TECHNICAL ASSIGNMENT ONE
Construction Project Management
September 29, 2008

The Scripps Research Institute

Biomedical Research Building

Florida Atlantic University
Jupiter, FL

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Architectural Engineering
Construction Management Option

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. . . . at the forefront of biomedical science, a vital segment of medical research that seeks to comprehend the most fundamental processes of life . . . .

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Technical Assignment One focuses on defining the construction and management methods and systems chosen to deliver The Scripps Research Institute Biomedical Research Building in Jupiter, Florida. Included in this report are the following items. Summary of the schedule with key milestones, summary of the building systems, project cost evaluation, site plan elements, client information, local conditions, summary of the project delivery system, and a staffing plan for the project.

A summary of the project schedule provides key activities along with milestone dates for this three year project beginning with Schematic Design in February of 2006 and finishing with owner move in, in January of 2009.

The building systems summary of this report highlights the features of the main components of each major building system. The IT, Fire Protection, and mechanical systems are all interlinked between the three buildings being constructed at once on this project, creating sizing issues for the equipment which will supply the needs of each building.

Two project cost evaluation methods have been included in this report providing construction cost data ranging from the D4 Cost estimate of $40,781,806 to an RS Means estimate of $32,783,017. Both of these numbers coming in below the construction cost of $47,524,760. Analyses of factors unique to this project which account for the cost estimate discrepancy are included in this section of the report.

The existing conditions portion of this report includes details of existing utilities, existing buildings adjacent to the site, as well as access and shakeout locations on this site. Two site plans are included in the appendices.

The local conditions of the construction site are typical of coastal areas in South Florida, and account for many decisions regarding the construction methods and systems employed on this project. The conditions which drive the decisions for these various systems and technologies are highlighted in this section of the report.

The Scripps Research Institute is recognized for many achievements in varying areas of research. This facility is on the opposite coast of their other campus and is expected to increase the capacity of the institute to have a positive impact in the drug discovery and cancer research portion of the medical field. This project is expected to help the economy in the West Palm Beach / Jupiter Communities.

The final portion of this report takes into account the overall construction process by looking at the project delivery methods employed on this project along with the staffing plan for the Construction/Program Manager on this project.

The schedule for this project requires a high level of detail due to the number of buildings being constructed at the same time. The coordination issues associated with running essentially three projects at once on the same site become very important. The number of systems which are interlinked between buildings on this project is also an important scheduling consideration. One positive that this project can benefit from is an increase in productivity due to repetitive tasks occurring in each building. As the project proceeds an increase in quality and production should be gained. For a single page summary schedule see **Appendix A.**

Foundations

The first major scheduling item for the building comes with preparations for the pouring of the spread footings. Following the rough grade preparation for the building pad, Vibroflotation technology was used to increase the bearing capacity of the soil. Once the building pad has been tested, and bearing capacity has been verified, pouring of the foundations can commence.

Structure

The cast in place structure begins once the first set of foundations has reached adequate strength. The structure follows the foundation on the first level, and then proceeds floor by floor. The pours are split up on each level for efficiency and quality due to the use of a pump truck to place the concrete slabs and other horizontal components of the structure. Once the main structure has been erected the penthouse construction follows. Maintaining efficiency requires proper shoring techniques required for the concrete to reach strength. This in turn allows consistent progress to be maintained and also allows for multiple operations to occur at the same time without creating conflicts between trades.

Exterior

The exterior of the building is scheduled to be completed by elevation through the use of scaffolding to install the stucco EIFS system.

Interior Finishes

The Interior of the building construction begins with the construction of the elevator pit and platforms, equipment pads for the cup, hangars for the MEP systems etc. and then the parade of trades is run from the third floor down and out of the building.

This table shows a summary of key phases to keep this project on schedule for the owner

	2006	2007	2008	2009
Design & Documents				
CM Selection & GMP Development				
Fabrication				
Construction				

Other key milestones on this project

- Building Permit Issued — September, 6th 2006
- Begin Site Construction — October, 10th 2006
- Begin Building Construction — December,15th 2006
- Permanent Power On — March, 14th 2008
- Startup & Commissioning Complete — September, 8th 2008
- Owner Move-In — January, 2nd 2009

Work Scope	Yes	No
Demolition Required?		X
Structural Steel Frame		X
Cast in Place Concrete	X	
Precast Concrete		X
Mechanical System	X	
Electrical System	X	
Masonry	X	
Curtain Wall	X	
Support of Excavation	X	

CAST IN PLACE CONCRETE

The structural system is a two way cast in place 10" flat slab with 14" drop panels, 24"x24" perimeter beams, and 24" square concrete columns which run to 12' square spread footings which are 2' deep. Typical bays are 22' by 32'. The floor to floor height on the first floor is 18' and 15' at the other levels. The lateral system is comprised of concrete moment frames formed by the concrete columns and the flat slab. The mechanical penthouse consists of steel joists on 12" masonry. The horizontal formwork for the slabs and beams was all plywood and timber formwork construction onsite. The vertical formwork for the columns was all steel forms which were prefabricated and bolted together onsite. At the front entryway there are tapered columns. Creating the formwork for these columns posed difficulties which were handled by United Forming Inc. The concrete placement method for this project varied based on whether the elements were vertical or horizontal. For horizontal elements such as slabs and beams, placement was done using a pump truck. For the vertical elements such as columns, the placement was done using a crane and bucket. Due to the nature of the climate in this area, a threshold inspector took a reading of the temperature of each concrete truck that came on site to verify that the temperature met the placement requirements. If the temperature was above 100 degrees, the truck was turned away so that there would be no strength issues due to improper curing. Super plasticizers were used to ease concrete placement as well.

MECHANICAL SYSTEM

The mechanical system has three main areas. The central utilities plant (CUP) on the first floor, the mechanical yard, and the penthouse level. Located in the central utilities plant are two 1050 ton chillers able to supply 1575 GPM each. These chillers have a 630KW electrical load supplied by 480V three phase controls. One of these chillers is on at all times and the other is controlled by Variable Frequency Drive (VFD). There are two 1050 ton chiller condensers with 100HP on-off pumps. There are two, Variable Frequency Drive, primary chilled water pumps able to supply 1575 GPM each. There are two main steam boilers able to supply 6500 lb/hr of 100psi steam, with boiler blow down. The steam boiler system also has a de aeration tank. The centrally supplied steam is at 60psi and used to supply equipment such as sterilizers and cage washers. Industrial hot and cold water is supplied by 15 lb steam. 0lb steam is used for humidification in the Vivarium. Two Hot Water Boilers and Hot Water Heaters are housed in the CUP as well. Four 500 ton cooling towers are housed in the mechanical yard. Four air handling units are housed at the penthouse level. Two 290 ton air handlers are dedicated to the Vivarium, each able to supply 36,000 CFM. One of these is a backup unit. The rest of the building is serviced by two 465 ton units, each able to supply 65,000 CFM.

