.90	\$ 195.42 \$	24,219.00 \$	938.60 \$	247.00 \$	25,404.60 STD Year 2009 100-102
W-Wide Flange: W18X119 W-Wide Flange: W18X119; 2		61 051223753980	W18x119	E5 900 0.039 L.F. \$ 203.34 \$ 5.55	\$ 2.29 \$ 211.18 \$	12.403.74 \$	338.55 \$	139.69 \$	12.881.98 \$ 223.09 \$ 9.63 \$ 2.52	\$ 235.24 \$	13.608.49 \$	587.43 \$	153.72 \$	14.349.64 STD Year 2009 100-102
W-Wide Flange: W18x192		100 AF 10007 3444	10000-000		e	10.000 70 0	677.40	070.00		a	12.010.02			15 204 00 PTD V 0400 100 100
W-Wide Flange: W18X192: 4 W-Wide Flange: W21X122	122 113.08 44.58 122	122 051223753900	W10X132	E5 300 0.069 L.P. \$ 328.08 \$ 5.55	5 2.27 5 335.72 5	40,025.76 5	677.10 \$	2/3.35 \$	40,982.24 \$ 359.94 \$ 9.63 \$ 2.52	\$ 372.03 \$	43,312.00 \$	1,1/4.00 5	307,44 \$	45,334.35 51D Tear 2009 100-102
W-Wide Flange: W21X122: 6	117 108.27 26.86 117 4333.56 4144.86 743.32	117 051223754780 Total	W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00	\$ 2.07 \$ 215.11 \$	24,340.68 \$	585.00 S	242.19 S	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 : 366.430.28	\$ 239.65 \$	26,762.58 \$ 372,204.82 \$	1,010.88 S	265.59 \$ 9.977.90 \$	28,039.05 STD Year 2009 100-102
29														
Concrete-Rectangular Beam: 36x30 Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"	"x30" L.F. \$ 62.26 \$ -	\$ · \$ 62.26 \$	3.735.60 \$	- S	- S	3,735.60 \$ 68.61 \$ - \$ - 5	\$ 68.61 \$	4.116.60 \$	· \$	- S	4.116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40(2)(/8		16.10 06.00000000	U004-0-12		c	70.04	0.00	C2.02		e 40.00 e	77.40 6	475.00	10.05	202.00 PTD V 2000 100 100
HSS-Hollow Structural Section1: HSS6X4X3/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	HODHAZATIYO	E2 550 0.102 L.F. \$ 4.54 \$ 6.27	5 3.47 5 14.30 5	70.01 5	\$ 00.00	53.02 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.63	\$ 19.59 \$	77.10 \$	100.32 3	53.06 5	302.06 310 Tear 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flance1: W10X12	191.98 170.83 7.68	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27	\$ 3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83	\$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 49 1.18 53	52.69 051223750600	W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75	\$ 3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52	\$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92	\$ 2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40	\$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19		266.26 064222764400	W42-40	E2 000 0.0541 E # 99.67 # 9.00	P 0.40 P 30.67 P	9.672.60	1012 74 8	100.16	10 000 07 P 30 00 P 6 74 P 0 10		0.00.07	1 200 00 0	610.00 F	11 017 00 CTD Vest 2000 100 102
W-Wide Flange1: W10X19: 36 W-Wide Flange1: W10X22	200.20 240.33 3.44 200 -	200.20 051223751100	WIZAIJ	E2 000 0.000 L.F. 3 32.57 3 3.32	a 2.10 a 30.67 a	0,072.03 a	1,043.74 5	560.45 3	10,290,27 8 35,65 8 0.71 8 2.40	3 44.70 3	3,432.17 3	1,765.60 3	639.02 8	11,317.80 310 1481 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 993.63 43.9 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48	\$ 1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13	\$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 60.98 5.23 71	71.21 051223752320	W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26	\$ 2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60	\$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.25 4 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67	\$ 2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 S	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85	\$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2	17.67 16.06 1.01	37.67 064933763600	W14×109	E2 720 0.0781 E c 204.02 c 400	\$ 9.67 \$ 949.40 \$	7 740 74 6	190.00 0	100.00 0	8.001.11 6 252.23 8 8.54 8 8.55	\$ 236.77 ¢	a at 201 8	300.07 6	110.37 6	8 919 13 STD Year 2009 100.102
W-Wide Flange1: W16X26	30.00 7.93 35	01.01 V01223102000	11 14 A 19 2	Le rev v.vroL.r. 3 204.33 \$ 4.80	a 2.07 5 212.40 5	7,719.71 \$	100.52 3	100.00 0	0,001.11 9 245.03 9 0.21 9 2.93	* 230.11 3	0,423,45 3	363.21 3	110.37 \$	0,313.13 010 1488 2003 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46	\$ 1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12	\$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84	\$ 2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35	\$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1407.76 99.49 1.445	1444.74 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20	\$ 2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37	\$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40	137.60 121.33 36.66	337.68 064939769600	Wilky/A	E5 950 0.021 E & 6534 C CC	\$ 246 8 2644 4	22.046.62	57664	206.04	26.648.07 5 76.64 9 0.66 9 4.55	4 14 14	26 330 64	3 036 74 1 4	844.34	20 176 66 STD Vear 2009 1400 400
W-Wide Flange1: W21X50		401.00 V91223133300			× 2.12 8 /5.00 8	23,090.32 3	1,100.34 3	120.01 3	20,040.01 0 15.04 0 0.73 0 2.37	v 00.40 3	20,033.51 0	3,033.74 3	000.30 3	43,110.00 (414) (148) 6443 (146-146)
W-Wide Flange1: W21X50: 7 W-Wide Flange: W18X76	219 213.4 21.44 219	219 051223754300	W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70	\$ 1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14	\$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W18X76: 2	61 56.79 8.73 61	61 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55	\$ 2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52	\$ 154.98 \$	8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.27 26.86 117	117 051223754780	W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00	\$ 2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27	\$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
W-Wide Flange: W36X160 W-Wide Flange: W16X160: 4		122 061223767600	W36x160	E5 1150 0.071 E 5 273 73 5 4 35	\$ 180 5 076.00 E	33.300.00 e	530.70 E	219.60 6	34 145 36 5 304 60 5 7 50 5 4 07	5 311/4 C	36.844.64	916.00	240.34	37 995 90 STD Year 2009 100.102
No. 100	4133.06 4146.44 685.01	Total	11/2001/200		+ 1.0v 3 £13.00 3	200.085.43	19.647.51 \$	9 253 72 \$	340 886 67	- 011140 B	310 451 03 \$	13,830,84 \$	10 182 87 \$	363.473.76

30													
Concrete-Rectangular Beam: 36x30: 6	60 60 371.88	60 033105350412	Concrete Rectangular Beam: 36"x30"	L.F. \$ 62.2	26 5 - 5 - 5	2.26 \$ 3,735.60 \$. S	. s	3,735.60 \$ 68.61 \$ - \$ - \$ 68.61 \$	4,116.60 \$	· \$	· \$	4,116.60 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.5	54 \$ 6.27 \$ 3.49 \$	4.30 \$ 70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8	101.00 170.03 7.60	191.98 051223750360	LICC5.4.218 E2	650 0.1021 E 8 401	10 E £ 37 E 3 46 E	0.64 E 7.040.14 E	1 202 71 6	670.01 8	6 701 07 e 46 00 e 10 76 e 3 09 e 60 51 e	8 (12 0) 8	2.055 70 8	716.58 6	11 443 03 STD Vear 2009 100.102
W-Wide Flange1: W10X12	131.30 1/0.83 7.08	131.30 031223130300		0.102 0.102 0.1	00 0 0.27 0 3.47 0 3	0.04 0 7,040.14 0	1,203.11	670.01	3,121.01 a 45.02 a 10.10 a 3.63 a 53.01 a	0,042.54 3	2,005.70 3	135.20 0	11,443.33 010 1441 2009 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 49 1.18 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$ 20.4	49 \$ 5.75 \$ 3.20 \$ 3	9.44 \$ 1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. \$ 27.0	43 \$ 3.92 \$ 2.18 \$	3.53 \$ 1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.064 L.F. \$ 32.9	57 \$ 3.92 \$ 2.18 \$	8.67 \$ 8,672.09 \$	1,043.74 S	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 993.9 43.91 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.5	51 \$ 3.48 \$ 1.94 \$ 4	9.93 \$ 45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16		71.21 051223752320	W14v43 E2	810 0.059 LF \$ 71	49 5 4 26 5 2 37 5 1	0.12 \$ 6.233.22 \$	303.36 S	563 77 6	6 706 36 S 00 73 S 7 29 S 2 60 S 90 62 S	6.748.78 \$	619.12 \$	186.16 6	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2						0.12 0 0,200 22 0	000.00		5,105.05 0 00.15 0 1.15 0 1.00 0 50.02 0	5,146.10	515.12	100.10	
W-Wide Flange1: W14082 2: 1 W-Wide Flange1: W140109 2	26.33 24.25 4 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.3	22 \$ 4.67 \$ 2.59 \$ 1	1.48 \$ 4,060.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.06 7.93 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.9	93 \$ 4.80 \$ 2.67 \$ 2	2.40 \$ 7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. \$ 44.5	51 \$ 3.46 \$ 1.92 \$ 4	9.89 \$ 2,921.19 \$	227.08 \$	126.01 S	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19 146.06 9.12 151	151.19 051223752900	W16x31 E2	900 0.062 L.F. \$ 52.7	79 \$ 3.84 \$ 2.13 \$	8.76 \$ 7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36		1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.0	03 5 5 20 5 2 15 5	7 38 5 86 727 74 5	7.512.65 \$	3 106 19 5	97.346.68 \$ 66.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94.948.31 \$	12 988 21 \$	3.424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40		202.40		660 0.000 5 5 5									
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 321.32 25.96 335	337.68 051223753500	W18X40 E5	960 0.083 L.P. \$ 68.3	31 5 5.20 5 2.15 5	5.00 \$ 23,000.92 \$	1,/55.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 85.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,1/5.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W18X76	219 213.4 21.44 219	219 051223754300	W21x50 E5	1054 0.075 L.F. \$ 85.3	39 \$ 4.70 \$ 1.94 \$	2.03 \$ 18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W18X76: 2	61 56.79 8.73 61	61 051223753940	W18x76 E5	900 0.089 L.F. \$ 129.3	38 \$ 5.55 \$ 2.29 \$ 1	7.22 \$ 7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X143 W-Wide Flange: W18X143: 4	122 113.68 33.06 122	122 051223753980	W18x143 E5	900 0.089 L.F. \$ 244.3	35 \$ 5.55 \$ 2.29 \$ 2	2.19 \$ 29,810.70 \$	677.10 \$	279.38 \$	30.767.18 \$ 268.08 \$ 9.63 \$ 2.52 \$ 280.23 \$	32,705.76 \$	1,174.86 \$	307.44 \$	34,188.06 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6		117 051223754780	W21x122 E5	1000 0.08 L.F. \$ 208.0	04 \$ 5.00 \$ 2.07 \$ 2	5.11 \$ 24.340.68 \$	585.00 S	242.19 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.66 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102
30: 199	4333.06 4147.04 681.35	Total				\$ 287,401.07 \$	19,793.91 \$	9,313.50 \$	316,508.49 \$	315,315.22 \$	34,099.70 \$	10,249.97 \$	359,664.92
51 Concrete-Rectangular Beam: 36x24													
Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412	Concrete Rectangular Beam: 36'x24*	L.F. \$ 49.0	81 5 - 5 - 5	9.81 \$ 996.20 \$	· \$. S	996.20 \$ 54.89 \$ - \$ - \$ 54.89 \$	1,097.80 S	. S	. S	1.097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS402X1/8 HSS-Hollow Structural Section1: HSS402X1/8:8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.5	54 \$ 6.27 \$ 3.49 \$	4.30 \$ 70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 173.33 7.79	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.0	88 \$ 6.27 \$ 3.49 \$	0.64 \$ 7,848.14 \$	1,203.71 \$	670.01 S	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52 64 .40 8 1.2 53	62.94 051223750500	W10x12 E2	600 0.093 E S 20/	49 5 5 75 5 3 20 5	9.44 \$ 1.084.74 \$	304.41 5	169.41 5	1 558 55 5 22 77 5 9.84 5 3 52 5 36 13 5	1 205 44 5	520.93 \$	186.35	1 912 72 STD Year 2009 100-102
W-Wide Flange1: W12X16	16.74 49.0 1.2	02.04	TTING L	000 0.000 C.T. 9 200	10 a 0.10 a 0.20 a .			107.41	1,000.00 a 22.77 a 0.04 a 3.02 a 30.13 a	1,200,000	020.00	100.00	1,412,12 010 14812000 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.054 L.F. \$ 27.4	43 \$ 3.92 \$ 2.18 \$	3.53 \$ 1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19 E2	880 0.054 L.F. \$ 32.9	57 \$ 3.92 \$ 2.18 \$	8.67 \$ 8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,785.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.64 994.69 43.94 1,028	1027.64 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.5	51 \$ 3.48 \$ 1.94 \$ 4	9.93 \$ 45,740.26 \$	3,576.19 \$	1,993.62 \$	51,310.07 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,994.69 \$	6,124.73 \$	2,188.87 \$	58,308.29 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 61.8 5.3 71	71.21 051223752320	W14x43 E2	810 0.059 L.F. \$ 73.4	49 \$ 4.26 \$ 2.37 \$ 1	0.12 \$ 5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	6,748.78 \$	519.12 \$	185.15 S	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	- 26.33 24.55 4.05 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. 5 154.2	22 5 4 67 5 2 59 5 10	1.48 \$ 4.050.61 \$	122.96 \$	68.19 \$	4.251.77 S 168.71 S 8.00 S 2.85 S 179.56 S	4.442.13 5	210.64 \$	75.04 \$	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2		27.67		700 0.0701 5 4 0000			100.00						4 4 4 4 0TD 1/ 0000 400 400
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 38	31.01 031223132300		720 0.070 C.P. 5 204.3	53 a 4.60 a 2.67 a 2	2.40 5 7,719.71 5	160.62 3	100.56 8	6,001.11 a 225.63 a 6.21 a 2.33 a 2.36.77 a	0,433.40 3	303.27 5	110.37 \$	6,913.13 510 Teal 2009 Too-Too
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26 E2	1000 0.056 L.F. \$ 44.9	51 \$ 3.46 \$ 1.92 \$ 4	9.89 \$ 2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 148.35 9.26 151	151.19 051223752900	W16x31 E2	900 0.062 L.F. \$ 52.	79 \$ 3.84 \$ 2.13 \$!	8.76 \$ 7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1410.92 99.71 1,445	1444.74 051223753300	W18x35 E5	960 0.083 L.F. \$ 60.0	03 \$ 5.20 \$ 2.15 \$	7.38 \$ 86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 322.15 26.03 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.3	31 \$ 5.20 \$ 2.15 \$	5.66 \$ 23,066.92 \$	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7		219 051223754300	W21x50 E5	1054 0.075 L.F. 5 85	39 5 470 5 194 5	2 03 5 18 700 41 5	1.029.30 \$	424.86 5	20 154 57 5 94 19 5 8 14 5 2 14 5 104 47 5	20.627.61 \$	1.782.66 \$	468.66 \$	22.878.93 STD Year 2009 100-102
W-Wide Flange: W16X26		20 05 422277 2700					101.01	21.00					0.040.40 (TD) V(2000 400.400)
W-Wide Flange: W16X26: 2 W-Wide Flange: W16X31	39 36.37 1.9 39	39 051223752700	W16x26 EZ	1000 0.056 L.F. \$ 44.9	51 \$ 3.46 \$ 1.92 \$ 4	9.89 \$ 1,735.89 \$	134.94 \$	74.85 \$	1.945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 \$	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.35 2.27 39	39 051223752900	W16x31 E2	900 0.062 L.F. \$ 52.1	79 \$ 3.84 \$ 2.13 \$!	8.76 \$ 2,058.81 \$	149.76 \$	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 S	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 172.44 26.49 183	183 051223753940	W18x76 E5	900 0.089 L.F. \$ 129.3	38 \$ 5.55 \$ 2.29 \$ 1	7.22 \$ 23,676.54 \$	1,015.65 \$	419.07 \$	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 108.87 27.01 117	117 051223754780	W21x122 E5	1000 0.08 L.F. \$ 208.0	04 \$ 5.00 \$ 2.07 \$ 2	5.11 \$ 24,340.68 \$	585.00 S	242.19 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 S	265.59 \$	28,039.05 STD Year 2009 100-102
31: 199 32	4371.31 4194.33 398.48	Total				\$ 274,434.71 \$	20,080.02 \$	9,472.23 \$	303,986.97 \$	301,199.20 \$	34,588.04 \$	10,425.16 \$	346,212.42
Concrete-Rectangular Beam: 36x24													
Concrete-Rectangular Beam: 36x24: 2 HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 99.17	20 033105350412	Concrete Rectangular Beam: 36 x24	L.F. 5 49.0	51 5 - 5 - 5 -	9.81 5 996.20 5	. 5	. 5	996.20 \$ 54.89 \$. \$. \$ 54.89 \$	1,097.80 \$. 5	. 5	1,097.80 S1D Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8 E2	550 0.102 L.F. \$ 4.5	54 \$ 6.27 \$ 3.49 \$	4.30 \$ 70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 173.33 7.79	191.98 051223750360	HSS6x4x3/8 E2	550 0.102 L.F. \$ 40.0	88 \$ 6.27 \$ 3.49 \$	0.64 \$ 7,848.14 \$	1,203.71 \$	670.01 S	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11.443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 49.55 1.19 53	52.69 051223750600	W10x12 E2	600 0.093 L.F. \$ 20.4	49 \$ 5.75 \$ 3.20 \$ 3	9.44 \$ 1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16 E2	880 0.064 L.F. \$ 27.4	43 \$ 3.92 \$ 2.18 \$ 3	3.53 \$ 1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19		266.26 061222761100	W12-19 E2	880 0.064 E 5 320	27 E 202 E 240 E	0.07 E 9.073.0	1.042.74 6	500.45	40.000 07 6 00.00 6 74 6 0.40 6 44.70 6	0.402.47 5	1 795 60 5	630.02 €	44 047 00 STD Year 2009 100.102
W-Wide Flange1: W14X22	200.20 240.33 3044 200	20020 001220101100		0.00 0.000 0.1 3 32.		0.01 a 0.012.03 a	1,043.14	500.45	10,230,27 3 30,00 3 0,71 3 2,40 3 44,70 3	5,452.17 3	1,100.00 a	033.02 3	