ELECTRICAL SYSTEM

The electrical system has a main-tie-main 408Y/277V switchboard configuration with two 5000A main circuit breakers. Two main switchboards (MSBD) distribute power throughout the building. MSBD-A has a capacity of 3300 KVA and MSBD-B has a capacity of 3030 KVA. Backup power is supplied by a 2.25 Megawatt, 6,200HP diesel backup generator housed in a weather protected enclosure. Loads on emergency power include egress lighting and exit signs per NFPA 101, 100% of all lighting in the Vivarium, 25% of all lighting in the laboratory areas, 100% of lighting within the fume hoods, the fire alarm control panel, elevator cab lighting and receptacles, along with the fire pump and jockey pump. No loads are classified as legally required standby per NEC article 701. Loads on optional standby power include laboratory receptacles defined by lab programming, 100% of all Vivarium receptacles and support equipment, information technology equipment, elevators, access control doors, air handling units and fume exhaust fans to maintain pressurization and safe ventilation in the laboratory and vivarium areas only. Under these circumstances, the fans will be set back to provide ventilation at minimum flow rates. Chilled water primary equipment to serve the Vivarium spaces and specific spaces for standby cooling, along with heating hot water to serve Vivarium spaces and specific spaces for standby heating, and the pumps and associated equipment to support the chilled water and heating systems are also on optional standby power along with the HVAC controls.

MASONRY

8” Reinforced CMU with a two coat stucco plus EIFS finish coat make up a large part of the building envelope on this project. The 8” CMU walls are reinforced both vertically and horizontally. The Masonry at the three enclosed stairwells are all fully grouted and reinforced. Scaffolding must be used to install both the CMU backup wall and the Stucco EIFS system.

CURTAIN WALL

There are different curtain wall configurations in the building which all consist of painted aluminum members with various types of glass. Various types of glass include blue reflective laminated vision glass, clear frosted laminated vision glass, clear low-e laminated vision glass, and blue reflective frosted laminated vision glass. Pre-fabricated and assembled onsite aluminum framing were placed using a combination of both a crane and man hoist to fix the framing in place until it was time to place the glazing.

SUPPORT OF EXCAVATION

Deep excavation on this project is associated with the installation of utility systems (storm & sanitary sewer). These deep excavations required shoring. The utility subcontractor utilized trench boxes to hold back excavated walls. The utility subcontractor utilized a temporary dewatering system comprised of horizontal piping with vertical well points every three to four feet. This piping system was connected to diesel pumps and outlet flow was directed to the water features adjacent to the FAU campus site. There is no permanent dewatering system on this project.

Actual Project Cost Information

Total Building Square Footage: 132,675 SF
Construction Cost: $47,524,760
CC/SF: $358.20

Total Project Square Footage: 351,803 SF
Total Project Cost (Other Buildings, Sitework, etc.): $186,624,455
TC/SF: $530.48

Mechanical System of HVAC, Plumbing, Fire Protection, Controls & Purified H_2O: $122.56/SF
Electrical System: $55.71/SF
Structural System of Concrete, Masonry, Structural and Misc. Steel: $55.15/SF

D4 COST ESTIMATE – $40.8MM

Utilizing D4 Cost Version 9 Estimating software, a parametric estimate was developed for this project. By going through projects which were similar to my building type as far as structure (concrete) and use (medical research) gave me the most accurate estimate of the various building combinations I used to develop this estimate. The search resulted in two medical research facilities with concrete structures.

Project Name	Size	Use	Floors	Cost
Medical Sciences Research	213,900SF	Medical Research	10	$37,077,304
Duke Univ. Med. Science Res. Bldg.	186,669SF	Medical Research	5	$26,734,239

These two projects resembled the building use and structure the closest of any projects in the database. The search was then adjusted to reflect the impacts of time escalation of cost (2006), square footage (132,675SF) and number of floors (4). These projects were included in the average for the estimate of the project cost.

Code	Division Name	%	Sq. Cost	Projected
00	Bidding Requirements	3.95	12.15	$1,611,858
01	General Requirements	3.97	12.21	$1,620,610
02	Site Work	3.22	9.89	$1,311,907
03	Concrete	13.86	42.60	$5,651,797
04	Masonry	2.89	8.89	$1,178,912
05	Metals	1.94	5.95	$789,657
06	Wood & Plastics	6.74	20.73	$2,750,253
07	Thermal & Moisture Protection	2.15	6.60	$875,665
08	Doors & Windows	2.29	7.05	$935,705
09	Finishes	5.61	17.24	$2,286,957
10	Specialties	0.18	0.56	$74,062
11	Equipment	1.44	4.44	$588,434
12	Furnishings	4.96	15.24	$2,021,592
13	Special Construction	2.00	6.16	$817,358
14	Conveying Systems	0.82	2.51	$332,609
15	Mechanical	35.57	109.32	$14,504,396
16	Electrical	8.41	25.85	$3,430,034
	Total Building Costs	100	307.38	$40,781,806

RS Means 2008 Cost Estimate

An estimate of the building cost was developed utilizing RS Means square-foot cost data of two different project types. The closest building type data RS Means has to this building type is a College Laboratory. However the information for this project is based off of a 1 story building with 12' story height and 45,000 SF of building space, which is far under the size of the facility in this estimate. Information from a 6 Story hospital project was used to account for the SF and perimeter of this project size. No exterior system matched the Stucco EIFS system over Concrete Block for a building of this size or use type. This left me to choose the lowest cost system from the 2-3 story hospital of Face Brick with Concrete Block Backup. Additives of items such as Stainless Steel Countertops, Fume Hoods with ductwork, Glasswashers, Eyewash stations both hand held and deluge showers, Closed Circuit TV system, Sterilizers and elevators were also added to make this estimate more accurate.