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 994.69 43.94 1,028	1027.65 051223751900	W14x22 E2	990 0.057 L.F. \$ 44.8	51 \$ 3.48 \$ 1.94 \$ 4	9.93 \$ 45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82 2	71.21 61.8 5.3 71	71.21 051223752320	W14x43 E2	810 0.059 L.F. \$ 73.4	49 \$ 4.26 \$ 2.37 \$ 1	0.12 \$ 5,233.22 \$	303.35 \$	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 S	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2: 1	26.33 24.55 4.05 26	26.33 051223752380	W14x82 E2	740 0.076 L.F. \$ 154.2	22 \$ 4.67 \$ 2.59 \$ 10	1.48 \$ 4,050.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.31 7.99 38	37.67 051223752500	W14x109 E2	720 0.078 L.F. \$ 204.9	93 \$ 4.80 \$ 2.67 \$ 2	2.40 \$ 7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26 F2	1000 0.056 L.F. S 44	51 \$ 3.46 \$ 1.92 ¢	9.89 \$ 2.921.19 €	227.08 5	126 01 5	3 274 28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 5.66.67 \$	3,192.90 \$	387.22 5	139.14 5	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31	00 00 100 000		L 100000 L 100000		10 0 00 0 000	5.75 F		200.00					
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.35 9.26 151	151.19 051223752900	WTING1 E2	900 0.062 L.F. \$ 52.1	17 9 3.84 5 2.13 5	0.70 \$ 7,981.32 \$	580.57 \$	322.03 \$	0.003.32 \$ 50.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,108.69 STD Tear 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1410.92 99.71 1,445	1444.74 051223753300	W18x35 E5	950 0.083 L.F. \$ 60.0	03 \$ 5.20 \$ 2.15 \$	7.38 \$ 86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 66.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 322.15 26.03 338	337.68 051223753500	W18x40 E5	960 0.083 L.F. \$ 68.3	31 \$ 5.20 \$ 2.15 \$	5.66 \$ 23,066.92 \$	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.98 21.5 219	219 051223754300	W21x50 E5	1064 0.075 L.F. \$ 85.3	39 \$ 4.70 \$ 1.94 \$	2.03 \$ 18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.37 1.0 29	39 051223752700	W16x26 F2	1000 0.056 L.F. S 44	51 \$ 3.46 \$ 1.92 \$	9.89 \$ 1.736.89 \$	134.94 \$	74 RR S	1945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 55.67 \$	1,897.35 \$	230 10 S	82.68 5	2.210.13 STD Year 2009 100-102
W-Wide Flange: W16X31	44 4 4 4 4	20 41-000708100			1.02 0 0			0.00		1,001.00			
w-wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.35 2.27 39	39 051223752900	WT6X31 E2	900 0.062 L.F. \$ 52.1	17 9 3.84 5 2.13 5	0.r0 \$ 2,058.81 \$	149.76 \$	83.07 \$	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2.628.21 SID Tear 2009 100-102
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 172.44 26.49 183	183 051223753940	W18x76 E5	900 0.089 L.F. \$ 129.3	38 \$ 5.55 \$ 2.29 \$ 1.	7.22 \$ 23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.87 27.01 117 4371.05 4194.08 398.47	117 051223754780 Total	W21x122 E5	1000 0.08 L.F. \$ 208.0	04 \$ 5.00 \$ 2.07 \$ 2	5.11 5 24,340.68 5 \$ 274,430,03 \$	585.00 \$	242.19 S	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102

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33														
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412 Concrete Rec	angular Beam: 36"x24"	L.F. S	49.81 S - S	- \$ 49.81 \$	996.20 \$	- S	- S	996.20 \$ 54.89 \$ · \$ · \$ 54.89 \$	1,097.80 S	- S	- S	1.097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	E2	550 0.102 L.F. S	4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 S	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8	101.00 173.33 7.30	101 08 051222750350 UPC6-4-2/8	E2	650 0 1021 E 6	40.00 8 6.07 8	346 8 6064 8	7.040.14	1 202 71 8	670.01 8	6 701 07 0 46 00 0 10 70 0 100 0 60 01 0	8642.04	2.055.70 8	716.00 6	11 443 03 STD Vear 2009 100.102
W-Wide Flange1: W10X12	191.76 173.33 7.79	131.30 031223130300 1103084330	<u></u>	0.102 [.1]. 3	40.00 a 0.27 a	3.42 8 50.04 8	7,040.14 3	1,203.71	670.01	3,121.01 a 45.02 a 10.10 a 3.63 a 53.01 a	0,042.34 0	2,005.70 3	130.20 0	11,443,33 310 1441,2007 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 49.55 1.19 53	52.69 051223750600 W/10x12	EZ	600 0.093 L.F. \$	20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2	880 0.064 L.F. \$	27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 S	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2	880 0.064 L.F. \$	32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 994.69 43.94 1,028	1027.65 051223751900 W14x22	E2	990 0.057 L.F. \$	44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14043 W-Wide Flange1: W14043; 16	71.21 61.8 5.3 71	71.21 051223752320 W14x43	E2	810 0.059 L.F. S	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5.233.22 \$	303.35 S	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 \$	519.12 \$	185.15 \$	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2 - 1		26.33 054223752380 W44v82	E2	740 0.0761 F S	164.92 \$ 4.67 \$	2 84 131 2 23 0	A 050 61 \$	122.66 \$	2 01 23	4 054 77 C 150 74 C 8 M C 9 85 C 470 55 C	4 442 13 8	2 13 010	75.04 8	4 727 84 STD Vee 2009 100-102
W-Wide Flange1: W14X109 2	20.55 24.55 40.05 20			740 0.070 1.7.	104.22 0 4.07 0	2.07 3 101.40 3		122.00			4,042.15	210.04	10.04	
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 38	37.67 051223752500 W14x109	EZ	720 0.078 L.F. 5 2	204.93 \$ 4.80 \$	2.67 5 212.40 5	7,719.71 \$	180.82 5	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2	1000 0.056 L.F. \$	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 148.35 9.26 151	151.19 051223752900 W16x31	E2	900 0.062 L.F. \$	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18835 W-Wide Flange1: W18835: 36	1444.74 1410.92 99.71 1,445	1444.74 051223753300 W18x35	E5	950 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 322.15 26.03 338	337.68 051223753500 W18x40	E5	960 0.083 L.F. \$	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,056.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 213.08 21.5 219	219 051223754300 W/21x50	E5	1054 0.075 L.F. S	85.39 \$ 4.70 \$	194 5 92.03 5	18.700.41 5	1.029.30 \$	424.86 S	20 154 57 5 94 19 5 8 14 5 2 14 5 104 47 5	20.627.61 \$	1.782.66 \$	468.66 \$	22.878.93 STD Year 2009 100-102
W-Wide Flange: W16X26		30 064933763700 MM6-36		1000 0.0551 5 4		100 0 0000 0	. 755 40 . 4	194.64	71.00		1007.00			2 346 42 CTD View 2000 400 402
W-Wide Flange: W16X/8: 2 W-Wide Flange: W16X31	59 30.57 1.9 59	02300114		1000 0.036 L.F. 3	44.51 3 3.40 3	1.92 3 49.69 3	1,/30.69 3	134.94 5	/4.00 3	1,345.71 3 480.69 3 5.39 3 2.12 3 56.67 3	1,091.35 3	230.10 3	62.65 3	2,210,13 STD Tear 2003 100-102
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.35 2.27 39	39 051223752900 W16x31	E2	900 0.062 L.F. \$	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 S	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 S	91.65 \$	2.628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 172.44 26.49 183	183 051223753940 W18x76	E5	900 0.089 L.F. \$ 1	129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 108.87 27.01 117 4321.05 4161.07 308.47	117 051223754780 W21×122	E5	1000 0.08 L.F. \$ 2	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
34	4072.00 4124.00 338.47					3	x14/400/00 3	KA/010/01 3	alat 199 3	500,000.00 S	941,123.03	04/303/04 3	repaid the a	
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412 Concrete Rec	angular Beam: 36"x24"	L.F. S	49.81 S - S	- \$ 49.81 \$	996.20 S	- 5	- S	996.20 \$ 54.89 \$ - \$ - \$ 54.89 \$	1,097.80 S	- S	- 5	1,097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X22X1/8 HSS-Hollow Structural Section1: HSS4X22X1/8	13.56 0.60 0.00	13.56 051223750360 Upost-tu-tie	F2	550 0.1021 F	454 \$ 607 \$	3 49 5 14 10 5	61.64	86.02	47.32 €	193 91 5 5 600 5 10 72 6 3 03 6 40 60 4	£7 00 6	145.01 0	61 03 0	265.64 STD Year 2009 100.102
HSS-Hollow Structural Section1: HSS4X2X1/8:8 HSS-Hollow Structural Section1: HSS6X4X1/8	13.30 9.89 0.09	10.00 Vanee.or 00300 PISS48281/8	Eć	550 0.196 L.F. \$		0.47 0 14.30 0	91.00 0	99.02 3	41.36 3	130.31 0 0.00 0 10.70 0 3.63 0 19.59 5	01.00 3	140,91 9	21.23 3	200.04 010 1488 2003 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flange1: W10X12	193.49 174.83 7.85	193.49 051223750360 HSS6x4x3/8	EZ	550 0.102 L.F. S	40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9,798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 49.58 1.19 53	52.69 051223750600 W10x12	E2	600 0.093 L.F. \$	20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2	880 0.064 L.F. \$	27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2	880 0.054 L.F. \$	32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.66 994.77 43.95 1,028	1027.66 051223751900 W14x22	E2	990 0.057 L.F. \$	44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,741.15 \$	3,576.26 \$	1,993.66 S	51,311.06 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.66 \$	6,124.85 \$	2,188.92 \$	58,309.43 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 61.95 5.31 71	71.21 051223752320 W14x43	E2	810 0.059 L.F. \$	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.58 4.05 26	26.33 051223752380 W14v82	F2	740 0.076LE \$	164 22 \$ 4.67 \$	2.69 5 161.48 5	4 060 61 5	122.96 \$	2 01 53	4 261 77 6 160 71 6 8 60 6 2 86 6 179 66 6	4 442 13 8	210.64 \$	75.04 \$	4 727 81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2						2.00 0 101.40 0	4,000.01	122.00			4,442.10	210.04	15.04	
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 35	37.67 051223752500 97148109	EZ	720 0.076 L.F. 5 2	204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71	180.82 5	100.58 5	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,423.48 5	309.27 \$	110.37 5	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2	1000 0.056 L.F. \$	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.35 9.26 151	151.19 051223752900 W16x31	E2	900 0.052 L.F. S	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 S	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1411.07 99.72 1,445	1444.74 051223753300 W18x35	E5	950 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18840 W-Wide Flange1: W18840: 11	337.68 322.2 26.03 338	337.68 051223753500 W18x40	E5	960 0.083 L.F. \$	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,056.92 \$	1,755.94 \$	726.01 S	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.01 21.5 219	219 051223754300 W/21x50	E5	1054 0.075 L.F. \$	85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700 W16x26	E2	1000 0.056 L.F. \$	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1.735.89 \$	134.94 \$	74.88 \$	1 945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1.897.35 \$	230.10 S	82.68 \$	2 210 13 STD Year 2009 100-102
W-Wide Flange: W16X31		30 06+933763000 MH6-34	E2	000 0.052 E	CO 70 6 2.04 6	0.40 6 60.70 6	0.020.04	440.75	82.07		0.000.70	055.04	64.65	0.000.01 (CTD) Very 2000 100.100
W-Wide Flange: W16X51: 2 W-Wide Flange: W18X76	39 30.35 2.27 37	39 00122312300 0012331	E2	500 0.052 C.P. \$	52.19 3 3.04 3	2.13 3 50.70 3	2,000.01 3	143.70 3	63.07 \$	2,231.04 \$ 30.40 \$ 0.50 \$ 2.55 \$ 01.57 \$	2,200.12	200,04 9	31.05 \$	2,020,21 310 1441 2003 100-102
W-Wide Flange: W18X76: 6 W-Wide Flange: W21X122	183 172.55 26.51 183	183 051223753940 W18x/6	Eb	900 0.089 L.F. \$	129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 \$	25.111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	451.16 \$	28,361.34 S1D Year 2009 100-102
W-Wide Flange: W21X122: 6 34: 199	117 109.03 27.05 117 4370.72 4194.49 398.62	117 051223754780 W21x122 Total	E5	1000 0.06 L.F. S 2	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$ 274,483,76 \$	585.00 S 20,076,46 S	242.19 S 9.470.24 S	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$ 304.030.46 \$	26.762.58 \$ 301.253.16 \$	1,010.88 S 34,581.94 S	265.59 \$ 10,422.99 \$	28.039.05 STD Year 2009 100-102 346.258.10
35														
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412 Concrete Rec	angular Beam: 36"x24"	L.F. S	49.81 \$ - \$	- \$ 49.81 \$	996.20 S	- \$	- \$	996.20 \$ 54.89 \$ - \$ - \$ 54.89 \$	1,097.80 \$	- \$	- \$	1,097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40(2)(1/8 HSS-Hollow Structural Section1: HSS40(2)(1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	E2	550 0.102 L.F. \$	4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X403/8 HSS-Hollow Structural Section1: HSS6X403/8: 20	191.98 173.33 7.79	191.98 051223750360 HSS6x4x3/8	E2	550 0.102 L.F. \$	40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203,71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443,93 STD Year 2009 100-102
W-Wide Flange1: W10X12		62.60 064222760600 W40w42	E2	600 0.093 E	20.40 8 6.76 8	2.00 8	1.070.62	202.07	100.01		1.150.76	610.47 8	196.47 4	1 003 00 0TD Vest 2000 100 102
W-Wide Flange1: W10X12; 2 W-Wide Flange1: W12X16	32.09 49,36 1.19 33	32.03 031223730000 VFT0X12		000 0.000 0.7. 3	20.45 8 5.75 8	3.20 8 23.44 8	1,075.62 3	302.51 8	100.01 3	1,301.13 0 22.11 0 3.04 0 3.32 0 30.13 0	1,122.75 8	510.47 3	100.41 0	1,503.05 510 14812003 100-102
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	05.63 63.26 2.04 66	65.63 051223751100 W12x16	EZ	880 0.064 L.F. S	27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 S 30.02 S 6.71 S 2.40 S 39.13 S	1,970.21 5	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2	880 0.064 L.F. \$	32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 994.77 43.95 1,028	1027.65 051223751900 W14x22	E2	990 0.057 L.F. \$	44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 61.95 5.31 71	71.21 051223752320 W14x43	E2	810 0.059 L.F. \$	73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.58 4.05 26	26.33 051223752380 W14x82	E2	740 0.076 L.F. \$	154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 S	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.31 7.99 38	37.67 051223752500 W14x109	E2	720 0.078 L.F. S 2	204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 S	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499,48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700 UV46_36	E2	1000 0.0561 F	44.61 \$ 3.42 \$	102 \$ 49.00 €	2 921 16 e	227.64	126.01 €	3 274 28 \$ 48.65 \$ 5.66 \$ 2.10 \$ 2.00 \$	3 100 00 8	387.99 6	110 14 6	1 719 26 STD Year 2009 100.102
W-Wide Flange1: W16X11	474 4	151 10 December 100 1910020		000 0000 0	0.70 0 0.40 0	0.42 6 42.02 0	a., rat 17 9	aa			v, +26.7V 0		9 P1.501	
w-wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.35 9.26 151	151.19 U51223/52900 W16x31	E2	540 0.062 L.F. \$	5.e.79 \$ 3.84 \$	2.13 \$ 58.76 \$	/,961.32 \$	580.57 \$	322.03 \$	0,683.32 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	310.30 \$	19,188.69 STD Tear 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1411.07 99.72 1,445	1444.74 051223753300 W18x35	E5	960 0.083 L.F. \$	60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 66.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,968.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 322.2 26.03 338	337.68 051223753500 W18x40	E5	960 0.083 L.F. S	68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 S	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 214.01 21.5 219	219 051223754300 W21x50	E5	1054 0.075 L.F. \$	85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700 W16x26	E2	1000 0.056 L.F. \$	44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 S	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 \$	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2	19 16.15 2.27 19	39 051223752900 W16x31	E2	900 0.052 L.F. S	52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2.058.81 \$	149 76 5	83.07 S	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 6.7 % \$	2,280,72 5	255.84 \$	91.65 \$	2.628.21 STD Year 2009 100-102
W-Wide Flange: W18X76		482 06492376344A		600 0.080 E	100.00 0 0 0 0 0 0	2 22 8 127 22 8	20.676.51	1011 44 14	110.02		AL 193 AL 4	1 7/2 00 0	40.00	100 000 000 V
W-Wide Flange: W21X122	103 1/2.55 20.51 183	100 WARKAT (200 WICK/6	ED		16.0.00 0 0.00 0	a.27 0 13/.22 3	23,010.54 3	1,010.00 8	412.0/ 3	au, 111,20 a 142,03 a 3,03 a 2,52 a 154,98 \$	20,131.03 3	1,102.29 3	401.10 3	148 2003 100-102
W-Wide Flange: W21X122: 6 35: 199	117 109.03 27.05 117 4371.05 4194.86 398.57	117 051223754780 W21x122 Total	E5	1000 0.08 L.F. \$ 2	208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$ 274,430.03 \$	585.00 \$ 20,078.61 \$	242.19 \$ 9,471.45 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$ 303,980.10 \$	26,762.58 \$ 301,193.99 \$	1,010.88 \$ 34,585.64 \$	265.59 \$ 10,424.30 \$	26,039.05 [STD Year 2009 100-102 346,203.96

36		_											
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412	Concrete Rectangular	Beam: 36"x24" L.F. \$ 49.81 \$ - \$	- \$ 49.81 \$	996.20 S	. S	. S	996.20 \$ 54.89 \$ - \$ - \$ 54.89 \$	1,097.80 \$	- S	- S	1.097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 S	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 S	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8		101.00 051000750050	LICCC4	9 69 9 90 60 4 9 3 1001 0 013	240 8 50 84 8	2010.11	1 000 74	670.04			0.000 20 0	21/ 02 8	11 443 03 CTD V444 2005 100 102