Medical Research Facility – 4 stories – 16' average story height
SF Area = 132,675 SF
LF Perimeter = 1178 LF

Interpolation results in a unit cost of: $251.08/SF

Adjustment for additional perimeter: 438.923 LF
Interpolation: Add $3.13/SF per 100 LF additional perimeter
Adjusted Cost = $251.08/SF + (438.923 LF/100 LF)($3.13/SF) = $266.20/SF

Adjustment for increased Story Height: 16'
Interpolation: Add $1.73/SF per 1' additional story height
Adjusted Cost = $266.20/SF + (4')($1.73/SF) = $273.12/SF

West Palm Beach, FL Location Modification Factor: 0.85

Adjusted Unit Cost = $232.15/SF

Estimated Project Cost = $232.15/SF * 132,675 SF = $30,800,502

Additives:

• Closed Circuit TV	$1,750 each	[4]
• Sterilizer Single Door Steam	$161,500 each	[3]
• Sterilizer Double DoorSteam	$207,500 each	[3]
• Stainless Steel Countertops	$112 SF	[500]
• Hood + Ductwork	$20,000 each	[31]
• Glasswasher	$13,100 each	[3]
• Hand Held Eyewash	$445 each	[40]
• Deluge Eyewash	$805 each	[3]
• 4,500lb Capacity Elevators	$133,000 total	[2]

Total Additives Cost: **$1,982,515**

Total RS Means Estimated Cost = $32,783,017

Total RS Means Estimated CC/SF = $247.09/SF

This RS Means number comes short by nearly $15MM ($111.10/SF) of the actual construction cost for construction which came to a total of $47,524,760. This discrepancy can be attributed to a few major factors.

- The first problem comes from building façade. The building façade is a combination of systems which include a stucco EIFS system over concrete block backup walls, metal paneling over concrete block backup walls in some areas, and a curtain wall system with painted aluminum framing in others.
- Another factor creating this low estimate can be attributed to the highly technical nature of this facility. The amount and size of the research equipment such as a large cage wash machine, a tunnel/cage wash machine, a bulk sterilizer and other smaller sterilizers (single and double door), various glasswashers and dryers, various fume hoods (radioisotope, laminar flow, etc.) and bio-safety cabinets (BSC's), environmentally controlled rooms (cold rooms), card access security system for various laboratories, automated watering system on the Vivarium level. A corrosion waste and vent system is separately installed with techniques employed to collect all waste chemicals for disposal as hazardous waste. This piping is fire-resistant polypropylene with socket coil-fusion joints. A high purity water system which includes multimedia filtration, water softening, activated carbon filtration, particle filtration, reverse osmosis, deionization, ultraviolet radiation and 0.2 micron final particle filtration before it is stored in a constantly circulating atmospheric fiberglass tank, and is piped through the building. The piping material is virgin polypropylene with socket fusion joints. All of the major plumbing equipment serving the laboratory and Vivarium areas are configured so that there are multiple parallel pieces of equipment to maintain critical functions should one of the components fail. These pieces of equipment include water booster pumps, water heaters, fuel oil pumps, high purity water pumps, vacuum pumps, and air compressors.
- The climate in this area must also be accounted for in the sizing of the mechanical equipment. The amount of exhaust and pressurization required in the building are significantly high due to the nature of the activities occurring in this building. Also the mechanical system has been sized to provide chilled water to other buildings on the site rather than just its own building requirements.

These factors combine to contribute to the reason that this RS Means estimate came out so low.

The Florida Atlantic University (FAU), Abacoa Campus is located in Jupiter, Florida off interstate 95. The project site is location is bordered by Donald Ross Road, Central Blvd, and the existing FAU Campus. There were no demolition requirements due to the fact that the site was undeveloped.

The Site plans, **Appendix C**, show how this project extends the campus in the southeast direction. The existing campus and buildings are to the west, Donald Ross Road is to the south, Central Blvd wraps the north and east sides of the site. These roads provide two separate entrance/exits to the site, the main entrance being located off Donald Ross Road. Utility connection points from the existing campus were used to tie into water and sewer utilities, while the electric, phone, fibernet, and gas will all be run on-site by the various utilities and extended around the site along the road that runs in front of each building. The various IT, and electric running between buildings is encased in concrete duct banks. Fire protection lines come on site for each building with Department connections outside each building, and main lines running between all buildings for the interlinked fire protection system which enables each building to supply another if necessary.

Site Prior To Construction (refer to Appendix C for a more detailed site plan)

Cast in place concrete structures are a common construction method in the South Florida region due to the nature of the climate this close to the Atlantic Ocean, and experience of the labor force in the area.

Parking on this site was not an issue due to the size of the site. The GC elected to pre-pave a portion of the final parking to use for conex placement and material shakeout and distribution, as well as on-site parking for the workers.

There was not much of a recycling effort on this particular project. Dumpster costs have been forecast to cost approximately $1.11/SF of $.012/CF of building space. Dumpster fees average approximately $225.00 per pull for a 30 yard dumpster.

The subsurface soil conditions in South Florida are typical of a coastal area. The soil consists of compacted fine sand, and slightly silty fine sand. The water table is approximately five to six feet below grade. The type of footings chosen to deal with the nature of the soil condition were spread type footings. The size, and therefore the cost of the foundations were greatly reduced by improving the bearing capacity of the soil utilizing Vibroflotation technology to create deep compaction of granular soils. By employing this technology the bearing capacity at the spread footing locations from 3000psi allowable to 6000psi allowable bearing capacity, thus avoiding any deep foundation drilling to produce substantial bearing capacity.

Scripps, the owner of The Scripps Research Institute (TSRI), is the largest, private, non-profit scientific research organization in the world. Scripps stands at the forefront of basic biomedical science, a vital segment of life. The Scripps Florida campus (Three buildings 350,000 SF total) will focus on drug discovery and technology development. These facilities incorporate chemistry/biology labs, Vivarium labs, Nuclear Magnetic Resonance (NMR) labs, BSL-2 and BSL-3 labs, automation and advanced robotics research labs, which aim to push the boundaries of modern biomedical research in each of these areas. TSRI has a campus in La Jolla, California which consists of fourteen laboratory buildings with more than 1,000,000 SF of space which overlooks the pacific. TSRI is internationally recognized for its research in areas which include immunology, molecular and cellular biology, chemistry, neurosciences, autoimmune diseases, cardiovascular diseases, virology and synthetic vaccine development. A major area of study which TSRI is immersed is the study of the basic structure and design of biological molecules. TSRI is among the world leaders in this type of research.