W-Wide Flange1: W10X12	191.98 175.53 7.79	191.96 051223750300	1556242516	E.e 000 0.106 L.F. 3 40.88 3 6.27 3	3.43 3 50.64 3	7,040.14 5	1,203.71	6/0.01 5	3,721.67 & 45.02 & 10.76 & 3.63 & 53.61 &	8,642.54 3	2,060.70 5	135.26 3	11,443.33 010 1101 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 49.58 1.19 53	52.69 051223750600	W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 S	580.45 S	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 S	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33	1027.65 994.77 43.95 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 61.95 5.31 71	71.21 051223752320	W14x43	F2 810 0.069 F \$ 73.49 \$ 4.26 \$	2 37 5 80 12 5	6 213 22 \$	202.25	168.77 \$	2 53.00 2 03.5 2 05.7 2 17.02 2 37.307.3	6.748.78 S	519 12 S	125.15.5	6 453 05 STD Year 2009 100-102
W-Wide Flange1: W14082 2	7444 94477 772 772				2.57 0 00.12 0	0,00012				5,146.10	515.12	100.10	
W-Wide Flange1: W14082 2: 1 W-Wide Flange1: W14X109 2	26.33 24.58 4.05 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 38	37.67 051223752500	W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19 148.35 9.26 151	151.19 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1411.07 99.72 1.445	1444.74 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86.727.74 \$	7.512.65 \$	3.105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94.948.31 \$	12.988.21 \$	3.424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40		337.68 061223763600	Wabyth	a or a br sa a 1 (000 0.000 0.00 0.00	2.46 8 76.66 8	22.066.92	1 765 64 5	725.01 5	75 540 07 E 75 A4 E 0 00 E 7 77 E 05 40 E	25 220 51 6	2.026.74 8	800.00 5	29 175 55 9TD Var 2009 100-102
W-Wide Flange1: W21X50	337.00 322.2 20.03 335	001.00 001660100000			2.10 0 10.00 0	23,000.02	1,700.04	720.01	20,040,07 0 10,04 0 0,09 0 2,07 0 00,40 0	20,000.01	3,030,74 3	000.50	23,173,55 010 144,2007 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W16X26	219 214.01 21.5 219	219 051223754300	W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 \$	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31: 2	39 36.15 2.27 39	39 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 6	183 172.55 26.51 183	183 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 \$	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 109.03 27.05 117	117 051223754780	W21x122	E5 1000 0.00 L.F. S 208.04 S 5.00 S	2.07 \$ 215.11 \$	24.340.68 S	585.00 \$	242.19 5	25.167.87 5 228.74 5 8.64 5 2.27 5 239.65 5	26.762.58 \$	1.010.88 S	265.59 \$	28.039.05 STD Year 2009 100-102
36:199	4371.05 4194.86 398.57	Total			\$	274,430.03 \$	20,078.61 \$	9,471.45 \$	303,980.10 S	301,193.99 \$	34,585.64 \$	10,424.30 \$	346,203.96
37 Concrete-Rectangular Beam: 36x24													
Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033106350412	Concrete Rectangular	Beam: 36"x24" L.F. \$ 49.81 \$ - \$	- \$ 49.81 \$	996.20 \$	- \$	- \$	995.20 \$ 54.89 \$ - \$ - \$ 54.89 \$	1,097.80 \$	· \$	- \$	1,097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4A2A1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	13.56 9.89 0.09	13.56 051223750360	HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 S	85.02 \$	47.32 S	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 S	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 174.83 7.85	193.49 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 S	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.60 49.6 1.10 53	52.69 051223750600	W10x12	F2 600 0.093 LF \$ 20.49 \$ 5.75 \$	3 20 5 29.44 5	1.079.62 \$	302.97 \$	168.61 \$	1 551 19 5 22 77 5 9.84 5 3.52 5 35 13 5	1 199 75 8	518.47 \$	185.47 \$	1 903 69 STD Year 2009 100-102
W-Wide Flange1: W12X16	32,09 49,00 41,19	56.03	10000 A		5.20 5 20.44 5	1,073,02	542.51	100.01		1,100.10	510.47	100.47	
W-Wide Flange1: W12X16: 3 W-Wide Flange1: W12X19	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 5	257.27 \$	143.07 5	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 5	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,785.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 994.82 43.95 1,028	1027.65 051223751900	W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 62.15 5.33 71	71.21 051223752320	W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 S	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 S	185.15 S	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.6 4.05 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 S	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2		37.67 061933763600	W14-109	E2 720 0.070 E £ 204.03 £ 4.00 £	2.67 8 21240 8	2 710 71 0	100.02	100.00		8.450.48 F	200.07	110.37	8 040 42 PTD Vast 2008 100 102
W-Wide Flange1: W16K26	37.07 30.31 7.39 30	STOT OTEESTOEDO	1111/107	Le 720 0.010 LT. 3 204.33 3 4.00 3	2.67 3 212.40 3	7,715.71	100.02 3	100.50 a	0,001.11 0 225.03 0 0.21 0 2.53 0 230.77 0	0,422.40 3	303.21 8	110.57 8	0,313,13,010,1481,2009,100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 148.35 9.26 151	151.19 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1411.27 99.74 1,445	1444.74 051223753300	W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 S	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 S	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 322.36 26.04 338	337.68 051223753500	W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.03 21.5 219	219 051223754300	W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18.700.41 S	1.029.30 \$	424.86 S	20.154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20.627.61 \$	1.782.66 \$	468.66 \$	22.878.93 STD Year 2009 100-102
W-Wide Flange: W16X26		20 0000000000	WHE AF		100 0 1000 0		10101	74.00		4 002 05 0	000.40		2 240 42 CTD V 2000 400 400
W-Wide Flange: W10X26: 2 W-Wide Flange: W16X31	39 36.37 1.9 37	39 051223752700	VY16X26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 5 49.89 5	1,735.89 \$	134.94 \$	74.85 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 5	82.65 \$	2,210.13 SID Tear 2009 100-102
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.35 2.27 39	39 051223752900	W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 6	183 172.66 26.53 183	183 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	23,676.54 \$	1,015.65 \$	419.07 S	25,111.26 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	26,137.89 \$	1,762.29 \$	461.16 S	28,361.34 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 109.14 27.08 117	117 051223754780	W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
37: 199	4370.72 4195.36 398.72	Total			s	274,483.31 \$	20,076.42 \$	9,470.22 \$	304,029.96 \$	301,252.67 \$	34,581.88 \$	10,422.96 \$	346,257.53
Concrete-Rectangular Beam: 36x24		00 000105050440	Concerts Restanceday										4 663 66 OTD Var 2005 420 484
HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 99.17	20 033105350412	Concrete Rectangular	Deam: 30 X24 L.F. 5 49.81 5 - 5	- 5 49.81 5	396.20 8	. 5	. 5	396.20 5 54.69 5 · 5 · 5 54.69 5	1,097.60 \$. 5	1,097.00 510 Tear 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 173.33 7.79	191.98 051223750360	HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 49.59 1.19 53	52.69 051223750600	W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2 880 0.064 L.F. \$ 32.67 \$ 3.92 \$	2.18 \$ 38.67 \$	8.672.09 \$	1.043.74 \$	580.45 S	10.296.27 \$ 36.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9.492.17 \$	1.786.60 \$	639.02 \$	11.917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22			1414.00		101 6 1000 6	10 740 70		1002.01		10.002.17	6 404 30 6	0.400.00 F	CO. 200. 05 (CTD) No 2000 100 100
W-Wide Flange1: W140(22: 33 W-Wide Flange1: W140(43	1027.65 994.78 43.95 1,028	1027.65 051223751300	VY14X22	E2 930 0.001 L.F. 5 44.51 5 3.48 5	1.54 5 49.93 5	45,740.70 5	3,5/6.22 8	1,333.64 5	51,310.56 \$ 46.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,550.17 3	6,124.79 5	2,100.03 5	58,308.86 510 Tear 2009 100-102
W-Wide Flange1: W14043: 16 W-Wide Flange1: W14082.2	71.21 62.15 5.33 71	71.21 051223752320	W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2: 1	26.33 24.6 4.05 26	26.33 051223752380	W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 S	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.11 7.99 38	37.67 051223752500	W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2.921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3.192.90 \$	387.22 \$	139.14 \$	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31	151.10 1.48.20 0.36 ***	151.19 051223752900	W16x31	E2 900 0.0621 F 5 52.79 5 3.94 5	2 13 5 58 76 6	7 981 32 6	580 57 S	322.03 6	8 883 92 5 58 48 5 6 56 5 2 36 6 67 70 6	8 841 59 5	991.01 €	365.30 €	10 188 69 STD Vear 2009 100.102
W-Wide Flange1: W18X35	131.13 140.33 3.20 1.31	101.10 001220102000			2.15 3 50.10 3	1,001.02	566.57	522.05	0.00.0 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0 0.00 0 0 0 0.00 0 0 0 0.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0,041.55	331.01 3	555.56 4	10,100,03 010 1101 100 100
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1411.23 99.74 1,445	1444.74 051223753300	W18x35	E5 960 0.003 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 322.36 26.04 338	337.68 051223753500	W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 S	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 214.03 21.5 219	219 051223754300	W21x50	E5 1054 0.075 LF. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700	W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 S	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2		39 051223752900	W16x31	E2 900 0.062LF 5 52.79 5 3.94 5	2 13 5 58 76 5	2.058.81 \$	149.76 \$	83.07 5	2 291 64 5 58 48 5 6 46 5 2 36 5 67 30 5	2 280 72 5	266.84 \$	2 23 19	2 628 21 STD Year 2009 100-102
W-Wide Flange: W18X76	377 30133 2.27 33 1				a na a como a	5,000.01				A. 8/0.72		91.02 e	
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X86	61 57.53 8.84 61	61 051223753940	W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X86: 4 W-Wide Flange: W21X122	122 115.13 20.14 122	122 051223753940	W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 S	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173.77 \$	19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 109.14 27.08 117	117 051223754780	W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 5	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102

39															
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412	Concrete Rectange	lar Beam: 36"x24"	L.F. S 49.81 S - S	· 5 49.81 5	996.20 S	· 5	. 5	995.20 \$ 54.89 \$. \$. \$	54.89 S	1.097.80 \$. 5	. 5	1.097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8		16.10	W001.0.19	63	510 0 100 E 5 151 5 507 5		70.44	45.62	(3 m) (40.50	71.01.0			202.00 (PD) March 400 100
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	HSS4x2x1/8	EZ	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 \$	77.10 \$	165.92 \$	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 173.33 7.79	191.98 051223750360	HSS6x4x3/8	E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 S	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 S	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 49.59 1.19 53	52.69 051223750600	W10x12	E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$	36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2	880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1.800.23 \$	257.27 \$	143.07 \$	2 200 57 \$ 30 02 \$ 6 71 \$ 2 40 \$	39.13 \$	1.970.21 \$	440.38 S	157.51 \$	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19															
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19	EZ	880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 8	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$	44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 994.78 43.95 1,028	1027.65 051223751900	W14x22	E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 62.15 5.33 71	71.21 051223752320	W14x43	E2	810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$	90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.13 24.6 4.05 26	26.33 051223752380	W14x82	E2	740 0.076 L.F. S. 154.22 S. 4.67 S.	2.59 5 161.48 5	4.050.61 \$	122.96 \$	68.19 \$	4 251 77 5 158 71 5 8 00 5 2 85 5	179.56 \$	4.442.13 \$	210.64 \$	75.04 \$	4.727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2															
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 38	37.67 051223752500	W14x109	E2	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 5	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$	236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16831 W-Wide Flange1: W16831: 4	151.19 148.35 9.26 151	151.19 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 S	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36	1444.74 1411.23 99.74 1.445	1444.74 051223753300	W18x35	E5	960 0.083 L.F. S 60.03 S 5.20 S	2 15 5 67 38 5	86 727 74 S	7.512.65 \$	3 105 19 5	97 346 58 5 65 72 5 8 99 5 2 37 5	77.08 5	94.948.31 \$	12 988 21 \$	3 424 03 5	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40															
W-Wide Flange1: W18840: 11 W-Wide Flange1: W21X50	337.68 322.16 26.04 338	337.68 051223753500	W16X40	Eb	960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ /5.66 \$	23,066.92 \$	1,/55.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$	86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 214.03 21.5 219	219 051223754300	W21x50	E5	1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104.47 S	20,627.61 \$	1,782.66 \$	468.66 S	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 S	1,897.35 \$	230.10 S	82.68 S	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2	39 36.35 2.27 39	39 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2 13 5 58 76 5	2.058.81 \$	149.76 \$	83.07 \$	2 291 64 5 58 48 5 6 56 5 2 35 5	67.39 \$	2 280 72 5	255.84 \$	91.65 \$	2 628 21 STD Year 2009 100-102
W-Wide Flange: W18X76															
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X86	61 57.53 8.84 61	61 051223753340	W16X/6	5	900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 5	8,3/0.42 \$ 142.83 \$ 9.63 \$ 2.52 \$	154.98 5	8,/12.63 \$	587.43 8	153.72 8	9,453.78 STD 14ear 2009 100-102
W-Wide Flange: W18X86:4 W-Wide Flange: W21X122	122 115.13 20.14 122	122 051223753940	W18x86	E5	900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 \$	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$	173.77 \$	19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 109.14 27.08 117	117 051223754780	W21x122	E5	1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 S	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$	239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102
59: 199 40	4371.05 4195.66 401.11	Total				\$	277,354.37 \$	20,078.61 \$	9,4/1.45 \$	306,904.44	\$	303,486.37 \$	34,585.64 \$	10,424.30 \$	346,495.34
Concrete-Rectangular Beam: 36x24		20 00000000000	Carrows David	las Brann 365-241						005.00 5 51.00 5	64.00	1.007.00			4 007 00 CTD V 5505 465 464
Concrete-Rectangular Beam: 30x24: 2 HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 99.17	20 033105350412	Concrete Rectange	iar beam: 36 x24	L.P. \$ 49.81 \$ - \$	- \$ 49.81 \$	930.20 \$	- 3	- >	396.20 5 54.89 5 - 5 - 5	54.89 \$	1,097.80 \$	- 3	- 5	1,097,80 STD Tear 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X1/8	13.56 9.89 0.09	13.56 051223750360	HSS4x2x1/8	E2	550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 S	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 174.83 7.85	193.49 051223750360	HSS6x4x3/8	E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 S	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 S	8,710.92 S	2,081.95 \$	741.07 S	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 49.62 1.19 53	52.69 051223750600	W10x12	E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$	36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16		66.63 061022761100	10/12-16	E2	200 0.054 E E 0743 E 202 E	240 6 22 62 6	1 000 00 0	267.27	143.07	2000 67 8 20 00 8 6 71 8 2 40 8	30.13	1.070.21	440.38	107.01	0.668.50 STD Vear 2008 100.502
W-Wide Flange1: W12X19	05.03 03.20 2.04 00	0.00 001223701100	TTEATO	64	000 0.000 L.1. a 21.43 a 3.32 a	2.10 0 33.53 0	1,000.2.3 8	251.21 0	143.07 8	2,200.57 a 30.02 a 0.71 a 2.40 a	35.13 8	1,570.21 3	440.30 a	197.91 0	2,500.10 510 14412007 100-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100	W12x19	E2	880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$	44.76 S	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 994.84 43.95 1,028	1027.65 051223751900	W14x22	E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 62.18 5.33 71	71.21 051223752320	W14x43	E2	810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 S	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$	90.62 \$	5,748.78 S	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.62 4.06 26	26.33 051223752380	W14x82	E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4.050.61 \$	122.96 \$	68.19 S	4 251 77 \$ 168 71 \$ 8 00 \$ 2.85 \$	179.56 \$	4.442.13 \$	210.64 \$	75.04 S	4.727.81 STD Vear 2009 100-102
W-Wide Flange1: W14X109 2	20033 24000 4000 50		111111			2.00 0 101.40 0		144.07				4,442,10 4	210.01	10.04	