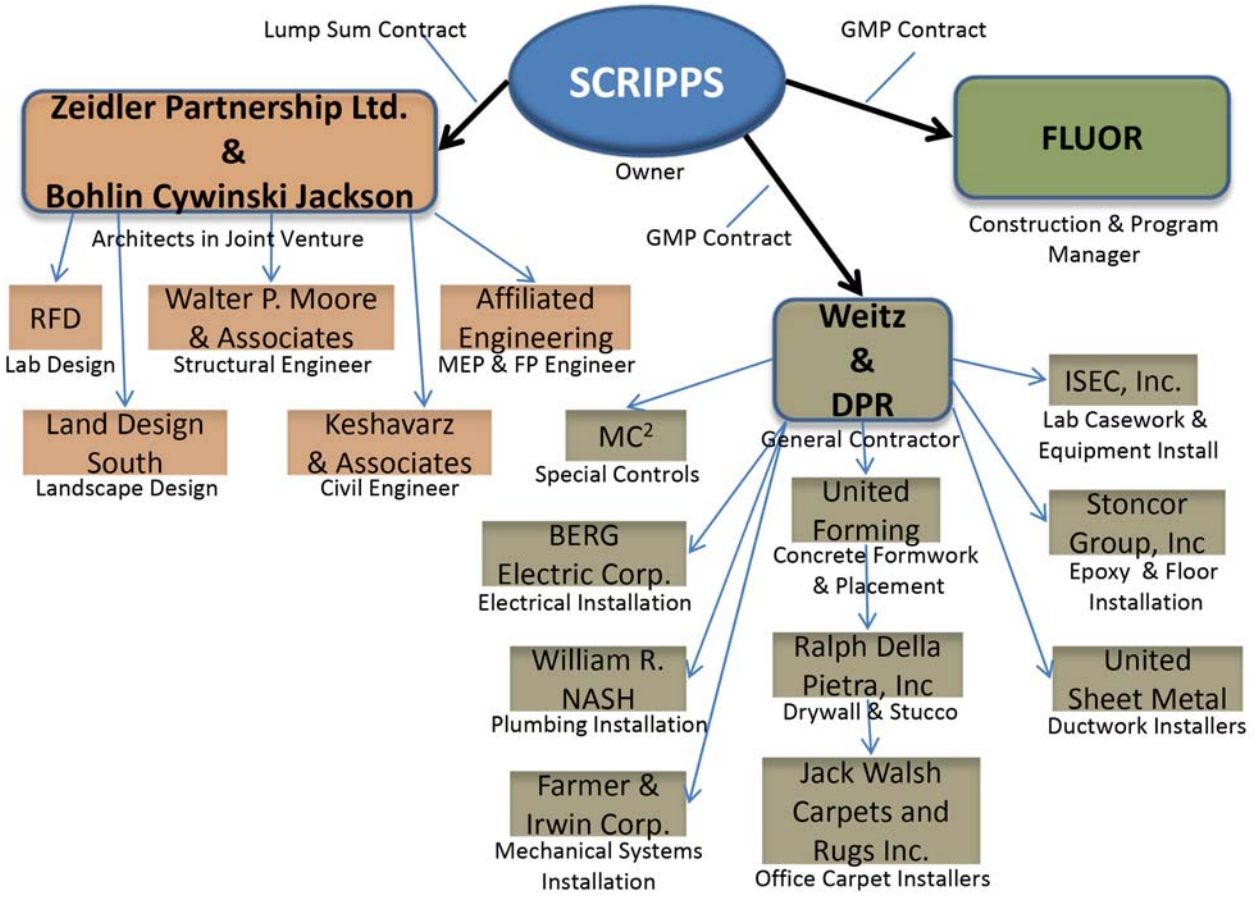
Scripps established budgets early on when it entered into contracts with Palm Beach County for the construction of this project. A Palm Beach County "Grant Agreement" was executed that contained Cost and Schedule objectives. These expectations were filtered down to all project stake holders.

To enforce their expectations for the project Scripps hired a world class Construction/Program Management firm (FLUOR) to provide full time on site project oversight. FLUOR implemented standard Project Control procedures to ensure Cost and Schedule objectives were realized. As it stands the project is scheduled to finish ahead of schedule and within budget.

FLUOR provided a full time FF&E Project Manager to oversee the logistics of the temporary Scripps Florida facilities move. A detailed sequencing move in plan was developed and monitored weekly for progress. Items of particular interest to Scripps include relocation of existing scientific equipment (robotics) and defined protocols related to commissioning the Vivarium spaces in the Biomedical Research facility.

The three building 30 acre site has a phased turnover plan for the three buildings which occur in two week intervals.

Keys to completing the project to the expectations of Scripps include Communication and Project Controls, Weekly and monthly stake holder meetings, on-site Construction Administration representatives of the A/E project team, timely responses to RFIs, detailed tracking tools, and a primavera master project schedule to track and maintain progress.



Scripps first hired a Program Manager (FLUOR) and an A/E Team (ZPA & BCJ). During the design development phase, a GC package (RFP) was prepared and issued for bid. Approximately 30 GC proposals were received and four firms were short-listed. Scripps holds all major contracts between themselves and the General Contractor, A/E, and Construction/Program Manager. The GC and CM/PM contracts are GMP contracts whereas the A/E contract is a Lump Sum contract.

Scripps narrowed down the proposals received to a short-list of four GCs, followed by a detailed evaluation of each contractor based on factors such as; Experience building labs, experience with Scripps, cost analysis (proposed fee), Insurance Modifier Rate, experience in South Florida, and the size of the firms through contacting their references.

The GC furnished a full GMP value Payment & Performance bond. The contract with Scripps required that insurance include items such as; Commercial General Liability $10,000,000.00, Business Automobile Liability $1,000,000.00, Worker Compensation in accordance with Chapter 440, Florida Statues, Professional Liability (for the A/E Only) $10,000,000.00. Scripps was also required to provide Builders Risk Insurance for the Full Construction value of the project which amounted to approximately $182.4MM. The GC used an internally managed “Subguard” program in lieu of requiring subcontractors to furnish a Performance & Payment Bond (P&P). The cost of this program was 1.25% of the subcontracted value.

Construction Manager/Program Manager FLUOR

The highly technical nature of the project required all members of all teams to work together to deliver a successful project in all aspects of construction.

The FLUOR staffing plan is arranged from the top starting with the **Project Director**. The role of the Project Director is to handle the estimating, scheduling, and financial planning for the project. The Project Director is full time on this project. By having the Project Director on this project for a full thirty six months it ensures his full attention to the project from start to finish. His duties also include maintaining a high level of communication with the owner.

The **Project Manager** is full time performing duties which range from directing and coordinating construction activities, processing change orders, and verifying job cost. The Project Manager is also assigned for a full thirty six months to this project.

Later in the project FLUOR provided a full time **FF&E Project Manager** and **Project Controls Specialist**. These two were assigned fulltime for eighteen months. The FF&E Project Manager has specific duties aligned with the owner to ensure that all furniture, finishes and equipment are installed in the correct preferences of the owner. This job also comes with the responsibility of coordinating the transfer of equipment from the temporary facilities to the building upon completion. The Project Controls Specialist ensures that the equipment controls are calibrated and functioning in the proper way.

Finally FLUOR provided a full time **Commissioning Manager** to ensure that all building systems are installed, calibrated, and operate as they have been designed. The Commissioning Manager is assigned to this project full time for twelve months. This individual has a lot of experience with laboratories, and lab equipment such as fume hoods, glasswashers, cage washers, sterilizers, and has a thorough understanding of the way that STERIS (manufacturer of the major pieces of equipment) operates.

Appendix A

Summary Schedule for The Scripps Research Institute Biomedical Research Building

Appendix B

RS Means Data Pages
&
D4 Cost Data

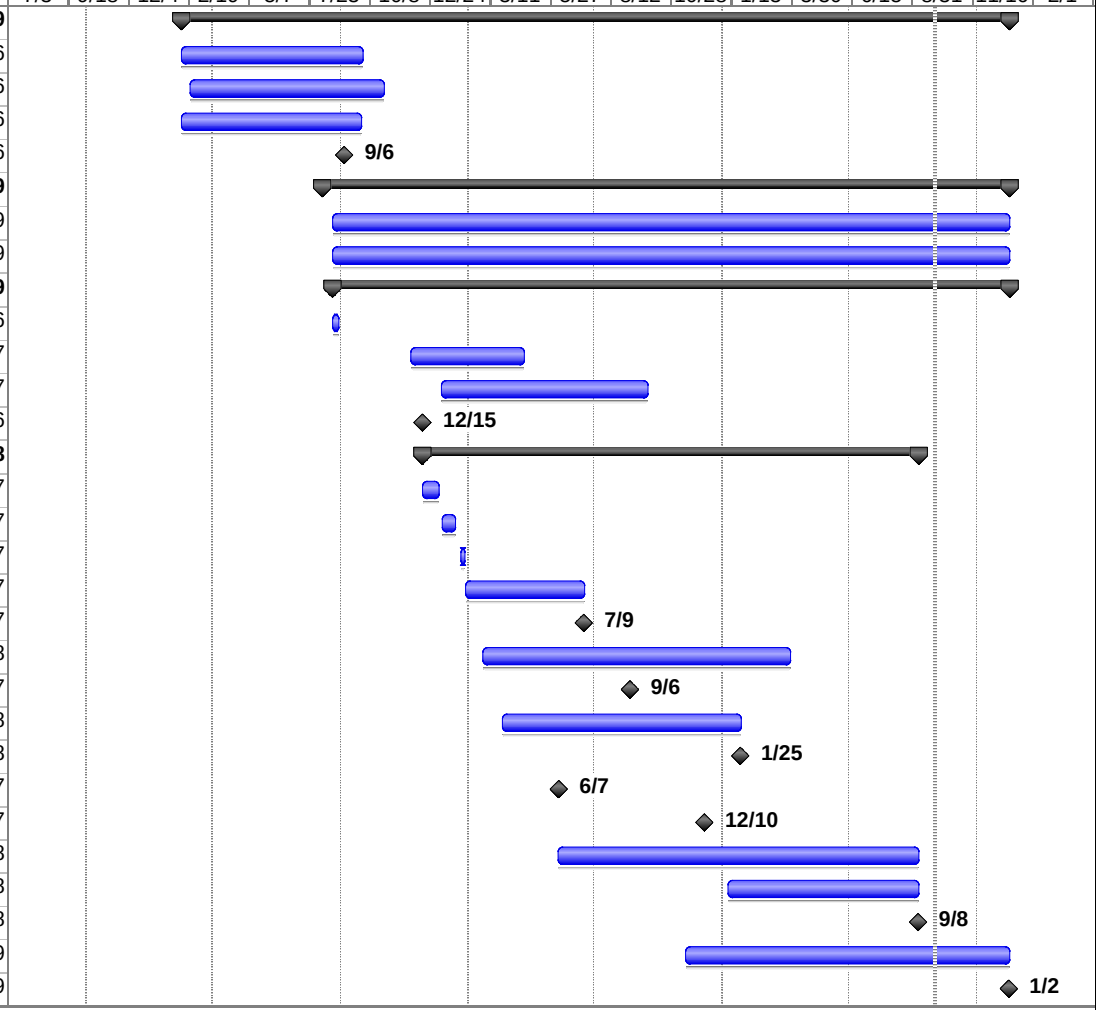
Appendix C

Site Plan of Existing Conditions

Appendix D

Close Up Site Plan of Existing Conditions

ID	Task Name	Duration	Start	Finish
1	**The Scripps Research Institute**	**756 days?**	**Fri 2/10/06**	**Fri 1/2/09**
2	Schematic Design Phase	166 days	Fri 2/10/06	Fri 9/29/06
3	Construction Document Phase	178 days	Tue 2/21/06	Thu 10/26/06
4	Assemble Team & GMP Development	164 days	Fri 2/10/06	Wed 9/27/06
5	Building Permit Issued	0 days	Wed 9/6/06	Wed 9/6/06
6	**Site**	**628 days**	**Wed 8/9/06**	**Fri 1/2/09**
13	Construction Bldg. A	619 days	Tue 8/22/06	Fri 1/2/09
14	Construction Bldg. B	619 days	Tue 8/22/06	Fri 1/2/09
15	**BUILDING C**	**619 days?**	**Tue 8/22/06**	**Fri 1/2/09**
16	Bid/Buyout	6 days	Tue 8/22/06	Tue 8/29/06
17	Coordination/Shop Drawings/Submittals	103 days	Thu 11/30/06	Mon 4/23/07
18	Fabrication	190 days	Mon 1/8/07	Fri 9/28/07
19	Begin Building C Construction	0 days	Fri 12/15/06	Fri 12/15/06
20	**Construction**	**452 days?**	**Fri 12/15/06**	**Mon 9/8/08**
21	Rough Grade Bldg. Pad	15 days	Fri 12/15/06	Thu 1/4/07
22	Vibroflotation	13 days?	Tue 1/9/07	Thu 1/25/07
23	Bldg. Pad Tested	3 days	Fri 2/2/07	Tue 2/6/07
24	Foundations	108 days	Thu 2/8/07	Mon 7/9/07
25	Foundations Complete	0 days	Mon 7/9/07	Mon 7/9/07
26	Structure	281 days	Fri 3/2/07	Fri 3/28/08
27	Structure Complete	0 days	Thu 9/6/07	Thu 9/6/07
28	Exterior	219 days	Tue 3/27/07	Fri 1/25/08
29	Watertight	0 days	Fri 1/25/08	Fri 1/25/08
30	Interior Construction to Begin	0 days	Thu 6/7/07	Thu 6/7/07
31	Interior Finishes starting w/ drywall Begir	0 days	Mon 12/10/07	Mon 12/10/07
32	Interior Construction	329 days	Wed 6/6/07	Mon 9/8/08
33	Startup & Commissioning	174 days	Wed 1/9/08	Mon 9/8/08
34	Startup & Commissioning Complete	0 days	Mon 9/8/08	Mon 9/8/08
35	Occupancy	296 days	Fri 11/16/07	Fri 1/2/09
36	Owner Move In	0 days	Fri 1/2/09	Fri 1/2/09