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.31 7.99 38	37.67 051223752500	W14x103	EZ	720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 5	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$	236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X21	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16831 W-Wide Flange1: W16831: 4	151.19 148.35 9.26 151	151.19 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 S	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35 W-Wide Flange1: W18X35: 36		1444.74 051223753300	W18x35	E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$	77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40		337.69 061323763600	W18-40	Ef	950 0.022 E 8 (8.24 8 6.20 8	24 4 76 46 4	22.046.02.8	176.01	206.04	26 48 97 8 76 4 8 960 8 237 8	86.40	26.220.61	2026.74	840.30 F	20.574 66 STD Vear 2009 100.102
W-Wide Flange1: W18AW, 11 W-Wide Flange1: W21X50	337.00 322.34 20.09 330	331.00 021623133000	TT TWATY		200 0.000 L1. 3 00.01 3 0.20 3	2.10 0 10.00 0	23,099.72 3	1,735.24 0	120.01 3	20,040.07 0 10.04 0 0.00 0 2.07 0	00.44	20,330.01 0	3,030.74 3	044.34 a	29,110,00 010 1481 2002 102-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W16X26	219 214.05 21.5 219	219 051223754300	W21x50	E5	1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26: 2	39 36.37 1.9 39	39 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1.945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 \$	1,897.35 \$	230.10 S	82.68 S	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2	39 36.35 2.27 39	39 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 S	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 S	2,280.72 \$	255.84 S	91.65 S	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 2	61 57.57 8.84 61	61 051223753940	W18x76	ES	900 0.089 L.F. 5 129 38 5 5.55 5	2 29 5 137 22 5	7.892.18 \$	338.55 \$	139.69 \$	8 370 42 5 142 83 5 9 63 5 2 52 5	154.98 \$	8,712,63 5	587.43 \$	153.72 \$	9.453.78 STD Year 2009 100-102
W-Wide Flange: W18X86															
W-Wide Flange: W18X86: 4 W-Wide Flange: W21X122	122 115.17 20.14 122	122 051223753940	W18X86	ES	900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 S	677.10 S	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$	173.77 \$	19,717.64 \$	1,174.86 5	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 109.2 27.09 117 4120.72 4196.17 401.25	117 051223754780 Total	W21x122	E5	1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25.167.87 S 228.74 S 8.64 S 2.27 S	239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
41	4770.72 4270.27 40125							10,010,01		and a state of the			54,551.00	10,422.00	(All and a second secon
Concrete-Rectangular Beam: 36x24 Concrete-Rectangular Beam: 36x24: 2	20 20 99.17	20 033105350412	Concrete Rectang	lar Beam: 36%24*	IF 5 4981 5 . 5	. 5 49.81 5	996.20 \$. 5		995.20 5 54.89 5 . 5 . 5	54.89 5	1.097.80 5			1.097.80 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8															
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360	H554X2X1/6	EZ	550 0.102 L.P. S 4.54 S 6.27 S	3.49 5 14.30 5	70.01 5	36.68 \$	53.82 3	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$	19.59 5	77.10 \$	165.92 8	59.06 \$	302.06 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flagge1: W10X12	191.98 173.33 7.79	191.98 051223750360	HSS6x4x3/8	E2	550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$	59.61 S	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 49.62 1.19 53	52.69 051223750600	W10x12	E2	600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$	36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100	W12x16	E2	880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 S	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$	39.13 S	1,970.21 \$	440.38 S	157.51 S	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19		266.26 061222761102	W12-10	62	80 0.000 E E 20.07 E 200 E	2 42 5 29 57 5	0.670.00	100274	600.45 E	40.005.07 5 75.55 5 5.74 5 0.40 5	44.76	0.00.07	1 700 00 0	670 M2 K	44.047.00 CTD Vers 2000 100.100
W-Wide Flange1: W12X19: 30 W-Wide Flange1: W14X22	005 94,0 05.005	200.20 001223751100	WIZA15	E2	000 0.004 L.F. \$ 32.57 \$ 3.32 \$	2.10 3 30.07 3	0,072.03 5	1,043.74 5	500.45 3	10,239,27 9 30,00 9 0,71 9 2,40 9	46.70 3	3,432.17 3	1,700.00 3	639.02 \$	11,917,00 31D 1148 2003 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 994.84 43.95 1,028	1027.65 051223751900	W14x22	E2	990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$	56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 62.18 5.33 71	71.21 051223752320	W14x43	E2	810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$	90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Hange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.62 4.06 26	26.33 051223752380	W14x82	E2	740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$	179.56 S	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1		37.67 051223752500	W14x109	E2	720 0.078 L.F. 5. 204 93 5. 4.80 5.	2.67 5 212.40 5	7 719 71 \$	180.82 5	100.58 5	8 001 11 5 225 53 5 8 21 5 2 93 5	236.77 \$	849948 5	309.27 5	110.37 5	8 919 13 STD Year 2009 100-102
W-Wide Flange1: W16X26	30.31 7.39 30				120 0101021 0 200.00 0 0	2.07 0 2.12.40 0	1,12.11	100.02	100.00	0.001.11 0 110.00 0 011 0 1.00 0	230.11	0,425.46	565.27	110.51	0,313,13 010 100,200 100 100
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X11	65.63 63.03 3.3 66	65.63 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.35 9.26 151	151.19 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 S	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Hange1: W18835 W-Wide Flange1: W18835: 36	1444.74 1411.28 99.74 1,445	1444.74 051223753300	W18x35	E5	960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$	77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 322.91 26.09 338	337.68 051223753500	W18x40	E5	960 0.083 L.F. \$ 68.31 \$ 6.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25.548.87 \$ 76.04 \$ 8.59 \$ 2.37 \$	86.40 \$	25.339.51 S	3.035.74 \$	800.30 S	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50	330	040 Accessor													
W-Wide Flange1: W21X50: 7 W-Wide Flange: W16X26	219 214.05 21.5 219	219 051223754300	vv21x50	E5	100+ 0.075 L.P. \$ 85.39 \$ 4.70 \$	1.94 5 92.03 5	18,700.41 S	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$	104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	zz, 878, 93 [STD Year 2009 100-102
W-Wide Flange: W16X26: 2 W-Wide Flange: W16X11	39 36.37 1.9 39	39 051223752700	W16x26	E2	1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$	56.67 S	1,897.35 \$	230.10 \$	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31: 2	39 36.35 2.27 39	39 051223752900	W16x31	E2	900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 S	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$	67.39 S	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76 W-Wide Flange: W18X76: 2	61 57.57 8.84 61	61 051223753940	W18x76	E5	900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8.370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$	154.98 \$	8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X86 W-Wide Flange: W18X86: 4	122 115.12 20.44 155	122 051223753940	W18v86	E5	900 0.089 F. S 163 36 S F F F	2 29 5 161 10 6	18 709 70 5	677 10 C	276 38 6	19 666 18 5 161 62 6 0 63 6 0 69 4	173.77 €	19.717.64 E	1 174 86 1	307.44 6	21 199 94 STD Year 2009 100.102
W-Wide Flange: W21X122		The protection of			viver at a 155.35 a 5.55 a	a.a.r v 101.17 0	10,100.10 0	011.10 0	£17.30 0	10,000.10 0 101.02 0 2.03 0 2.02 0	110.11 0	12,111,04 2	1,174.00 4	Jul 199 0	- 1, 120, 20 prov
W-Wide Flange: W21X122: 6 41: 199	117 109.2 27.09 117 4371.05 4196.54 401.2	117 051223754780 Total	W21x122	E5	1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$ 277,354.37 \$	585.00 \$ 20,078.61 \$	242.19 \$ 9,471.45 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 306,904.44	239.65 \$	26,762.58 \$ 303,486.37 \$	1,010.88 \$ 34,585.64 \$	265.59 \$ 10,424.30 \$	28,039.05 STD Year 2009 100-102 348,496.34

42												
Concrete-Rectangular Beam: 36x18 Concrete-Rectangular Beam: 36x19: 2	20 20 24.39	20 033105350412	Novrada Dartanyular Baami 35°v18° I F C 17.36 C C	5 17 16 E	747.20 5			747 20 6 41 47 6 6 6 41 47 6	823.40 5			823.40 STD Veer 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 74.30	EA DOLLADORALE	concrete restangular beam. 20 x 10	- a 57.56 a	147.20 8			147.60 0 41.11 0 0 0 41.11 0	023,40			023.40 010 148 2009 100 401
HSS-Hollow Structural Section1: HSS402X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360 H	ISS4x2x1/8 E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 175.83 7.9	191.98 051223750360 H	ISS6x4x3/8 E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 S	1,203.71 \$	670.01 \$	9.721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 50.12 1.2 53	52.69 051223750600 W	V10x12 E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16		65.63 051223751100 M	V12v16 F2 880 0.0541 F € 27.43 € 3.02 €	2.10 \$ 33.63 \$	1 800 23 5	267.27 8	143.07 \$	2 200 67 6 30 02 6 6 78 6 2 40 6 30 13 6	1 970 21 6	440.38 \$	167.61 8	2.668.40 STD Veer 2009 100.102
W-Wide Flange1: W12X19	03.03 03.20 2.04 00	0.00 00.000 00.000		2.10 0 33.33 0	1,000.25	251.21	145.07	2,200.07 0 30.02 0 0.71 0 2.40 0 30.13 0	1,570.21	440.30 3	101.01	2,553.10 010 148.2007 149.102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100 V	V12x19 E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 S	10,296.27 \$ 36.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 995.84 43.99 1,028	1027.65 051223751900 V	V14x22 E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 62.18 5.33 71	71.21 051223752320 W	V14x43 E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5.233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 \$	519.12 \$	185.15 \$	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2												
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.87 4.1 26	26.33 051223752380 97	V14X82 E2 /40 0.0/6 L.P. \$ 154.22 \$ 4.6/ \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 5	75.04 \$	4,727.81 STD Tear 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 V	V14x109 E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W15X26 W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 V	V16x26 E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4		151 19 051223752900 V	V16x31 F2 900 0.062 F \$ 62.79 \$ 1.84 \$	2 13 5 58 76 5	7 981 12 \$	580.57 \$	322.03 \$	8 67 70 8 67 6 8 67 6 8 97 70	8.841.59 \$	991.81 \$	355 30 5	10 188 69 STD Year 2009 100-102
W-Wide Flange1: W18X35	434.17 490.0 7.00 4.74	151.15 65122500 P		2.13 3 30.10 3	1,001.00	560.57	322.03	0.0032 3 3030 3 0.50 3 2.55 3 01.55 3	0,001,02	331.01	333.37 4	10,100,00 010 10812000 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1413.28 99.88 1,445	1444.74 051223753300 V	V18x35 E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 S	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 323.16 26.11 338	337.68 051223753500 V	V18x40 E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.55 21.55 219	219 051223754300 W	V21x50 E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26		30 0/10007/0700			1775.00	121.01	74.00		4.007.02	000.40		0.040.42 (PTD) V 2000 100 100
W-Wide Flange: W16X26: 2 W-Wide Flange: W16X31	39 36.87 1.93 37	39 051223752700 1	V16X26 E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.85 \$	1,945./1 5 48.65 5 5.90 5 2.12 5 56.67 5	1,897.35 \$	230.10 5	82.65 \$	2,210.13 SID Tear 2009 100-102
W-Wide Flange: W16X31: 2	39 36.85 2.3 39	39 051223752900 V	V16x31 E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 2	61 58.07 8.92 61	61 051223753940 V	V18x76 E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	8,712.63 \$	587.43 \$	153.72 S	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X86 W-Wide Flange: W18X86: 4	122 116.17 20.32 122	122 051223753940 W	V18x86 E5 900 0.089 L.F. \$ 153 35 \$ 5.55 \$	2.29 \$ 161.19 \$	18 708 70 S	677.10 \$	279.38 \$	19 665 18 \$ 161 62 \$ 9 63 \$ 2 52 \$ 173 77 \$	19.717.64 \$	1.174.86 \$	307.44 \$	21 199 94 STD Year 2009 100-102
W-Wide Flange: W21X122	334 34747 87478 334											
W-Wide Flange: W21X122: 6 42: 199	117 109.2 27.09 117 4371.05 4206.54 377.21	117 051223754780 W	VZ1X1ZZ E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$ 277,105.37 \$	585.00 S 20,078.61 S	242.19 S 9,471.45 S	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$ 306,655.44 \$	26,762.58 \$ 303,211.97 \$	1,010.88 S 34,585.64 S	265.59 \$ 10,424.30 \$	28,039.05 STD Year 2009 100-102 348,221.94
43												
Concrete-Rectangular Beam: 36x18 Concrete-Rectangular Beam: 36x18: 2	20 20 74.18	20 033105350412	Concrete Rectangular Beam: 36'x18"	- \$ 37.36 \$	747.20 S	- S	- 5	747.20 \$ 41.17 \$ - 5 - 5 41.17 \$	823.40 \$	- S	- S	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8		13.52 0.523374344										
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	13.56 9.89 0.09	13.56 051223750360 H	ISS4x2x1/6 EZ 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 177.33 7.97	193.49 051223750360 H	ISS6x4x3/8 E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.7 50.14 1.2 53	52.7 051223750600 W	V10x12 E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.82 \$	303.03 \$	168.64 \$	1.551.49 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.98 \$	518.57 \$	185.50 \$	1.904.05 STD Year 2009 100-102
W-Wide Flange1: W12X16		65.63 051223751100 M	V12-16 F2 880 0.0541 F € 27.43 € 3.02 €	2.10 6 23.63 6	1 800 23 5	267.27 8	143.07 \$	2 200 67 6 30 02 6 6 78 6 2 40 6 30 13 6	1 970 21 8	440.38 \$	167.61 8	2.668.40 STD Veer 2009 100.102
W-Wide Flange1: W12X19	05.03 05.20 2.04 00	10.00 00 N22010 1100		2.10 0 33.33 0	1,000.25	251.21 0	145.07	2,200.37 9 30.02 9 0.71 9 2.40 9 35.13 9	1,570.21	440.56	101.01	2,000.10 010 1481,2009 149-148
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100 V	V12x19 E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33	1027.65 996.03 44 1,028	1027.65 051223751900 V	V14x22 E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 S	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 16	71.21 63.02 5.4 71	71.21 051223752320 W	V14x43 E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5.233.22 \$	303.35 \$	168.77 \$	5.705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5.748.78 \$	519.12 \$	185.15 S	6.453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2		00 00 AC 40000700000		0.00 0.000 0.00	1000.01	100.00	(0.40 A		1 110 10 1	010.01	75.44	4 707 04 CTD V 2005 400 400
W-Wide Flange1: W14062 2: 1 W-Wide Flange1: W140109 2	26.33 24.88 4.1 20	26.33 051223752300 9	T14X02 E2 /40 0.0/0 L.P. \$ 154.22 \$ 4.0/ \$	2.53 \$ 101.40 \$	4,050.61 5	122.99 \$	65.19 5	4,251.77 5 166.71 5 0.00 5 2.65 5 179.56 5	4,442.13 \$	210.64 5	75.04 5	4,727,01 STD 1487,2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.56 8.04 38	37.67 051223752500 V	V14x109 E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 V	V16x26 E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4	151.19 148.6 9.28 151	151.19 051223752900 W	V16x31 E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7.981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8.841.59 \$	991.81 \$	355.30 \$	10.188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35	-	1444 74 0(10007/00000 M		0.45 6 67.70 6		7.00.00	2405.40		01010.21	40.000.04	2424.02	444 300 77 PTD V 3000 100 100
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1413.53 99.9 1,445	1444.74 051223753300 9	V18X35 E5 960 0.083 L.P. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 5	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.03 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360,56 STD Tear 2009 100-102
W-Wide Flange1: W18X40: 11 W. Wide Flange1: W18X40	337.68 323.98 26.17 338	337.68 051223753500 V	V18x40 E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,056.92 \$	1,755.94 \$	726.01 \$	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 214.58 21.56 219	219 051223754300 V	V21x50 E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 S	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	458.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.87 1.93 39	39 051223752700 V	V16x26 E2 1000 0.056 LF. S 44.51 S 3.46 S	1.92 \$ 49.89 \$	1.735.89 \$	134.94 \$	74.88 \$	1945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1.897.35 \$	230.10 \$	82.68 \$	2.210.13 STD Year 2009 100-102
W-Wide Flange: W16X31	-	30 074233772300								055.04	41.41	4 504 AL OTD V/ 0000 400 400
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.85 2.3 39	39 051223/52900	V16x31 E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 5	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 2	61 58.1 8.93 61	61 051223753940 V	V18x76 E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.98 \$	8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X86: 4	122 116.22 20.33 122	122 051223753940 V	V18x86 E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 S	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173.77 \$	19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122 6		117 051223754780 V	V21x122 E5 1000 0.08 L.F. 5 208.04 5 5.00 5	2.07 5 215 11 5	24 340 68 5	585.00 \$	242 19 5	25 167 87 5 228 74 5 8 54 5 2 27 5 239 55 5	26 762 58 \$	1 010 88 5	265.59 \$	28.039.05 STD Year 2009 100-102
43: 199	4370.72 4208.48 377.45	Total		s	277,158.85 \$	20,076.48 \$	9,470.25 \$	306,705.60 \$	303,270.88 \$	34,581.98 \$	10,422.99 \$	348,275.87
44 Concrete-Rectangular Beam: 36x18												
Concrete-Rectangular Beam: 36x18: 2	20 20 74.38	20 033105350412 C	Concrete Rectangular Beam: 36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 \$	- \$	- \$	747.20 \$ 41.17 \$ - \$ - \$ 41.17 \$	823.40 \$	- \$	- \$	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360 H	ISS4x2x1/8 E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 S	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8	101.00 175.02 7.0	101.02 001222200300	10020-1-738 E2 E40 0 1021 E c 40.00 c c 77 c	3 43 6 60 64 6	7.040.44 6	1 000 71 5	670.01 6	0.704.07 6 46.00 6 40.76 6 2.02 6 60.64 6	9,642,04 6	2.055.70 8	736.99 6	11 442 02 CTD Very 2009 100 102
W-Wide Flange1: W10X12	191.90 175.83 7.9	121.20 021223/30300 P		3.42 9 50.64 9	1,040.14 3	1,293./1] \$	0/0.01 \$	a,rei.or a 40.ve a 10.76 5 3.63 5 59.61 5	0,042.34 \$	2,000.10 a	130.20 \$	11/443/33 [010 148/2003 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 50.14 1.2 53	52.69 051223750600 V	V10x12 E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 V	V12x16 E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,000.23 \$	257.27 S	143.07 S	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.13 \$	1,970.21 \$	440.38 S	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W	V12x19 E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 S	10.296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22		1003 07 074000 00										58 555 55 OTD 1/ 0000 400 400
W-Wide Flange1: W14K22: 33 W-Wide Flange1: W14K43	1027.65 996.03 44 1,028	1027.00 001223751300 17	T14X22 CZ 3730 0.001 L.F. 3 44.51 3 3.48 3	1.94 8 49.93 8	45,740.70 \$	3,576.22 8	1,993.64 3	51,310.56 a 40.65 a 5.36 a 2.13 a 56.74 a	43,335.17 3	6,124.79 3	2,100.03 3	56,306.86 510 1441 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 63.02 5.4 71	71.21 051223752320 V	V14x43 E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1	26.33 24.88 4.1 26	26.33 051223752380 W	V14x82 E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 S	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 W	V14x109 E2 720 0.078 L.F. 5 204.93 5 4.80 5	2.67 \$ 212.40 \$	7.719.71 \$	180.82 S	100.58 \$	8 001 11 5 225 63 5 8 21 5 2 93 5 236 77 5	8.499.48 S	309.27 \$	110.37 \$	8.919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26	200 AV 20	55 52										A THAT ALL OTTO ALL ON ALL OTTO ALL O ALL OTTO ALL OTTO A
W-Wide Flange1: W16X26: 3 W-Wide Flange1: W16X31	65.63 63.03 3.3 66	65.63 051223752700 V	VTEX25 EZ 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 \$	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31: 4	151.19 148.6 9.28 151	151.19 051223752900 V	V16x31 E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X55 W-Wide Flange1: W18X35: 36	1444.74 1413.53 99.9 1,445	1444.74 051223753300 W	V18x35 E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	94,948.31 \$	12,988.21 \$	3,424.03 \$	111.360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W19X40 ***	80,555 B0,555 B0,755	337.68 061223753600	V18x40 F5 950 0,000 F F 00.34 F 500 5	215 5 75.00 0	23.055.92	1766.04	735.04 8	26.648.87 \$ 76.04 € 8.60 € 9.97 € 80.04	26 330 54	3 036 74 1	800.30	28 176 55 STD Vear 2009 400 402
W-Wide Flange1: W21X50		WINESTOWN W		a. 10 0 10.00 0	a.d,000.02 3	s,100.24 3	120.01 3	au,umu.ur a 10.04 a 0.00 a 2.3/ 3 80.40 \$	20,000.01 0	3,035.74 3	300.30 3	AU, 110,00 (010) 1001 (000) 100-102
W-Wide Flange1: W21X50: 7 W-Wide Flange: W16X26	219 214.58 21.56 219	219 051223754300 V	V21x50 E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26: 2	39 36.87 1.93 39	39 051223752700 V	V16x26 E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1.945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	1,897.35 \$	230.10 \$	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2	39 36.85 2.3 34	39 051223752900 M	V16x31 E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2.058.81 S	149.76 \$	83.07 S	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2.280.72 \$	255.84 \$	91.65 S	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76		61 0612777779440		2 22 2 427 22 4	7 000 40 4	220.00	420.00	9 270 42 E 442 92 E 6 7 E 6 7 C E	0.740.00	607 43 A	442 33 4	9 452 79 CTD V 9998 449 449
W-Wide Flange: W18X86	vi 58.1 8.93 61	0, USI223153540 W	ED DW U.083[L.P. \$ 129.38 \$ 5.55 \$	6.67 9 131.22 \$	7,032.16 \$	330.00 \$	133.03 2	9.319.42 9 142.03 9 3.03 9 2.52 5 154.38 S	0,/12.63 \$	50r.43 \$	193.72 \$	9,455.10 0157 Teat 2009 100-102
W-Wide Flange: W18X86: 4 W-Wide Flange: W21X122	122 116.22 20.33 122	122 051223753940 V	V18x86 E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 S	279.38 \$	19.665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173.77 \$	19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 109.26 27.11 117	117 051223754780 V	V21x122 E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
44: 199	4371.05 4208.85 377.4	Total		\$	277,105.37 \$	20,078.61 \$	9,471.45 \$	306,655.44 \$	303,211.97 \$	34,585.64 \$	10,424.30 \$	348,221.94

45												
Concrete-Rectangular Beam: 36x18 Concrete-Rectangular Beam: 36x18: 2	20 20 74.38	20 033105350412 Concrete R	ectangular Beam: 36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 S	· \$	- S	747.20 \$ 41.17 \$ - \$ - \$ 41	17 \$ 823.40 \$. s	. S	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8 HSS.Mollow Structural Section1: HSS4X2X1/8: 8	15.42 11.26 0.11	15.42 051223750360 HSS4v2v1	8 F2 550 0.102 F 5 4.54 5 6.27 5	3.49 5 14.30 5	70.01 5	96.68 \$	53.82 5	220.51 \$ 5.00 \$ 10.75 \$ 3.83 \$ 10	59 \$ 77 10 \$	165.92 %	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8				0.49						100.02		
HSS-Hollow Structural Section1: HSS6X4X3/8: 20 W-Wide Flange1: W10X12	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3	8 E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 55	61 \$ 8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2 W-Wide Flange1: W12X16	52.69 50.14 1.2 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 S	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 34	13 \$ 1,199.75 \$	518.47 S	185.47 S	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$	257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 35	13 \$ 1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 S	580.45 S	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44	76 \$ 9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22 W-Wide Flange1: W14X22: 33		1027.65 051223751900 W14x22	F2 990 0.007 F 5 44.51 5 3.48 5	194 5 49.93 5	45 740 70 5	3 575 22 \$	1993.64 5	51 310 55 5 48 55 5 595 5 213 5 54	74 \$ 49 995 17 \$	6 124 79 5	2 188 89 5	58 308 85 STD Year 2009 100-102
W-Wide Flange1: W14X43	1000					0,070 82	1,000,04				2,100.07	
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82 2	71.21 63.02 5.4 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 S	168.77 S	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90	.62 \$ 5,748.78 \$	519.12 \$	185.15 S	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.88 4.1 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 175	56 \$ 4,442.13 \$	210.64 S	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 238	77 \$ 8,499.48 \$	309.27 \$	110:37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 54	.67 \$ 3,192.90 \$	387.22 \$	139.14 S	3,719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 4		151.19 051223752900 W16x31	E2 900 0.062 L.F. 5 52.79 5 3.84 5	2.13 \$ 58.76 \$	7.981.32 \$	580.57 S	322.03 \$	8 883 92 5 58 48 5 6 56 5 2 35 5 65	39 \$ 8.841.59 \$	991.81 \$	355.30 \$	10.188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35												
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1413.53 99.9 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77	08 \$ 94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11 W-Wide Flange1: W21X50	337.68 323.98 26.17 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86	40 \$ 25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50: 7	219 214.58 21.56 219	219 051223754300 W/21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	18,700.41 \$	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104	47 \$ 20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	39 36.87 1.93 39	39 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1,945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 54	67 \$ 1,897.35 \$	230.10 S	82.68 \$	2,210.13 STD Year 2009 100-102
W-Wide Flange: W16X31 W-Wide Flange: W16X31: 2		39 051223752900 W16x31	F2 900 0.0621 F 5 62.79 5 3.84 5	2 13 5 58 76 5	2 058 81 5	149.75 \$	83.07 5	2 291 54 5 58 48 5 6 56 5 2 35 5 63	39 \$ 2 280 72 \$	255.84 \$	91.65 \$	2.628.21 STD Year 2009 100-102
W-Wide Flange: W18X76												
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X86	61 58.1 8.93 61	61 051223753940 W18x76	E5 900 0.089[L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370,42 \$ 142,83 \$ 9,63 \$ 2.52 \$ 154	98 \$ 8,712.63 \$	587.43 \$	153.72 \$	9,453.76 STD Year 2009 100-102
W-Wide Flange: W18X86:4 W-Wide Flange: W21X122	122 116.22 20.33 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 S	677.10 S	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 17	77 \$ 19,717.64 \$	1,174.86 \$	307.44 \$	21.199.94 STD Year 2009 100-102
W-Wide Flange: W21X122: 6	117 109.26 27.11 117	117 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 238	65 \$ 26,762.58 \$	1,010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102
45: 199	4371.05 4208.85 377.4	fotal		S	z(7,105.37 \$	20,078.61 \$	9,471.45 \$	306,655.44	3 303,211.97 \$	34,585.64 \$	10,424.30 \$	346,ZZ1.94
Concrete-Rectangular Beam: 36x18		20 022405250440	antana dar Banasi 36°×10° D. P. Ja. antan	e 9794 e	747.00				17 6			992 46 CTD V 2000 400 404
Loncrete-Rectangular Beam: 30x18: 2 HSS-Hollow Structural Section1: HSS40x2X1/8	20 20 74.38	20 U03000412 Concrete R	estangerar ureant: 20 X10 L.P. 5 37.36 \$ - \$	- > 37.36 \$	141.20 5	- 5	- 5	r4r.zu > 41.1r 5 - 5 - 5 4	11 a 623,40 \$	- 5	- 5	823.40 [510 148/2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	13.56 9.89 0.09	13.56 051223750360 HSS4x2x1/	8 E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 S	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19	59 S 67.80 S	145.91 S	51.93 S	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 177.33 7.97	193.49 051223750360 HSS6x4x3	8 E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 \$	675.28 \$	9,798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 55	61 \$ 8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.7 50.16 1.2 53	52.7 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.82 \$	303.03 \$	168.64 \$	1.551.49 \$ 22.77 \$ 9.84 \$ 3.52 \$ 38	13 \$ 1,199.98 \$	518.57 \$	185.50 \$	1,904.05 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.054 L.F. 5 27.43 5 3.92 5	2.18 \$ 33.53 \$	1.800.23 \$	257.27 \$	143.07 S	2 200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 35	13 S 1.970.21 S	440.38 S	157.51 \$	2.568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19		365 36 06132751400 W49-10		0.00 E . 20.07 E	0.670.00	101274	600.45 F		72 8 0.000.07 8	1705.00	610.02 F	41.047.00 STD Vest 2008 100 102
W-Wide Hange1: W12X19: 36 W-Wide Flange1: W14X22	200.20 246.55 9.44 200	200.20 051223751100 9712813	E2 000 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 36.67 \$	8,672.09 \$	1,043.74 5	560.45 5	10,296,27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44	10 5 9,492.17 5	1,700.60 \$	639.02 \$	11,917.80 SID Tear 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 996.22 44.01 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. S 44.51 S 3.48 S	1.94 \$ 49.93 \$	45,740.70 S	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 50	74 \$ 49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 63.17 5.42 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90	62 \$ 5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14082.2 W-Wide Flange1: W14082.2:1	26.33 24.9 4.1 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179	56 \$ 4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 33	37.67 051223752500 W14x109	E2 720 0.078 L.F. 5 204.93 5 4.80 5	2.67 \$ 212.40 \$	7.719.71 \$	180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236	77 S 8.499.48 S	309.27 \$	110.37 S	8.919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26		66.63 06.577762760 Middle.08		4 00 0 40 00 0	0.001.40	007.00	405.04		CT 6 24000 6	207.02	120.44	2 740 05 ETD Vers 2000 100 100
W-Wide Hange1: W16X26: 3 W-Wide Flange1: W16X31	05.03 05.03 3.3 00	65.63 051223752700 VY16X26	C2 1000 0.030 L.F. 5 44.51 5 3.46 5	1.92 5 49.89 5	2,921.19 5	221.08 8	126.01 3	3,2/4.28 5 48.65 5 5.90 5 2.12 5 54	6/ 5 3,192.90 5	367.22 8	139.14 5	3,719.25 510 Tear 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.6 9.28 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 63	39 \$ 8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1413.68 99.91 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 71	08 \$ 94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18040 W-Wide Flange1: W18040: 11	337.68 324.08 26.18 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86	40 \$ 25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.73 21.57 219	219 051223754300 W/21x50	E5 1064 0.075 L.F. S 85.39 S 4.70 S	1.94 \$ 92.03 \$	18,700.41 S	1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104	47 \$ 20,627.61 \$	1,782.66 \$	468.66 S	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2		39 051223752700 W15v25	F2 1000 0.0561 F S 44.51 S 3.45 S	1 02 5 40 80 5	1 736 89 5	121.01 5	74.88 5	1 045 71 5 49 55 5 500 5 212 5 51	67 C 4 807 35 C	230.40 5	2 83 58	2 210 13 STD Year 2009 100-102
W-Wide Flange: W16X26.2 W-Wide Flange: W16X31	39 30.07 1.93 37	33 031223732100 0110020		1.52 0 45.05 0	1,735.65	134.54 8	74.00 3	1,343.11 0 40.00 0 3.30 0 2.12 0 5	or a 1,027.35 a	230.10 3	02.00 3	2,210.13 010 10412009 100102
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 36.85 2.3 39	39 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 63	39 \$ 2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X86	61 58.14 8.93 61	61 051223753940 W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154	98 \$ 8,712.63 \$	587.43 \$	153.72 S	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X86: 4	122 116.3 20.34 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 \$	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173	77 \$ 19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 109.41 27.14 117	117 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24,340.68 \$	585.00 \$	242.19 \$	25.167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 23	65 \$ 26,762.58 \$	1,010.88 \$	265.59 \$	28.039.05 STD Year 2009 100-102
46: 199	4370.72 4209.54 377.57	Total		s	277,158.85 \$	20,076.48 \$	9,470.25 \$	306,705.60	\$ 303,270.88 \$	34,581.98 \$	10,422.99 \$	348,275.87
Concrete-Rectangular Beam: 36x18												
Concrete-Rectangular Beam: 36x18: 2 HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 74.38	20 033105350412 Concrete R	ectangular Beam: 36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 S	· \$	· \$	747.20 \$ 41.17 \$ - \$ - \$ 41	17 \$ 823.40 \$. S	. S	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4022X1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/	8 E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19	59 \$ 77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3	8 E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$	1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 55	61 \$ 8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 50.16 1.2 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 S	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36	13 \$ 1,199.75 \$	518.47 \$	185.47 \$	1.903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3		65.63 051223761100 W12x16	E2 \$80 0.0641 E \$ 27.43 \$ 3.92 \$	2 18 5 33 53 5	1.800.23 \$	257.27 \$	143.07 \$	2 200 57 5 30 02 5 6 71 5 2 40 5 33	13 5 1 970 21 5	440.38 \$	157.51 \$	2 558 10 STD Year 2009 100-102