Project: Summary Schedule of The Sc
Date: Sun 9/28/08

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone	◇	Project Summary	
Milestone	◆	Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	⇩

SCRIPPS FLORIDA
THE SCRIPPS RESEARCH INSTITUTE

COMMERCIAL/INDUSTRIAL/INSTITUTIONAL — M.150 — College, Laboratory

Costs per square foot of floor area

Exterior Wall	S.F. Area	12000	20000	28000	37000	45000	57000	68000	80000	92000
	L.F. Perimeter	470	600	698	793	900	1060	1127	1200	1320
Face Brick with Concrete Brick Back-up	Steel Frame	249.75	205.20	184.80	171.85	165.35	158.95	153.75	149.70	147.25
	Bearing Walls	245.20	200.65	180.20	167.30	160.75	154.40	149.15	145.15	142.65
Decorative Concrete Block	Steel Frame	242.95	200.05	180.45	168.10	161.85	155.70	150.85	147.05	144.70
	Bearing Walls	238.60	195.65	176.10	163.80	157.55	151.40	146.50	142.70	140.40
Stucco on Concrete Block	Steel Frame	241.45	198.90	179.50	167.35	161.10	155.05	150.25	146.55	144.20
	Bearing Walls	237.10	194.55	175.15	162.95	156.75	150.70	145.90	142.15	139.85
Perimeter Adj., Add or Deduct	Per 100 L.F.	9.60	5.75	4.10	3.10	2.55	2.10	1.70	1.40	1.25
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	1.75	1.40	1.15	0.95	0.90	0.90	0.75	0.70	0.65
For Basement, add $ 28.60 per square foot of basement area										

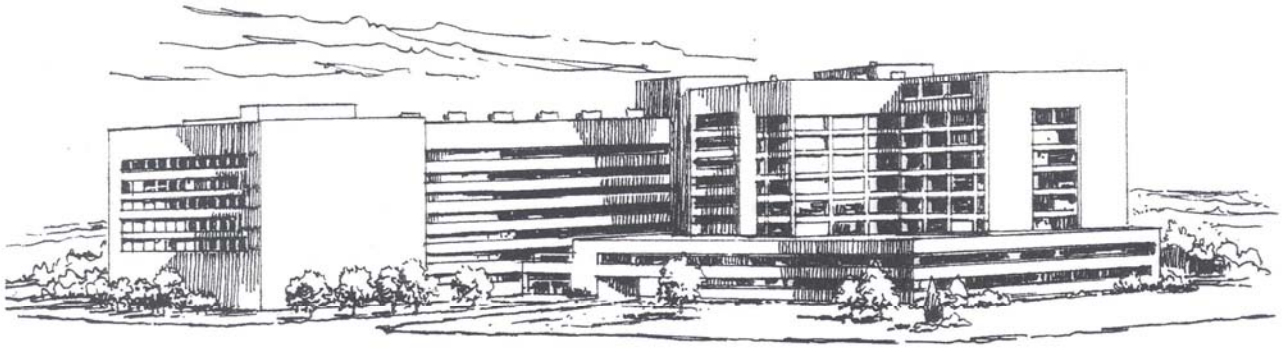
The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from $ 138.90 to $ 259.45 per S.F.

Common additives

Description	Unit	$ Cost
Cabinets, Base, door units, metal	L.F.	243
Drawer units	L.F.	480
Tall storage cabinets, open	L.F.	455
With doors	L.F.	690
Wall, metal 12-1/2" deep, open	L.F.	180
With doors	L.F.	325
Carrels Hardwood	Each	655 - 1200
Countertops, not incl. base cabinets, acid proof	S.F.	43.50 - 56
Stainless steel	S.F.	112
Fume Hood, Not incl. ductwork	L.F.	745 - 2550
Ductwork	Hood	4925 - 8100
Glassware Washer, Distilled water rinse	Each	6475 - 13,100
Seating		
Auditorium chair, all veneer	Each	218
Veneer back, padded seat	Each	264
Upholstered, spring seat	Each	264
Classroom, movable chair & desk	Set	65 - 120
Lecture hall, pedestal type	Each	208 - 620

Description	Unit	$ Cost
Safety Equipment, Eye wash, hand held	Each	445
Deluge shower	Each	805
Sink, One piece plastic		
Flask wash, freestanding	Each	2250
Tables, acid resist. top, drawers	L.F.	188
Titration Unit, Four 2000 ml reservoirs	Each	6050

COMMERCIAL/INDUSTRIAL/INSTITUTIONAL — M.340 — Hospital, 4-8 Story



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Costs per square foot of floor area

Exterior Wall	S.F. Area	100000	125000	150000	175000	200000	225000	250000	275000	300000
	L.F. Perimeter	594	705	816	783	866	950	1033	1116	1200
Face Brick with Structural Facing Tile	Steel Frame	252.95	246.70	242.50	236.10	233.70	231.80	230.35	229.15	228.10
	R/Conc. Frame	262.40	256.00	251.80	245.35	242.95	241.05	239.55	238.30	237.30
Face Brick with Concrete Block Back-up	Steel Frame	247.30	241.10	236.95	231.20	228.90	227.05	225.55	224.45	223.45
	R/Conc. Frame	258.50	252.35	248.20	242.45	240.10	238.30	236.85	235.70	234.65
Precast Concrete Panels With Exposed Aggregate	Steel Frame	249.85	243.65	239.50	233.55	231.20	229.40	227.90	226.75	225.75
	R/Conc. Frame	259.35	253.15	249.00	243.05	240.70	238.90	237.40	236.25	235.25
Perimeter Adj., Add or Deduct	Per 100 L.F.	4.15	3.30 3.13	2.75	2.35	2.05	1.90	1.60	1.50	1.40
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	1.85	1.75 1.73	1.70	1.40	1.35	1.35	1.30	1.30	1.30
For Basement, add $31.25 per square foot of basement area										

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from $151.70 to $369.90 per S.F.

Common additives

Description	Unit	$ Cost
Cabinets, Base, door units, metal	L.F.	243
Drawer units	L.F.	480
Tall storage cabinets, 7' high, open	L.F.	455
With doors	L.F.	690
Wall, metal 12-1/2" deep, open	L.F.	180
With doors	L.F.	325
Closed Circuit TV (Patient monitoring)		
One station camera & monitor	Each	1750
For additional camera add	Each	940
For automatic iris for low light add	Each	2425
Hubbard Tank, with accessories		
Stainless steel, 125 GPM 45 psi	Each	26,800
For electric hoist, add	Each	2925
Mortuary Refrigerator, End operated		
2 capacity	Each	12,500
6 capacity	Each	22,500

Description	Unit	$ Cost
Nurses Call Station		
Single bedside call station	Each	299
Ceiling speaker station	Each	136
Emergency call station	Each	182
Pillow speaker	Each	286
Double bedside call station	Each	365
Duty station	Each	310
Standard call button	Each	157
Master control station for 20 stations	Each	5775
Sound System		
Amplifier, 250 watts	Each	2225
Speaker, ceiling or wall	Each	181
Trumpet	Each	345
Station, Dietary with ice	Each	16,300
Sterilizers		
Single door, steam	Each	161,500
Double door, steam	Each	207,500
Portable, counter top, steam	Each	3875 - 6050
Gas	Each	40,000
Automatic washer/sterilizer	Each	55,500

Statement of Probable Cost

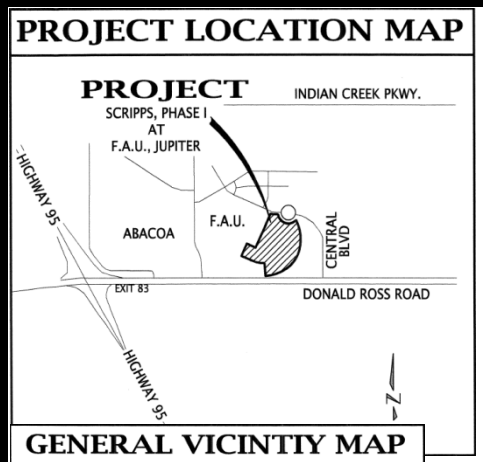
The Scripps Research Institute - Oct 2006 - FL - West Palm Beach - D4 Cost Estimate

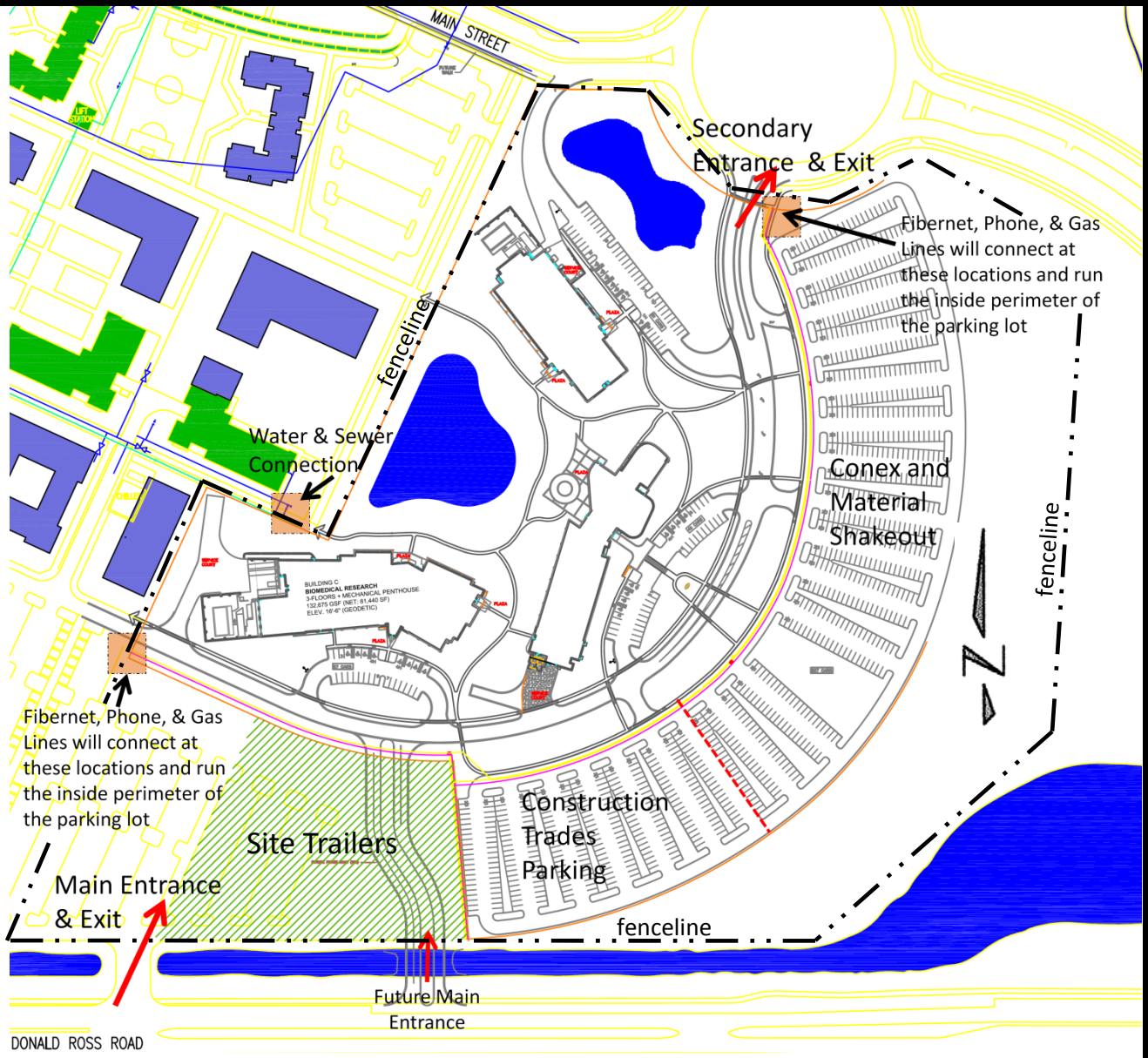
Prepared By: **Adam Houck**
Construction Management