W-Wide Flange1: W12X19	0000 0000 2.04 00			2.10 0 00.00 0	1,000.20	20121 4	140,07	2.200.07 0 30.02 0 0.71 0 2.90 0 30	1,010,21		101.01	8,000,10 01D 108 2002 100 102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 5	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44	76 \$ 9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 996.22 44.01 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	45,740.70 \$	3,576.22 \$	1,993.64 \$	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 54	74 \$ 49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 63.17 5.42 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$	303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90	.62 \$ 5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.9 4.1 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179	56 \$ 4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1		37.67 051223752500 W14×109	E2 720 0.078 LF. 5 204 93 5 4.80 5	2.67 5 212.40 5	7.719.71 \$	180.82 5	100.58 \$	8 001.11 5 225.63 5 8.21 5 2.93 5 236	77 5 8.499.48 5	309.27 \$	110.37 5	8 919 13 STD Year 2009 100-102
W-Wide Flange1: W16X26		444440 (11)		100 0 1000 0	2.621.42				e2 e			3 746 36 CTD V 5555 455 455
w-wide flange1: W16X26: 3 W-Wide flange1: W16X31	05.03 03.03 3.3 66	60.63 U01223752700 W16x26	EZ 1000 0.056 L.P. 5 44.51 \$ 3.46 \$	1.92 5 49.89 5	2,921.19 \$	227.08 \$	126.01 \$	3,274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 54	toria 3,192.90 \$	387.22 \$	139.14 5	3,719.25 [510] Year 2009 [100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.6 9.28 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 S	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67	39 \$ 8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1413.68 99.91 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	86,727.74 \$	7,512.65 \$	3,105.19 \$	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77	.08 \$ 94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 11	337.68 324.08 26.18 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	23,066.92 \$	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86	40 \$ 25,339.51 \$	3,035.74 \$	800.30 \$	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50-2	219 214 71 21 57 914	219 061223764300 W24-60	E5 1064 0.07% F C 00.30 C 4.30 C	1.94 5 92.03 5	18.700.41	1,029 30 4	424.86 C	20 154 57 5 94 19 5 8 14 5 2 4 5 4	47 5 20 507 51 =	1782.64 5	468.66. *	22 878 93 STD Vear 2009 100. 102
W-Wide Flange: W16X26	219	20. Pristor Prove 1121X50		100 0 00.00 0	10,100/01 B	-,464,474 [3	-44.00 9		an a	1,194,00 3		
W-Wide Flange: W16X26: 2 W-Wide Flange: W16X31	39 36.87 1.93 39	39 051223752700 W16x26	EZ 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	1,735.89 \$	134.94 \$	74.88 \$	1.945.71 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56	or \$ 1,897.35 \$	230.10 \$	82.68 \$	2,210.13 [S1D] Year 2009 100-102
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X26	39 36.85 2.3 39	39 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 65	39 \$ 2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X76: 2	61 58.14 8.93 61	61 051223753940 W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$	338.55 \$	139.69 \$	8.370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154	98 \$ 8.712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X97 W-Wide Flange: W18X97: 4	122 116.3 22.91 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$	18,708.70 \$	677.10 \$	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.62 \$ 173	77 \$ 19,717.64 \$	1,174.86 \$	307.44 \$	21, 199.94 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122 6	112 109.41 27.14	117 051223764780 0424-133	E5 1000 0.001 E 5 200.04 5 500 F	2.07 5 215 44 6	24 340 69 4	585 M 8	242 49 6	25 167 87 5 228 74 6 8 54 6 2 37 6 39	65 S 06 760 68 F	1010.00 5	265.50 5	28.039.05 STD Year 2009 100.002
47: 199	4371.05 4209.91 380.09	Total		\$	277,105.37 \$	20,078.61 \$	9,471.45 \$	306,655.44	\$ 303,211.97 \$	34,585.64 \$	10,424.30 \$	348,221,94

48											
Concrete-Rectangular Beam: 36x18 Concrete-Rectangular Beam: 36x18: 2	20 20 24.38	20 033105350412 Concrete Rectangular	r Beam 36"x18"	. \$ 37.36 \$	747 20 5		747 20 5 41 17 5 5 5 5 41	7 5 823.40 5		. 5	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS40(2)(1/8	20 20 74.70										
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223/50360 HSS4x2x1/8	EZ 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$ 96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19	9 \$ 77.10 \$	165.92 \$	59.06 S	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$ 1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59	1 \$ 8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12: 2	52.69 50.16 1.2 53	52.69 051223750500 W10x12	E2 600 0.093 L.F. S 20.49 S 5.75 S	3.20 \$ 29.44 \$	1,079.62 \$ 302.97 \$	i 168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.	3 \$ 1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.064 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$ 257.27 \$	143.07 \$	2.200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.	3 \$ 1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19 W-Wide Flange1: W12X19: 36	266.26 246.35 9.44 266	266.26 051223751100 W12x19	E2 880 0.064 LF \$ 32.67 \$ 3.92 \$	2 18 5 38 67 5	8 672 09 5 1 043 74 5	580.45 S	10 296 27 \$ 36 65 \$ 6 71 \$ 2 40 \$ 44	16 S 9 492 17 S	1785.60 \$	639.02 \$	11 917 80 STD Year 2009 100-102
W-Wide Flange1: W14X22	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1										
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 996.22 44.01 1,025	1027.65 051223751900 W14x22	EZ 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$ 4	15,740.70 \$ 3,576.22 \$	5 1,993.64 5	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.	4 \$ 49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16 W-Wide Flange1: W14X82.2	71.21 63.17 5.42 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$ 303.35 \$	i 168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.	2 \$ 5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1	26.33 24.9 4.1 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$ 122.96 \$	68.19 S	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.	6 \$ 4,442.13 \$	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$ 180.82 \$	100.58 \$	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.	7 \$ 8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26 W-Wide Flange1: W16X26: 3		65.63 051223752700 W16x26	E2 1000 0.056LF \$ 44.51 \$ 3.46 \$	192 \$ 49.89 \$	2 921 19 5 227 08 5	126.01 \$	3 274 28 5 48 65 5 5 90 5 2 12 5 66	7 5 3 192 90 5	387.22 \$	139.14 \$	3 719 25 STD Year 2009 100-102
W-Wide Flange1: W16X31		40.40 40 400 000 000 000 000 000 000 000		1.22 0 42.03 0	2,021.10	120.01	0,114,20 0 40,00 0 0,00 0 2,12 0 000		001.22	100.14	
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.6 9.28 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$ 580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	9 \$ 8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1413.68 99.91 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$ 8	86,727.74 \$ 7,512.65 \$	5 <u>3,106.19</u> 5	97.346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.	38 \$ 94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 324.08 26.18 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$ 2	23,066.92 \$ 1,755.94 \$	5 725.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.	0 \$ 25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.73 21.57 219	219 051223754300 W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$ 1	18,700.41 \$ 1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.	7 \$ 20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	30 36.07 1.03 30	39 051223752700 W16v26	E2 1000 0.055 E \$ 44.51 \$ 3.46 \$	2 01.01 2 00.1	1716.00 6 134.04 6	74.88 \$	1 946 71 6 48 66 6 6 90 6 2 12 6 66	7 6 1 867 36 6	210 10 5	12.61 \$	2 210 13 STD Vear 2009 100-102
W-Wide Flange: W16X31											
W-Wide Flange: W10X31: 2 W-Wide Flange: W18X76	39 36.85 2.3 39	39 051223752900 W16X31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 5 58.76 5	2,058.81 5 149.76 5	83.07 5	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	19 5 2,280.72 S	255.84 5	91.65 5	2,628.21 S1D Year 2009 100-102
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X97	61 58.14 8.93 61	61 051223753940 W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$ 338.55 \$	139.69 \$	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154	8 \$ 8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X97: 4	122 116.3 22.91 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$ 1	18,708.70 \$ 677.10 \$	5 279.38 S	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173.	7 \$ 19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 109.41 27.14 117	117 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$ 2	24,340.68 \$ 585.00 \$	242.19 5	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239	5 \$ 26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
48: 199 40	4371.05 4209.91 380.09	Total		\$ 27	77,105.37 \$ 20,078.61 \$	9,471.45 \$	306,655.44	\$ 303,211.97 \$	34,585.64 \$	10,424.30 \$	348,221.94
Concrete-Rectangular Beam: 36x18								-			
Concrete-Rectangular Beam: 36x18: 2 HSS-Hollow Structural Section1: HSS402201/8	20 20 74.38	20 033106360412 Concrete Rectangular	r Beam: 36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 \$ - \$	5 - 5	747.20 \$ 41.17 \$ - \$ - \$ 41.	7 \$ 823.40 \$	- \$	- \$	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$ 96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19	9 \$ 77.10 \$	165.92 \$	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6M03/8: 20	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$ 1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59	1 \$ 8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 50.17 1.21 53	52.69 051223750600 W10×12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$ 302.97 \$	i 168.61 \$	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.	3 \$ 1,199.75 \$	518.47 \$	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3		65.63 051223751100 W12v16	E2 880 0.0641 E E 27.43 E 3.02 E	2 48 5 22 62 5	4 800 23 5 267 27 5	543.07 5	2 200 67 5 20 02 5 6 71 5 2 40 5 30	1 5 1 070 21 5	A40.38 S	467.64 E	2 668 40 STD Veer 2009 100-102
W-Wide Flange1: W12X19	03.03 03.20 2.04 00	40.00 00102101109 01102010		2.10 0 33.33 0	1,000.23 0 251.21 0	145.07 3	2,200.57 3 30.02 3 0.71 3 2.40 3 35.	5 6 1,510.21 6	440.50	157.51	2,500.10 010 148 200 100 100
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	206.26 246.35 9.44 206	266.26 051223751100 W12x19	EZ 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$ 1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.	6 \$ 9,492.17 \$	1,785.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 996.24 44.01 1,028	1027.65 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$ 4	15,740.70 \$ 3,576.22 \$	5 1,993.64 S	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.	4 \$ 49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 63.07 5.41 71	71.21 051223752320 W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$ 303.35 \$	168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.	2 \$ 5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2 W-Wide Flange1: W14X82 2: 1	26.33 24.92 4.11 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$ 122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.	6 \$ 4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7.719.71 \$ 180.82 \$	100.58 S	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236	7 5 8.499.48 5	309.27 \$	110.37 S	8.919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26		65 63 AE10007607AA MAR96		100 6 40 00 6	0.001.00	100.01		7 6 2 402 00 6	207.02	430.44	3 740 35 PTD Vor 3005 100 102
W-Wide Flange1: W16X20: 3 W-Wide Flange1: W16X31	05.63 63.03 3.3 00	65.63 U51223/52/UV W16826	E2 1000 0.050 L.F. \$ 44.51 \$ 3.46 \$	1.32 5 49.89 5	2,921.19 \$ 227.08 \$	126.01 5	3,2/4.28 \$ 48.60 \$ 5.90 \$ 2.12 \$ 50.0	3,192.90 5	387.22 \$	139.14 5	3,/19,25 SID Tear 2009 100-102
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.17 148.6 9.28 151	151.17 051223752900 W16x31	E2 900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,980.26 \$ 580.49 \$	321.99 \$	8,882.75 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	9 \$ 8,840.42 \$	991.68 \$	355.25 \$	10,187.35 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36	1444.74 1413.58 99.9 1,445	1444.74 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$ 8	86,727.74 \$ 7,512.65 \$	\$ 3,106.19 \$	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.	8 \$ 94,948.31 \$	12,988.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18840: 11	337.68 327.03 26.42 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$ 2	1,755.94 \$	726.01 \$	25.548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.	0 \$ 25,339.51 \$	3,035.74 \$	800.30 S	29,175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7	219 214.75 21.57 219	219 051223754300 W21x50	E5 1054 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$ 1	18,700.41 \$ 1,029.30 \$	424.86 S	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.	7 \$ 20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2	10 36.87 1.03 39	39 051223752700 W16x26	F2 1000 0.0% F 5 44.51 5 3.45 5	192 5 49.89 5	1735.89 5 134.94 5	74.88 5	1945.71 5 48.65 5 5 90 5 2 12 5 55	7 5 1897 35 5	230.10 \$	82.68 5	2 210 13 STD Year 2009 100-102
W-Wide Flange: W16X31	33 30107 203 33										
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X76	39 37.1 2.32 39	39 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$ 149.76 \$	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	19 \$ 2,280.72 \$	255.84 \$	91.65 \$	2,626.21 S1D Year 2009 100-102
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X97	61 58.17 8.94 61	61 051223753940 W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$ 338.55 \$	i 139.69 S	8,370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154	8 S 8,712.63 S	587.43 S	153.72 S	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X97: 4	122 116.3 22.91 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$ 1	18,708.70 \$ 677.10 \$	279.38 \$	19,665.18 \$ 161.62 \$ 9.63 \$ 2.52 \$ 173.	7 \$ 19,717.64 \$	1,174.86 \$	307.44 \$	21,199.94 STD Year 2009 100-102
W-Wide Flange: W2IX122 W-Wide Flange: W2IX122: 6	117 109.44 27.15 117	117 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$ 2	24,340.68 \$ 585.00 \$	242.19 S	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239	5 \$ 26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
49: 199 50	4371.04 4213.03 380.34	Total		\$ 27	7,104.31 \$ 20,078.53 \$	5 9,471.41 5	306,654.27	\$ 303,210.80 \$	34,585.51 \$	10,424.25 \$	348,220.60
Concrete-Rectangular Beam: 36x18											
Concrete-Rectangular Beam: 36x18: 2 HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 74.38	20 033105350412 Concrete Rectangular	r Beam: 36'x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 5 - 5	i - S	747.20 \$ 41.17 \$ - \$ - \$ 41.	7 \$ 823.40 \$	- S	- S	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section5: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$ 96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19	9 \$ 77.10 \$	165.92 \$	59.06 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 \$ 1,203.71 \$	670.01 \$	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.	1 \$ 8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 50.17 1.21 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$ 302.97 \$	i 168.61 S	1,551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36:	3 S 1,199.75 S	518.47 S	185.47 \$	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.054 L.F. \$ 27.43 \$ 3.92 \$	2.18 \$ 33.53 \$	1,800.23 \$ 257.27 \$	143.07 \$	2,200.57 \$ 30.02 \$ 6.71 \$ 2.40 \$ 39.	I3 \$ 1,970.21 \$	440.38 \$	157.51 \$	2,568.10 STD Year 2009 100-102
W-Wide Flange1: W12X19		966 96 061933261400 MH9-49	E2 000 0.0541 E e 2547 e 2.02 e	2.40 8 20.67 8	8.672.00 8 5.042.74 8	100.15	10 100 17 8 16 6 6 71 8 1 40 8 44	2 6 6 6 6 1 7 F	1705.00 8	630.02	11 017 00 STD Ven 2009 100 102
W-Wide Flange1: W14X22	200.20 240.33 3.44 200	20120 00122101100 011210		2.10 a 30.01 a	0,012.03 0 1,043.14 0	5 500.45 a	10,230.27 3 30.00 3 0.71 3 2.40 3 44.	0 0 0 0,452.17 0	1,700.00 3	635.02 8	11,511.60 510 104 2007 105-102
W-Wide Flange1: W14X22: 33 W-Wide Flange1: W14X43	1027.65 996.24 44.01 1,028	1027.65 051223751900 W/14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$ 4	15,740.70 \$ 3,576.22 \$	5 1,993.64 5	51,310.56 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.	74 \$ 49,995.17 \$	6,124.79 \$	2,188.89 \$	58,308.86 STD Year 2009 100-102
W-Wide Flange1: W14X43: 16	71.21 63.07 5.41 71	71.21 051223752320 W14x43	E2 810 0.069 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	5,233.22 \$ 303.35 \$	i 168.77 \$	5,705.35 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.	2 \$ 5,748.78 \$	519.12 \$	185.15 \$	6,453.05 STD Year 2009 100-102
W-Wide Flange1: W14X82 2: 1	26.33 24.92 4.11 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$ 122.96 \$	68.19 S	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179	6 S 4,442.13 S	210.64 S	75.04 S	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 33	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$ 180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.	7 \$ 8,499.48 \$	309.27 \$	110.37 \$	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26	-	65 63 051223752700 W46-26	F2 1000 0.0551 E E 44.51 6 345 6	1.02 6 40 80 6	2 921 10 6 937 44 4	100.04	1274 20 5 40 55 6 540 6 240 6 54	7 6 3 663 66 1 4	987.99 8	110 14 8	3 719 26 STD V-++ 2009 400.402
W-Wide Flange1: W16X31	93,03 3,5 66	****** *******************************		1.06 9 97.07 0	221.08 3	1,20,01 3	VALVENU V 40.00 0 0.00 3 2.12 3 561	3,192.90 3	6 32.100	122.14 3	0.110.00 prof. 1100.0003 100-106
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W18X35	151.19 148.6 9.28 151	151.19 051223752900 W16x31	EZ 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,961.32 \$ 580.57 \$	322.03 \$	8.883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	ra \$ 8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W18X35: 36 W-Wide Flange1: W18X40	1444.74 1413.58 99.9 1,445	1444.74 051223753300 W18x35	E5 960 0.083 LF. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$ 8	16,727.74 \$ 7,512.65 \$	5 3,106.19 S	97,346.58 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.	8 94,948.31 \$	12,968.21 \$	3,424.03 \$	111,360.56 STD Year 2009 100-102
W-Wide Flange1: W18X40: 11	337.68 327.03 26.42 338	337.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$ 2	23,066.92 \$ 1,755.94 \$	726.01 S	25,548.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.	0 \$ 25,339.51 \$	3,035.74 \$	800.30 \$	29.175.55 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 7		219 051223754300 W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$ 1	18,700.41 \$ 1,029.30 \$	424.86 \$	20,154.57 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.	7 \$ 20,627.61 \$	1,782.66 \$	468.66 \$	22,878.93 STD Year 2009 100-102
W-Wide Flange: W16X26 W-Wide Flange: W16X26: 2		39 051223752700 WH6v26	E2 1000 0.0551 F S 44.51 C 3.45 C	192 \$ 49.80 E	1735.89 \$ 137.64	74 88	1946.71 \$ 48.66 \$ 6.91 \$ 212 \$ 66	7 5 1 807 36 4	210.10 6	12 44 C	2 210 13 STD Year 2009 100.102
W-Wide Flange: W16X31	39,01 1.23 53		6 64.6 6 10.44 0 10.0 0 10.0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.02 0 0000 0	104.34	. 14.00 g		1,021.00 3	2.50.10 0	vs.00 0	
w-wide Flange: W10X31: 2 W-Wide Flange: W10X76	39 36.85 2.3 39	39 V91223/929V9 W16X31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 5 58.76 5	2,000.01 5 149.76 5	83.07 \$	2,291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.	17 ə 2,280.72 \$	255.84 \$	91.65 \$	2,626.21 [510 Year 2009 100-102
W-Wide Flange: W18X76: 2 W-Wide Flange: W18X97	61 58.17 8.94 61	61 051223753940 W18x76	E5 900 0.089 L.F. \$ 129.38 \$ 5.55 \$	2.29 \$ 137.22 \$	7,892.18 \$ 338.55 \$	139.69 \$	8.370.42 \$ 142.83 \$ 9.63 \$ 2.52 \$ 154.	8 \$ 8,712.63 \$	587.43 \$	153.72 \$	9,453.78 STD Year 2009 100-102
W-Wide Flange: W18X97: 4	122 116.3 22.91 122	122 051223753940 W18x86	E5 900 0.089 L.F. \$ 153.35 \$ 5.55 \$	2.29 \$ 161.19 \$ 1	18,708.70 \$ 677.10 \$	279.38 S	19,665.18 \$ 161.62 \$ 9.63 \$ 2.62 \$ 173.	7 \$ 19,717.64 \$	1,174.86 \$	307.44 S	21,199.94 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	117 109.44 27.15 117	117 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$ 2	24,340.68 \$ 585.00 \$	242.19 \$	25,167.87 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239	5 \$ 26,762.58 \$	1,010.88 \$	265.59 \$	28,039.05 STD Year 2009 100-102
50: 199	4371.05 4212.78 380.33	Total		\$ 27	7,105.37 \$ 20,078.61 \$	9,471.45 \$	306,655.44	\$ 303,211.97 \$	34,585.64 \$	10,424.30 \$	348,221.94

51												
Concrete-Rectangular Beam: 36x18 Concrete-Rectangular Beam: 36x18: 2	20 20 74.38	20 033105350412 Concrete Rectangular Beam	36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 \$	· 5	. s	747.20 \$ 41.17 \$. \$. \$. \$ 41.17 \$	823.40 \$. s	. 5	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8		45.45 DEX0007ED100 Li004.0.48			70.04							202 02 07D No 2000 400 400
HSS-Hollow Structural Section1: HSS4X2X1/8: 8 HSS-Hollow Structural Section1: HSS6X4X3/8	15.42 11.76 0.11	15.42 051223750360 HSS4x2x1/8	EZ 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	70.01 \$	96.68 \$	53.82 \$	220.51 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	77.10 \$	165.92 \$	59.05 \$	302.08 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8: 20	191.98 175.83 7.9	191.98 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,848.14 S	1,203.71 \$	670.01 S	9,721.87 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,642.94 \$	2,065.70 \$	735.28 \$	11,443.93 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6868(1/4: 14	183.99 173.02 6.49	183.99 051223750360 HSS6x6x1/4	E2 550 0.102 L.F. \$ 40.86 \$ 6.27 \$	3.49 \$ 50.62 \$	7,517.83 \$	1,153.62 \$	642.13 \$	9,313.57 \$ 45.00 \$ 10.76 \$ 3.83 \$ 59.59 \$	8,279.55 \$	1,979.73 \$	704.68 \$	10,963.96 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.69 50.17 1.21 53	52.69 051223750600 W10x12	E2 600 0.093 L.F. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.62 \$	302.97 \$	168.61 \$	1.551.19 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.75 \$	518.47 \$	185.47 S	1,903.69 STD Year 2009 100-102
W-Wide Flange1: W10X22 2 W-Wide Flange1: W10X22 2: 22		239.32 051223750720 W10v22	E2 600 0.0931 E 5 37.65 5 6.75 5	1.20 5 46.61 5	9.012.79 5	1 376 09 5	765.02 5	41 464 71 C 41 47 C 0 84 C 3 62 C 64 63 C	9.862.85	2 364 01 6	842.41 5	13 060 12 STD Year 2009 100-102
W-Wide Flange1: W10022 2:52 W-Wide Flange1: W10026 2	239,32 209,10 9,20 237	EGY-DE GOTEED GYDER		5.20 0 40.01 0	5,012.75	1,510.05	705.02	11,104,11 0 41,11 0 0.04 0 0.02 0 04.00 0	5,052.00	2,354.51	042.41	13,030.12 010 1461.2009 140-102
W-Wide Flange1: W10X26 2: 6 W-Wide Flange1: W10X39	88.74 83.33 4.37 89	88.74 051223750720 W10x26	E2 600 0.093 L.F. \$ 44.51 \$ 5.75 \$	3.20 \$ 53.46 \$	3,949.82 \$	510.26 \$	283.97 \$	4,744.04 \$ 48.65 \$ 9.84 \$ 3.52 \$ 62.01 \$	4,317.20 \$	873.20 \$	312.36 \$	5,502.77 STD Year 2009 100-102
W-Wide Flange1: W10X39: 16	71.37 54.58 4.28 71	71.37 051223750720 W10x39	E2 600 0.093 L.F. \$ 66.77 \$ 5.75 \$	3.20 \$ 75.72 \$	4,765.37 \$	410.38 S	228.38 \$	5.404.14 \$ 72.98 \$ 9.84 \$ 3.52 \$ 86.34 \$	5,208.58 \$	702.28 \$	251.22 \$	6.162.09 STD Year 2009 100-102
W-Wide Flange1: W10000 W-Wide Flange1: W10000: 3	39 35.55 4.31 39	39 051223750720 W10x60	E2 600 0.093 L.F. \$ 102.72 \$ 5.75 \$	3.20 \$ 111.67 \$	4,006.08 \$	224.25 \$	124.80 \$	4,355.13 \$ 112.28 \$ 9.84 \$ 3.52 \$ 125.64 \$	4,378.92 \$	383.76 \$	137.28 \$	4,899.96 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 3	65.63 63.26 2.04 66	65.63 051223751100 W12x16	E2 880 0.054 L.F. \$ 27.43 \$ 3.92 \$	2 18 5 33 53 5	1 800 23 5	257.27 \$	143.07 5	2 200 57 5 30 02 5 6 71 5 2 40 5 39 13 5	1 970 21 5	440.38 \$	157.51 \$	2 568 10 STD Year 2009 100-102
W-Wide Flange1: W12X19												10.007 00 0TO 110400 440 480
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W12X53	266.26 244.03 9.35 266	266.26 051223/51100 W12x19	EZ 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 5	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,786.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W12X53: 8 W-Wide Flange1: W14X22	233 228.64 24.21 233	233 051223751300 W12x53	E2 880 0.064 L.F. \$ 91.02 \$ 3.92 \$	2.18 \$ 97.12 \$	21,207.66 \$	913.36 \$	507.94 \$	22,628.96 \$ 99.74 \$ 6.71 \$ 2.40 \$ 108.85 \$	23,239.42 \$	1,563.43 \$	559.20 \$	25,362.05 STD Year 2009 100-102
W-Wide Flange1: W14X22: 21	637.64 618.74 27.34 638	637.64 051223751900 W14x22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	28,381.36 \$	2,218.99 \$	1,237.02 \$	31,837.37 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	31,021.19 \$	3,800.33 \$	1,358.17 \$	36.179.69 STD Year 2009 100-102
W-Wide Flange1: W14X43 W-Wide Flange1: W14X43: 12		56.54 051223752320 W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	4,155.12 \$	240.86 \$	134.00 \$	4,529.98 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	4,564.47 \$	412.18 \$	147.00 S	5,123.65 STD Year 2009 100-102
W-Wide Flange1: W14X68 W-Wide Flange1: W14X68: 5	350.92 350.97 47.71 351	350.97 051223752320 W14x68	F2 810 0.059 F \$ 112.22 \$ 4.26 \$	2 37 5 118.85 5	19 385 85 5	1.495.13 \$	831.80 5	41 712 78 \$ 127 67 \$ 7 29 \$ 2 60 \$ 137 66 \$	44 808 34 5	2 558 57 5	912.52 \$	48 279 43 STD Year 2009 100-102
W-Wide Flange1: W14X82 2	330.37 330.37 WITX 3334			2.01 4 110.00 4		1,430.10	001.00		44,000.04	2,000.01	016.06	40,219,49 010 14812409 149-142
W-Wide Flange1: W14X82 2: 1 W-Wide Flange1: W14X109 2	26.33 24.92 4.11 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,060.61 \$	122.96 \$	68.19 \$	4,251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2: 1 W-Wide Flange1: W16X26	37.67 36.56 8.04 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 \$	100.58 \$	8,001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 \$	8.919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26: 3	65.63 63.03 3.3 66	65.63 051223752700 W16x26	E2 1000 0.056 L.F. \$ 44.51 \$ 3.46 \$	1.92 \$ 49.89 \$	2,921.19 \$	227.08 S	126.01 \$	3.274.28 \$ 48.65 \$ 5.90 \$ 2.12 \$ 56.67 \$	3,192.90 \$	387.22 \$	139.14 S	3.719.25 STD Year 2009 100-102
W-Wide Flange1: W16X31 W-Wide Flange1: W16X31: 16		541.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	28,569.42 \$	2,078.17 \$	1,152.73 \$	31,800,32 \$ 58,48 \$ 6,56 \$ 2,35 \$ 67,39 \$	31,648.79 \$	3,550.21 \$	1,271,80 \$	36,470,79 STD Year 2009 100-102
W-Wide Flange1: W16X36		427.55 05422252400 WHEw26	E2 600 0.071 E E 60.31 E 4.33 E	240 8 26 00 8	0.712.64	(110) t	205.12	65000 E 760 E 796 E 960 E 860 E	0.071.26	039.77 6	276.46	10 846 58 PTD Van 2008 100 102
W-Wide Flange1: W16X50.9 W-Wide Flange1: W16X50.2	127.55 119.12 0.00 120		L2 000 0.07 L1. 3 00.31 3 4.32 3	2,40 0 10,03 0	0,712.54 9	551.92	309.12 0	2,570,00 a 15,04 a 7,39 a 2,63 a 65,03 a	3,571,35 4	320.77 8	333,49 8	10,040,00 010 11481 2009 100-102
W-Wide Flange1: W16X50 2: 18 W-Wide Flange1: W18X35	140.54 127.1 12.88 141	140.54 051223753120 W16x50	E2 800 0.07 L.F. \$ 85.39 \$ 4.32 \$	2.40 \$ 92.11 \$	12,000.71 \$	607.13 S	337.30 S	12,945.14 \$ 94.19 \$ 7.36 \$ 2.63 \$ 104.18 \$	13,237.46 \$	1,034.37 \$	369.62 \$	14,641.46 STD Year 2009 100-102
W-Wide Flange1: W18X35: 8 W-Wide Flange1: W18X40	320 312.67 22.1 320	320 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	19,209.60 \$	1,664.00 \$	688.00 \$	21,561.60 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	21,030.40 \$	2,876.80 \$	758.40 \$	24,665.60 STD Year 2009 100-102
W-Wide Flange1: W18X40: 1	37.68 36.26 2.93 38	37.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	2,573.92 \$	195.94 \$	81.01 \$	2,850.87 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	2,827.51 \$	338.74 \$	89.30 \$	3.255.55 STD Year 2009 100-102
W-Wide Flange1: W21X44 W-Wide Flange1: W21X44: 28	1124.74 1101.34 97.9 1,125	1124.74 051223754100 W21x44	E5 1054 0.075 L.F. \$ 75.04 \$ 4.70 \$	1.94 \$ 81.68 \$	84,400.49 \$	5,286.28 \$	2,182.00 \$	91,868.76 \$ 82.80 \$ 8.14 \$ 2.14 \$ 93.08 \$	93,128.47 \$	9,155.38 \$	2,406.94 \$	104,690.80 STD Year 2009 100-102
W-Wide Flange1: W21X50 W-Wide Flange1: W21X50: 3		89 051223754300 W21x50	E5 1054 0.075 LF. \$ 84.39 \$ 4.70 \$	194 5 92.03 5	7 599 71 5	418.30 \$	172.66 \$	8 190 67 5 94 19 5 8 14 5 2 14 5 104 47 5	8 382 91 \$	724.46 \$	190.46 \$	9 297 83 STD Year 2009 100-102
W-Wide Flange1: W24X55	07 04:03 0.32 0.7			1.04 0 02.00 0	1,000.11	410.00	172.00		0,002.01	124/40 3	130,40	
W-Wide Flange1: W24X55: 10 W-Wide Flange1: W24X104 2	300 290.77 32.27 300	300 051223754900 WV24x55	E5 1110 0.072 L.F. \$ 94.19 \$ 4.50 \$	1.86 \$ 100.55 \$	28,257.00 \$	1,350.00 \$	558.00 \$	30,165.00 \$ 103.50 \$ 7.79 \$ 2.05 \$ 113.34 \$	31,050.00 \$	2,337.00 \$	615.00 \$	34,002.00 STD Year 2009 100-102
W-Wide Flange1: W24X104 2: 10 W-Wide Flange1: W24X117 2	288 277.1 58.7 288	288 051223755740 W/24x104	E5 1050 0.076 L.F. \$ 178.02 \$ 4.76 \$	1.97 \$ 184.75 \$	51,269.76 \$	1,370.88 \$	567.36 \$	53,208.00 \$ 195.62 \$ 8.21 \$ 2.16 \$ 205.99 \$	56,338.56 \$	2,364.48 \$	622.08 \$	59,325.12 STD Year 2009 100-102
W-Wide Flange1: W24X117 2: 2	60 57.83 13.75 60	60 051223755740 W24×117	E5 1050 0.076 L.F. \$ 200.27 \$ 4.76 \$	1.97 \$ 207.00 \$	12,016.20 \$	285.60 \$	118.20 \$	12,420.00 \$ 220.07 \$ 8.21 \$ 2.16 \$ 230.44 \$	13,204.20 \$	492.60 \$	129.60 \$	13,826.40 STD Year 2009 100-102
W-Wide Flange1: W24X162 2 W-Wide Flange1: W24X162 2: 1	39 37.88 12.51 39	39 051223755740 W24x162	E5 1050 0.076 L.F. \$ 227.30 \$ 4.76 \$	1.97 \$ 234.03 \$	8,864.70 \$	185.64 \$	76.83 \$	9,127.17 \$ 304.71 \$ 8.21 \$ 2.16 \$ 315.08 \$	11,883.69 \$	320.19 \$	84.24 \$	12,288.12 STD Year 2009 100-102
W-Wide Flange1: W30X99 W-Wide Flange1: W30X99: 4	130 129.91 26.02 130	130 051223756100 W30x99	E5 1200 0.067 L.F. \$ 168.71 \$ 4.16 \$	1.72 \$ 174.59 \$	21.932.30 \$	540.80 S	223.60 S	22,696,70 \$ 186,30 \$ 7,22 \$ 1,90 \$ 195,42 \$	24,219.00 \$	938.60 \$	247.00 S	25.404.60 STD Year 2009 100-102
W-Wide Flange: W14X48		0.1.C 0.00000000000000000000000000000000	E2 010 0.000 E e 03.84 e 4.96 e	2.27 6 00.47 6	793.04 6	10.25	22.40 5	945 40 E 00 10 E 7.90 E 0.00 E 100.01 E	00103	£0.05 E	24.67 6	045 05 0T2 Very 2005 100 102
W-Wide Flange: W16X31	200 200 0.01 7			2.57 0 05.47 0	102.04	4010	11.40		001.00	00.05	24.51	
W-Wide Flange: W16X31: 2 W-Wide Flange: W18X35	39 36.85 2.3 39	39 051223752900 W16x31	E2 900 0.052 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X35: 2 W-Wide Flange: W18X143	39 36.83 2.6 39	39 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	2,341.17 \$	202.80 \$	83.85 \$	2,627.82 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	2,563.08 \$	350.61 \$	92.43 \$	3,005.12 STD Year 2009 100-102
W-Wide Flange: W18X143: 2	61 58.17 16.92 61	61 051223753980 W18x143	E5 900 0.089 L.F. \$ 244.35 \$ 5.55 \$	2.29 \$ 252.19 \$	14,905.35 \$	338.55 \$	139.69 \$	15,383.69 \$ 268.08 \$ 9.63 \$ 2.52 \$ 280.23 \$	16,352.88 \$	587.43 \$	153.72 \$	17,094.03 STD Year 2009 100-102
W-Wide Flange: W18x234 W-Wide Flange: W18x234: 4	122 116.3 55.69 122	122 051223753980 W18x234	E5 900 0.089 L.F. \$ 399.85 \$ 5.55 \$	2.29 \$ 407.69 \$	48,781.70 \$	677.10 \$	279.38 \$	49,738.18 \$ 438.68 \$ 9.63 \$ 2.52 \$ 450.83 \$	53,518.96 \$	1,174.86 \$	307.44 \$	55,001.26 STD Year 2009 100-102
W-Wide Flange: W21X122 W-Wide Flange: W21X122: 6	116.47 109.44 27.15 116	116.47 051223754780 W21x122	E5 1000 0.08 L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 215.11 \$	24.230.42 \$	582.35 \$	241.09 S	25.053.86 \$ 228.74 \$ 8.64 \$ 2.27 \$ 239.65 \$	26.641.35 \$	1.005.30 S	264.39 \$	27.912.04 STD Year 2009 100-102
51: 337	6226.8 5960.77 677.31	Total		\$	535,807.72 \$	28,502.75 \$	13,979.89 \$	578,290.34 \$	592,741.51 \$	49,028.12 \$	15,379.83 \$	657,149.51
52 Concrete-Rectangular Beam: 36x18												
Concrete-Rectangular Beam: 36x18: 2 HSS-Hollow Structural Section1: HSS4X2X1/8	20 20 70	20 033106360412 Concrete Rectangular Beam	: 36"x18" L.F. \$ 37.36 \$ - \$	- \$ 37.36 \$	747.20 \$	- \$	- \$	747.20 \$ 41.17 \$ - \$ - \$ 41.17 \$	823.40 \$	- \$	- \$	823.40 STD Year 2009 100-401
HSS-Hollow Structural Section1: HSS4X2X1/8: 8	13.56 9.89 0.09	13.56 051223750360 HSS4x2x1/8	E2 550 0.102 L.F. \$ 4.54 \$ 6.27 \$	3.49 \$ 14.30 \$	61.56 \$	85.02 \$	47.32 \$	193.91 \$ 5.00 \$ 10.76 \$ 3.83 \$ 19.59 \$	67.80 \$	145.91 \$	51.93 \$	265.64 STD Year 2009 100-102
HSS-Hollow Structural Section1: HSS6X4X3/8 HSS-Hollow Structural Section1: HSS6X4X3/8: 20	193.49 177.33 7.97	193.49 051223750360 HSS6x4x3/8	E2 550 0.102 L.F. \$ 40.88 \$ 6.27 \$	3.49 \$ 50.64 \$	7,909.87 \$	1,213.18 S	675.28 \$	9.798.33 \$ 45.02 \$ 10.76 \$ 3.83 \$ 59.61 \$	8,710.92 \$	2,081.95 \$	741.07 \$	11,533.94 STD Year 2009 100-102
W-Wide Flange1: W10X12 W-Wide Flange1: W10X12: 2	52.7 50.17 1.21 53	52.7 051223750600 W10x12	E2 600 0.093 LF. \$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,079.82 \$	303.03 \$	168.64 \$	1,551.49 \$ 22.77 \$ 9.84 \$ 3.52 \$ 36.13 \$	1,199.98 \$	518.57 \$	185.50 \$	1,904.05 STD Year 2009 100-102
W-Wide Flange1: W12X16 W-Wide Flange1: W12X16: 2		65.63 051223751100 W12v16	F2 880 0.0541 F 6 27.43 6 3.02 6	2.10 5 23.62 5	1 800 23 5	267.27 8	143.07 5	2 200 67 6 20 02 6 6 71 6 2 40 6 20 12 6	1 970 21 5	440.38 5	167.61 8	2.668.10 STD Vear 2009 100.102
W-Wide Flange1: W12X19	03.03 03.20 2.04 00	40.00 001820101100 01180 01010		2.10 0 30.55 0	1,000.23	20121 0	145.07	2,200.57 0 30.02 0 0.71 0 2.40 0 35.15 0	1,570.21	440.56	151.51	2,000.10 010 1488.2009 140-102