Prepared For: Technical Assignment One
Faculty Advisor Dr. David Riley

Building Sq. Size:	**132675**	Site Sq. Size:	**351803**
Bid Date:	**10/25/2008**	Building use:	**Medical**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**CMU**
Project Height:	**63**	Interior Walls:	**GYP**
1st Floor Height:	**18**	Roof Type:	**BIT**
1st Floor Size:	**44225**	Floor Type:	**VCT**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**3.95**	**12.15**	**1,611,858**
	Bidding Requirements	3.95	12.15	1,611,858
	Untitled	0.00	0.00	0
01	**General Requirements**	**3.97**	**12.21**	**1,620,610**
	General Requirements	3.97	12.21	1,620,610
02	**Site Work**	**3.22**	**9.89**	**1,311,907**
	Site Work	3.22	9.89	1,311,907
03	**Concrete**	**13.86**	**42.60**	**5,651,797**
	Concrete	13.86	42.60	5,651,797
04	**Masonry**	**2.89**	**8.89**	**1,178,912**
	Masonry	2.89	8.89	1,178,912
05	**Metals**	**1.94**	**5.95**	**789,657**
	Metals	1.94	5.95	789,657
06	**Wood & Plastics**	**6.74**	**20.73**	**2,750,253**
	Wood & Plastics	6.74	20.73	2,750,253
07	**Thermal & Moisture Protection**	**2.15**	**6.60**	**875,665**
	Thermal & Moisture Protection	2.15	6.60	875,665
08	**Doors & Windows**	**2.29**	**7.05**	**935,705**
	Doors & Windows	2.29	7.05	935,705
09	**Finishes**	**5.61**	**17.24**	**2,286,957**
	Finishes	5.61	17.24	2,286,957
10	**Specialties**	**0.18**	**0.56**	**74,062**
	Specialties	0.18	0.56	74,062
11	**Equipment**	**1.44**	**4.44**	**588,434**
	Equipment	1.44	4.44	588,434
12	**Furnishings**	**4.96**	**15.24**	**2,021,592**
	Furnishings	4.96	15.24	2,021,592
13	**Special Construction**	**2.00**	**6.16**	**817,358**
	Special Construction	2.00	6.16	817,358
14	**Conveying Systems**	**0.82**	**2.51**	**332,609**
	Conveying Systems	0.82	2.51	332,609
15	**Mechanical**	**35.57**	**109.32**	**14,504,396**
	Mechanical	35.57	109.32	14,504,396
16	**Electrical**	**8.41**	**25.85**	**3,430,034**
	Electrical	8.41	25.85	3,430,034
Total Building Costs		**100.00**	**307.38**	**40,781,806**





The Scripps Research Institute

Biomedical Research Building

Adam Houck

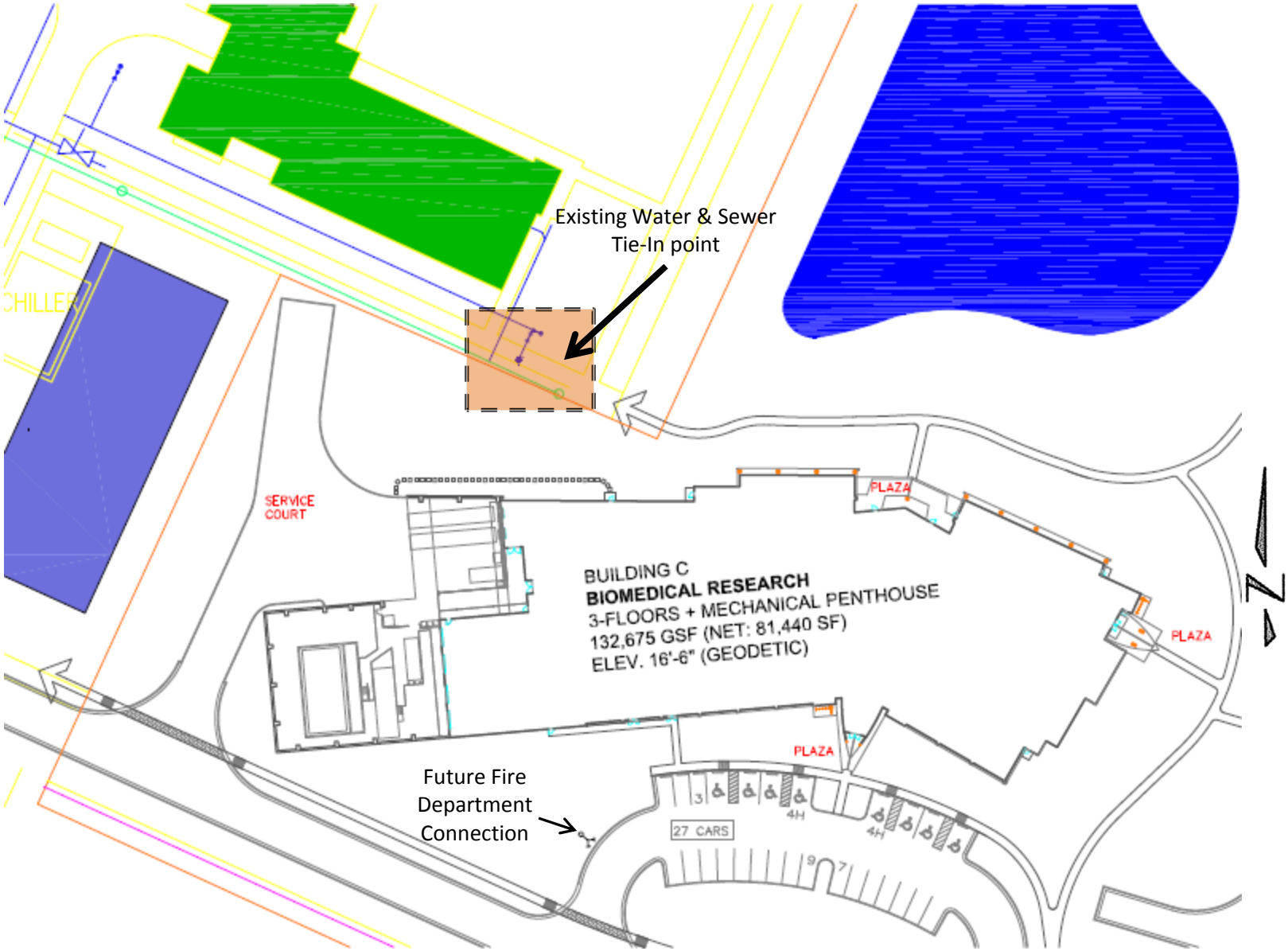
Technical Assignment One

September 29, 2008

Faculty Advisor: **Dr. David Riley**

Existing Conditions

Appendix C



The Scripps Research Institute

Biomedical Research Building

Adam Houck

Technical Assignment One

September 29, 2008

Faculty Advisor: **Dr. David Riley**

Existing Conditions

Appendix D