W-Wide Flange1: W12X19: 36 W-Wide Flange1: W14X22	266.26 248.37 9.51 266	266.26 051223751100 W12x19	EZ 880 0.064 L.F. \$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	8,672.09 \$	1,043.74 \$	580.45 \$	10,296.27 \$ 35.65 \$ 6.71 \$ 2.40 \$ 44.76 \$	9,492.17 \$	1,785.60 \$	639.02 \$	11,917.80 STD Year 2009 100-102
W-Wide Flange1: W14X22: 21 W-Wide Flange1: W14X43	637.65 623.76 27.56 638	637.65 051223751900 W14×22	E2 990 0.057 L.F. \$ 44.51 \$ 3.48 \$	1.94 \$ 49.93 \$	28,381.80 \$	2,219.02 \$	1,237.04 \$	31,837.86 \$ 48.65 \$ 5.96 \$ 2.13 \$ 56.74 \$	31,021.67 \$	3,800.39 \$	1,358.19 \$	36,180.26 STD Year 2009 100-102
W-Wide Flange1: W14X43: 12	56.54 50.48 4.33 57	56.54 051223752320 W14x43	E2 810 0.059 L.F. \$ 73.49 \$ 4.26 \$	2.37 \$ 80.12 \$	4,155.12 \$	240.86 S	134.00 \$	4,529.98 \$ 80.73 \$ 7.29 \$ 2.60 \$ 90.62 \$	4,564.47 \$	412.18 S	147.00 S	5.123.65 STD Year 2009 100-102
W-Wide Flange1: W14082 2 W-Wide Flange1: W14082 2: 1	26.33 24.92 4.11 26	26.33 051223752380 W14x82	E2 740 0.076 L.F. \$ 154.22 \$ 4.67 \$	2.59 \$ 161.48 \$	4,050.61 \$	122.96 \$	68.19 \$	4.251.77 \$ 168.71 \$ 8.00 \$ 2.85 \$ 179.56 \$	4,442.13 \$	210.64 \$	75.04 \$	4,727.81 STD Year 2009 100-102
W-Wide Flange1: W14X109 2 W-Wide Flange1: W14X109 2: 1	37.67 36.56 8.04 38	37.67 051223752500 W14x109	E2 720 0.078 L.F. \$ 204.93 \$ 4.80 \$	2.67 \$ 212.40 \$	7,719.71 \$	180.82 S	100.58 S	8.001.11 \$ 225.63 \$ 8.21 \$ 2.93 \$ 236.77 \$	8,499.48 \$	309.27 \$	110.37 S	8,919.13 STD Year 2009 100-102
W-Wide Flange1: W16X26	106.09 197.41 0.91 107	196.98 061223762700 W16v26	E2 1000 0.060 E 5 44.61 5 2.46 5	1.02 5 40.00 5	9 767 59 6	2 33 103	279.20 5	3 73 33 3 61 7 3 60 3 3 32 94 3 57 70 0	9.693.09	1 162 19 8	417.60 5	41 452 95 STD Var 2009 100-102
W-Wide Flange1: W16X31	X94390 X09740 930X X97											
W-Wide Flange1: W16X31: 4 W-Wide Flange1: W16X45 2	151.19 148.56 9.27 151	151.19 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	7,981.32 \$	580.57 \$	322.03 \$	8,883.92 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	8,841.59 \$	991.81 \$	355.30 \$	10,188.69 STD Year 2009 100-102
W-Wide Flange1: W16X45 2: 4 W-Wide Flange1: W18X35	130 124.82 11.37 130	130 051223753120 W16x45	E2 800 0.07 L.F. \$ 76.85 \$ 4.32 \$	2.40 \$ 83.57 \$	9,990.50 \$	561.60 S	312.00 \$	10,864.10 \$ 85.42 \$ 7.36 \$ 2.63 \$ 95.41 \$	11,104.60 \$	956.80 \$	341.90 \$	12,403.30 STD Year 2009 100-102
W-Wide Flange1: W18X35: 4	160 157.77 11.15 160	160 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	9,604.80 \$	832.00 \$	344.00 \$	10,780.80 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	10,515.20 \$	1,438.40 \$	379.20 \$	12.332.80 STD Year 2009 100-102
W-Wide Flange1: W18X40 W-Wide Flange1: W18X40: 7	217.68 210.71 17.02 218	217.68 051223753500 W18x40	E5 960 0.083 L.F. \$ 68.31 \$ 5.20 \$	2.15 \$ 75.66 \$	14,869.72 S	1,131.94 \$	468.01 S	16,469.67 \$ 75.04 \$ 8.99 \$ 2.37 \$ 86.40 \$	16,334.71 \$	1,956.94 \$	515.90 \$	18,807.55 STD Year 2009 100-102
W-Wide Flange1: W18X50 W-Wide Flange1: W18X50: 16	454.67 441.22 44.57 455	454.67 051223753920 W18x50	E5 900 0.089 L.F. \$ 85.19 \$ 5.55 \$	2.29 \$ 93.03 \$	38,733.34 \$	2.523.42 \$	1.041.19 \$	42,297.95 \$ 93.95 \$ 9.63 \$ 2.52 \$ 106.10 \$	42.716.25 \$	4,378.47 \$	1.145.77 \$	48.240.49 STD Year 2009 100-102
W-Wide Flange1: W21X44		1404.00 004002724400 M024-44		161 8 9189 8		6.000.04	0.000.07		63 H 6 67	A 414 12 4	242224	404 303 93 CTD V444 3005 400 402
W-Wide Flange1: W21X50	1124-00 114/1.04 97.95 1,123		5.0 1000 V.VI36.F. 3 13.04 3 4.10 3	1.24 0 01.00 3	04,411.00 3	5,200.34 3	2,102.21 3	v1,v30.£v a 0£.0v a 0.14 3 £.14 3 33.00 \$	55,140.05 3	9,100.52 B	2,901.24 3	
W-Wide Flange1: W21X50: 3 W-Wide Flange1: W30X99	89 84.83 8.52 89	89 051223754300 W21x50	E5 1064 0.075 L.F. \$ 85.39 \$ 4.70 \$	1.94 \$ 92.03 \$	7,599.71 \$	418.30 \$	172.66 \$	8.190.67 \$ 94.19 \$ 8.14 \$ 2.14 \$ 104.47 \$	8,382.91 \$	724.46 \$	190.46 \$	9,297.83 STD Year 2009 100-102
W-Wide Flange1: W30X99: 4 W-Wide Flange: W16X11	130 129.92 26.02 130	130 051223756100 W30x99	E5 1200 0.067 L.F. \$ 168.71 \$ 4.16 \$	1.72 \$ 174.59 \$	21,932.30 \$	540.80 \$	223.60 \$	22,696.70 \$ 186.30 \$ 7.22 \$ 1.90 \$ 196.42 \$	24,219.00 \$	938.60 \$	247.00 \$	25,404.60 STD Year 2009 100-102
W-Wide Flange: W16X31: 2	39 36.85 2.3 39	39 051223752900 W16x31	E2 900 0.062 L.F. \$ 52.79 \$ 3.84 \$	2.13 \$ 58.76 \$	2,058.81 \$	149.76 \$	83.07 \$	2.291.64 \$ 58.48 \$ 6.56 \$ 2.35 \$ 67.39 \$	2,280.72 \$	255.84 \$	91.65 \$	2,628.21 STD Year 2009 100-102
W-Wide Flange: W18X35 W-Wide Flange: W18X35: 2	39 36.83 2.6 39	39 051223753300 W18x35	E5 960 0.083 L.F. \$ 60.03 \$ 5.20 \$	2.15 \$ 67.38 \$	2,341.17 \$	202.80 \$	83.85 \$	2.627.82 \$ 65.72 \$ 8.99 \$ 2.37 \$ 77.08 \$	2,563.08 \$	350.61 \$	92.43 \$	3,006.12 STD Year 2009 100-102
W-Wide Flange: W18X40 W-Wide Flange: W18X40: 4	122 117.49 0.40 153	122 051223753500 W18-40	E5 960 0.083LF. \$ 68.35 \$ 6.90 \$	2.15 \$ 76.66 \$	8,333.82 *	634.40 s	262.30 8	9,230,62 \$ 75 64 \$ 8.99 \$ 2.17 \$ 86.46 \$	9 164 80 4	1.096.78	289.14 8	10.540.80 STD Year 2009 100.102
W-Wide Flange: W21X122				0.07 6.047.17	01000.00	(40 m 4						
W-Wide Flange: W21X122: 6 W-Wide Flange: W24X62	118.47 109.44 27.15 116	1/6.4/ U01223/54/00 W21X122	ED 1000 0.08L.F. \$ 208.04 \$ 5.00 \$	2.07 \$ 216.11 \$	24,230.42 \$	582.35 \$	241.09 \$	25.053.886 3 ZZ8.74 3 8.64 \$ 2.27 \$ 239.65 \$	26,641.35 \$	1,006.30 \$	264.39 \$	27,912.04 [STD 148/ 2009 100-102
W-Wide Flange: W24X62: 8 W-Wide Flange: W36X160	244 234.99 29.34 244	244 051223755300 W24x62	E5 1110 0.072 L.F. \$ 105.69 \$ 4.50 \$	1.86 \$ 112.05 \$	25,788.36 \$	1,098.00 \$	453.84 \$	27.340.20 \$ 116.08 \$ 7.79 \$ 2.05 \$ 125.92 \$	28,323.52 \$	1,900.76 \$	500.20 \$	30,724.48 STD Year 2009 100-102
W-Wide Flange: W36X160: 2 W-Wide Flange: W36X160: 2	61 58.17 18.8 61	61 051223757600 W36x160	E5 1150 0.07 L.F. \$ 273.73 \$ 4.35 \$	1.80 \$ 279.88 \$	16,697.53 \$	265.35 \$	109.80 S	17.072.68 \$ 301.98 \$ 7.50 \$ 1.97 \$ 311.45 \$	18,420.78 \$	457.50 \$	120.17 \$	18,998.45 STD Year 2009 100-102
W-Wide Flange: W36X182	122 116.3 42.94 122	122 051223757600 W36x182	E5 1150 0.07 L.F. \$ 311.37 \$ 4.35 \$	1.80 \$ 317.52 \$	37,987.14 \$	530.70 \$	219.60 \$	38,737.44 \$ 343.50 \$ 7.50 \$ 1.97 \$ 352.97 \$	41,907.00 \$	915.00 \$	240.34 \$	43,062,34 STD Year 2009 100-102
52: 221	4767.69 4601.71 503.15	Total		\$	385,915.53 \$	21,686.38 \$	10,052.08 \$	417,653.99 \$	424,920.96 \$	37,392.86 \$	11,064.32 \$	473,378.17

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53				_																			
W-Wide Flange1: W6X12				-	60	AC 400003/ AL 44	110.40	50	644	0.000 0												1 222 22 070	No
W-Wide Flange1: W6X12: 16		52	43 1.05	52	52	051223750600	Wr6x12	EZ	600	0.043 L.F.	\$ 20.49 \$ 5.75 \$	3.20 \$ 29.44 \$	1,055.48 \$	299.00 \$	166.40 \$	1,530.88 \$	22.77 \$ 9.64 \$ 3.52 \$	36.13 \$	1,164.04 5	511.68 \$	183.04 5	1,878.76 STD	Year 2009 100-102
W-Wide Hange1: W12X19						0.0000000000000000000000000000000000000	1442.46	60	684	0.054				224.00	101.00				2.045.02			2 701 02 070	No
W-Wide Flange1: W12X19: 6	8	4.58 79.	42 3.04	85	84.58	051223751100	W12013	EZ	880	0.054 L.P.	\$ 32.57 \$ 3.92 \$	2.18 \$ 38.67 \$	2,/54.// \$	331.55 \$	164.38 \$	3,2/0./1 \$	35.65 \$ 6.71 \$ 2.40 \$	44.76 \$	3,015.28 \$	567.53 \$	202.99 \$	3,785.80 510	Tear 2009 100-102
W-Wide Flange1: W14X22				-	15.5	05 100 100 100 100 100 100 100 100 100 1	1444-00	60	000	0.0571 5		101 0 10 00 0	724.40 6	(7.10. 8	22.01	202.05	1945 8 645 8 949 8	10.74	040.72	60.24	24.44	ASE OF STD	Very 2000 400 400
W-Wide Flange1: W14X22: 3		16.5 13.	53 0.6	17	19.9	051223751300	111422	Eé	330	0.057 L.P.	3 44.51 3 3.46 3	1.94 8 49.93 8	734.42 3	51.42 3	32.01 5	823.85 a	48.60 8 5.96 8 2.13 8	56.74 a	802.73 S	90.34 S	35.15 a	936.21 010	Tear 2009 100-102
w-wide Flanget: w14045		6.63	10 00 00	497	636.67	061223762320	Weiver	E2	810	0.0591 E	6 72 40 6 4 26 6	0.07 E 00.40 E	46 700 00 6	0.740.04	1 602 01 6	E1 010 00 E	90.73 5 7.00 5 9.60 5	60.62 E	54 369 37 E	4.644.32	1.655.24	57 665 04 STD	Very 2009 100, 102
W-Wide Flangel: W14X43: 34	69	0.07 0	13 52.57	637	030.07	051223152320	1114845	62	010	0.000 0.0	a 73.43 a 4.20 a	2.57 5 00.12 5	40,700.00 3	6,112.21 9	1,000.01 0	51,010.00 5	00.13 \$ 1.23 \$ 2.00 \$	30.02 3	51,329.37	9,091.32 9	1,000.34	57,035,04 510	Tear 2003 100-102
W-Wide Flange1: W14X68: 14	16	2 71 253	76 48.09	363	362.71	051223752320	W14x68	E2	810	0.069 L.F.	\$ 112.22 \$ 4.26 \$	2 37 5 118 85 5	40 703 32 8	1.646.14 \$	859.62 \$	43 108 08 5	127.67 \$ 7.29 \$ 2.60 \$	137.66 \$	46 307 19 5	2 644 16 \$	943.05 \$	49 894 39 STD	Year 2009 100-102
W.Wide Flanget: W14X74	30	6.71 3235	10 40.07	303	206.11	WY IEEST DEVEN			010	0.000 6.1	9 112.22 9 4.20 9	2.51 0 110.05 0	40,705.52	1,040,14	000.02 0	43,100.00 0	121.01 0 1.23 0 2.00 0	121.20	49,201.12	2,044.10	240.02	43,034.33 010	140 2005 100 102
W-Wide Flanget: W14X74:9		117 10	18 15.67	117	117	051223752380	W14x74	E2	740	0.076 L.F.	\$ 131.17 \$ 4.67 \$	2.59 \$ 138.43 \$	15 346 89 \$	646 39 S	303.03 \$	16 196 31 \$	152.25 \$ 8.00 \$ 2.85 \$	163.10 \$	17 813 26 \$	936.00 \$	333.45 \$	19.082.70 STD	Year 2009 100-102
W-Wide Flange1: W24X55 2		11/ 10	13:07	117		CONCESTION OF	111111		740	0.010 2.1	a 131.17 a 4.07 a	2.55 0 130.43 0	15,540.05	540.55 a	303.03	10,150.51	152.25 3 0.00 3 2.05 3	103.10	17,013.25 0	550.00	555.45 a	15,002.10 010	14012005 100-102
W-Wide Flange1: W24X55 2: 1	1	1.31 10	25 1.14	11	11.31	051223754300	W22x55	E5	1054	0.075 L.F.	S 97.34 S 4.70 S	1.94 \$ 103.98 \$	1.100.92 \$	53.16 \$	21.94 \$	1.176.01 \$	107 38 5 8 14 5 2 14 5	117.66 \$	1 214 47 \$	92.05 S	24.20 \$	1 330 73 STD	Year 2009 100-102
W-Wide Flange1: W24X68																			1001001			1,000.10	
W-Wide Flange1: W24X68: 2	5	1.33 5	5 7.1	53	53.33	051223755300	W24x68	E5	1110	0.072 L.F.	\$ 115.92 \$ 4.50 \$	1.85 \$ 122.28 \$	6.182.01 S	239.99 \$	99.19 S	6.521.19 S	127.31 \$ 7.79 \$ 2.05 \$	137.15 S	6.789.44 S	415.44 S	109.33 S	7.314.21 STD	Year 2009 100-102
W-Wide Flange1: W30X99																							
W-Wide Flange1: W30X99: 6	8	2.62 75.	89 15.2	83	82.62	051223756100	W30x99	E5	1200	0.057 L.F.	\$ 168.71 \$ 4.16 \$	1.72 \$ 174.59 \$	13,938.82 \$	343.70 \$	142.11 \$	14,424.63 \$	186.30 \$ 7.22 \$ 1.90 \$	195.42 \$	15,392.11 \$	596.52 \$	156.98 \$	16,145.60 STD	Year 2009 100-102
W-Wide Flange1: W30X108																							
W-Wide Flange1: W30X108: 3	4	5.67 42.	67 9.32	46	45.67	051223756300	W30x108	E5	1200	0.067 L.F.	\$ 184.23 \$ 4.16 \$	1.72 \$ 190.11 \$	8,413.78 \$	189.99 \$	78.55 \$	8,682.32 \$	202.86 \$ 7.22 \$ 1.90 \$	211.98 \$	9,264.62 \$	329.74 S	86.77 S	9,681.13 STD	Year 2009 100-102
W-Wide Flange1: W33X118 2																							
W-Wide Flange1: W33X118 2: 2	5	3.33 5:	.5 12.26	53	53.33	051223756700	W33x118	E5	1176	0.058 L.F.	\$ 201.83 \$ 4.25 \$	1.75 \$ 207.83 \$	10,763.59 \$	226.65 \$	93.33 S	11,083.57 \$	221.49 \$ 7.36 \$ 1.93 \$	230.78 \$	11,812.06 \$	392.51 \$	102.93 \$	12,307.50 STD	Year 2009 100-102
53:96	151	5.73 1439.	32 166.05	т	otal							\$	147,792.88 \$	6,545.20 \$	3,489.47 \$	157,827.55		\$	164,993.56 \$	11,225.30 \$	3,833.23 \$	180,052.07	
54																							
HSS-Hollow Structural Section1: HSS6X6X1/4																							
HSS-Hollow Structural Section1: HSS6X6X1/4: 6	11	9.01 108.	49 4.07		119.01	051223750360	HSS6x6x1/4	E2	550	0.102 L.F.	\$ 40.86 \$ 6.27 \$	3.49 \$ 50.62 \$	4,862.75 \$	746.19 \$	415.34 \$	6,024.29 \$	45.00 \$ 10.76 \$ 3.83 \$	59.59 S	5,355.45 \$	1,280.55 \$	455.81 \$	7,091.81 STD	Year 2009 100-102
W-Wide Flange1: W10X22 2																							
W-Wide Flange1: W10X22 2: 23	18	0.03 155.	26 6.89	180	180.03	051223750720	W10x22	E2	600	0.093 L.F.	\$ 37.66 \$ 5.75 \$	3.20 \$ 46.61 \$	6,779.93 \$	1,035.17 \$	576.10 \$	8,391.20 \$	41.17 \$ 9.84 \$ 3.52 \$	54.53 S	7,411.84 S	1,771.50 \$	633.71 S	9,817.04 STD	Year 2009 100-102
W-Wide Flange1: W10X39				-																			
W-Wide Flange1: W10X39: 7	3	8.77 30.	16 2.36	39	38.77	051223750720	W10x39	E2	600	0.093 L.F.	\$ 66.77 \$ 5.75 \$	3.20 \$ 75.72 \$	2,588.67 \$	222.93 \$	124.06 \$	2,935.66 \$	72.98 \$ 9.84 \$ 3.52 \$	86.34 \$	2,829.43 \$	381.50 \$	136.47 \$	3,347.40 STD	Year 2009 100-102
W-Wide Flange1: W10X60																							
W-Wide Flange1: W10X60: 2		26 2	.7 2.87	26	26	051223750720	W10x60	E2	600	0.093 L.F.	\$ 102.72 \$ 5.75 \$	3.20 \$ 111.67 \$	2,670.72 \$	149.50 \$	83.20 \$	2,903.42 \$	112.28 \$ 9.84 \$ 3.52 \$	125.64 \$	2,919.28 \$	255.84 \$	91.52 \$	3,266.64 STD	Year 2009 100-102
W-Wide Flange1: W12X53		_																					
W-Wide Flange1: W12X53: 2	3	4.99 35.	15 3.72	35	34.99	051223751300	W12x53	E2	880	0.054 L.F.	\$ 91.02 \$ 3.92 \$	2.18 \$ 97.12 \$	3,184.79 \$	137.16 \$	76.28 \$	3,398.23 \$	99.74 \$ 6.71 \$ 2.40 \$	108.85 \$	3,489.90 \$	234.78 \$	83.98 \$	3,808.66 STD	Year 2009 100-102
W-Wide Flange1: W16X50 2																							
W-Wide Flange1: W16X50 2: 14	12	2.51 109.	47 11.09	123	122.51	051223753120	W16x50	E2	800	0.07 L.F.	\$ 85.39 \$ 4.32 \$	2.40 \$ 92.11 \$	10,461.13 \$	529.24 \$	294.02 \$	11,284.40 \$	94.19 \$ 7.36 \$ 2.63 \$	104.18 \$	11,539.22 \$	901.67 \$	322.20 \$	12,763.09 STD	Year 2009 100-102
W-Wide Flange1: W24X104 2				-	00	AC ADDODTECT AND	hund day		4070	0.0751.5					177.04				17.017.01	212.44		10 500 10 IOTO	hu
W-Wide Flange1: W24X104 2: 3		90 86.	75 18.38	90	30	051223755740	VV24x104	ED	1050	0.076 L.P.	5 178.02 5 4.76 5	1.97 \$ 184.75 \$	16,021.80 \$	428.40 5	177.30 5	16,627.50 \$	195.62 5 8.21 5 2.16 5	205.99 \$	17,605.80 \$	738.90 5	194.40 5	18,539.10 510	Year 2009 100-102
\$4:\$7:00	61	1.32 548.	99 49.39		otal							3	46,569.79 5	3,248.59	1,746.30 3	51,564.70		,	51,150.92 3	5,564.74 3	1,918.09 5	58,633.74	
55																							
W-Wide Flange1: W10X30 2		_																					
W-Wide Flange1: W10X30 2: 4	3	3.93 31.	85 1.95	34	33.93	051223750720	vv10x30	E2	600	0.093 L.F.	\$ 51.36 \$ 5.75 \$	3.20 \$ 60.31 \$	1,742.64 \$	195.10 \$	108.58 \$	2,046.32 \$	56.13 \$ 9.84 \$ 3.52 \$	69.49 \$	1,904.49 \$	333.87 \$	119.43 \$	2,357.80 STD	Year 2009 100-102
W-Wide Flange1: W14X68					00.00	AC 40000000000	L huu co		040	0.050					445.45						and (2) a	10.515.50 070	No
W-Wide Flange1: W14X68: 1	9	0.99 90.	99 12.37	91	90.99	051223752320	vv14x68	EZ	810	0.069 L.F.	\$ 112.22 \$ 4.26 \$	2.37 \$ 118.85 \$	10,210.90 \$	387.62 \$	215.65 \$	10,814,16 \$	127.67 \$ 7.29 \$ 2.60 \$	137.56 \$	11,616.69 \$	663.32 \$	236.57 \$	12,516.58 STD	Year 2009 100-102
W-Wide Flange1: W16X36				-	444.74	AT 40000000000	1000.00		000	0.071				100.00								4 444 34 0770	No
W-Wide Flange1: W16X36: 6	11	1.71 105.	54 7.67	112	111.71 Intal	051223753100	9416X36	EZ	800	0.07 L.F.	5 68.31 \$ 4.32 \$	2.40 5 75.03 5	7,630.91 \$	482.59 \$	268.10 \$	8,381.60 S	75.04 \$ 7.36 \$ 2.63 \$	85.03 \$	8,382.72 \$	822.19 S	293.80 \$	9,498.70 STD	Tear 2009 100-102
55:11:00	23	0.03 228.	ss 21.99	1	otal							S	19,584.45 5	1,055.31 3	59Z.33 5	21,242.08		3	21,903.90 \$	1,819.38 \$	649.80 \$	24,373.08	
					Tetal								101.050.01 6 1 6	07 574 40 6 55	0.000 74 0.17	700 440 00		A 17	770 000 50 0 1		4 5 4 7 0 7 0 8 5 5	170 170 01	
Total Framing					IOTAL							\$ 16	194 952 24 \$10	6/5/142 \$ 50	IS 886 74 \$17	766 410 89		\$ 17	//8 968 58 \$1 8	COS96169 \$ 5	4 54/27 \$ 20'	1/2 4/8 64	

Figure 307: Structural Concrete Composite Slab Take-off

Floor Material Takeoff																																
Family and Type	Level	Material: Name	Material: Area N	Aaterial: Volume F	Perimeter Area	Volume	Quanti	ty LineNumbe	er So Si Des	escription	Crew Daily C	Output Labor Ho	ours Unit Mat	erial	Labor	Equipment	t Total	Ext. Mat.	Ext. La	bor E	xt. Equip.	Ext. Tota	al I	Mat. O Lab	or (Equir	p. Total O	Ext. Mat. O&P	Ext. I	Labor O&P	Ext. Equip. O&P	Ext. Total	0&P
Concrete - Light Weight - 4 ksi																																
Concrete - Light Weight - 4 ksi: 50			1371716	714436			Total											\$ 4,174,3	393.91 \$		ş -	\$	4,174,393.91				\$ 4,606,227	.68 \$		\$.	\$	4,606,227.68
Concrete - Normal Weight - 4 ksi																																
Concrete - Normal Weight - 4 ksi: 7			164483	205564			Total											\$ 878,0	062.81 \$		s .	\$	878,062.81				\$ 960,897	.50 \$		\$.	\$	960,897.50
Metal - Deck																																
Metal - Deck: 56			1470011	0			Total											\$ 4,880,4	436.52 \$	779,105.83	\$ 58,800.4	4 \$	5,718,342.79				\$ 5,350,840	1.04 \$	1,396,510.45	\$ 58,800.44	\$	6,806,150.93
Welded Wire Fabric																																
Welded Wire Fabric: 56			1470011	0	92872 1470011	853802	Total											\$ 415,7	719.07 \$	644,746.92	\$.	\$	1,060,465.87				\$ 454,821	.51 \$	1,051,204.86	\$-	\$	1,506,026.39
Slab Formwork																																
Slab Formwork: 56			1470011	0	92872 1470011	853802	Total											\$ 16,7	716.96 \$	415,137.84	\$-	\$	431,854.80				\$ 18,574	.40 \$	645,460.40	\$ -	\$	664,034.80
Grand total: 113			3006202	919999			Total											\$ 10,365,32	9.27 \$1,83	38,990.59	\$ 58,800.4	4 \$ 12,2	63,120.18				\$ 11,391,361.	13 \$3,	093,175.71	\$ 58,800.44	\$ 14,5	43,337.30