



## Building Statistics I

Alec Hanley

Construction Management

Advisor – Ray Sowers

Cardinal Wuerl North Catholic High School

Cranberry Township, PA

Wednesday, August 28<sup>th</sup>, 2013

## Executive Summary

Cardinal Wuerl North Catholic High School is a newly constructed private school north of downtown Pittsburgh. After years and years attempting to raise the money to fund the construction of the school, the project broke ground in June 2012. This traditional design-bid-build project was designed by Astorino and built as a multiple prime/general contractor lead with a construction management agency. The 177,129 GSF complex is set to be completed by June 2014. Being the most unique design component of the complex, the chapel's design and construction were ultimately delayed causing the date of substantial completion to change from January 2014 → June 2014. Regardless, Cardinal Wuerl North Catholic High School will be open to students for the 2014-15 school year and will do so in stylish fashion. CWNCHS's aesthetically pleasing design, quality of construction and efforts in sustainability will find new students very pleased with their new surroundings. All of the previously stated elements of CWNCHS are laid out in much greater detail in the following pages.

## General Building Data

<b>Building Name</b>	Cardinal Wuerl North Catholic High School
<b>Location &amp; Site</b>	1617 Route 228, Cranberry Township, PA, 16066
<b>Building Occupant Name</b>	Catholic Diocese of Pittsburgh
<b>Occupancy/Function Type</b>	Educational - E
<b>Size (gross square feet)</b>	177,129 GSF
<b>Number of Stories Above Grade/Total Levels</b>	2 above grade, 1 partial below grade (Cafeteria)
<b>Dates of Construction</b>	June 2012 - June 2014
<b>Overall Cost</b>	\$70 million
<b>Project Delivery Method</b>	Design-Bid-Build; Multiple Prime GC Lead w/ CM Agency

## Primary Project Team

<b>Owner</b>	<a href="#">Catholic Diocese of Pittsburgh</a>
<b>General Contractor</b>	<a href="#">Mascaro Construction</a>
<b>CM Agency</b>	<a href="#">Campayno Consulting Services</a>
<b>Architect</b>	<a href="#">Astorino</a>
<b>Site/Civil Engineering</b>	<a href="#">Civil &amp; Environmental Consultants, Inc. (CEC)</a>
<b>HVAC/Plumbing Contractor</b>	<a href="#">Renick Brothers</a>
<b>Electrical Contractor</b>	<a href="#">Lighthouse Electric</a>
<b>Site Contractor</b>	<a href="#">Allegheny Excavating, Inc.</a>
<b>Fire Suppression Contractor</b>	<a href="#">Interstate Fire Protection, Inc.</a>

## Architecture

### Design & Functional Components

The various roof levels and irregular perimeter shape display the complexity of the interior spaces. All of the interior spaces were split up amongst 7 sections (A-G) based on the types of rooms that are in that area.

*Area A* is split amongst two levels on the south elevation of the building. The bottom level is the only area of the building that is below grade and is a partial floor. It houses the cafeteria, kitchen, and MEP rooms. The ground level of Area A boasts a 1,500-person capacity gymnasium and locker rooms.

*Area B* is located to the east of Area on the ground level. A maintenance room, fitness center, and athletic/administrative offices are located here.

*Area C* is the chapel and is located in the courtyard of the building. It branches off to the west from the main corridor between Areas A & D. The design for Area D was late and did not begin until August 5, 2013.

*Area D* contains the 1,000-person capacity Auditorium and more administrative areas, as well as four bathrooms. Area D is further north of A and B (which are side by side) and the main façade of D is visible from the East & West Sides of the building. Area D also has the highest roof in the building at the stage area of the auditorium. This area is called the fly tower and reaches 53'-4" above the ground level.

*Area E* encloses the library as well as various musical education spaces. It is located at the north east section of the building and just north of Area D.

*Area F* is a two-story classroom wing to the west of areas A, B, D, and E and stems off perpendicularly at the intersection of Areas D & E. It contains language arts, art education, science labs and religious education classrooms. The second floor corridor has a curved ceiling that reaches up to the North clerestory and reflects light down into the hallway as if from an omniscient source, rendering itself one of the most unique architectural features of CWNCHS.

Area G has the same functionality as Area F, in that it solely contains classrooms and is two stories tall. It contains English, health, theology, math, and social studies rooms. Area G is only connected to Area F and bends off of the West End of F towards the Southwest at exactly 27 degrees. The second level of G is being built as a core-and-shell package since the space isn't necessary for the 2014-2015 school year. This has implications for the construction of the social studies and math classrooms only.

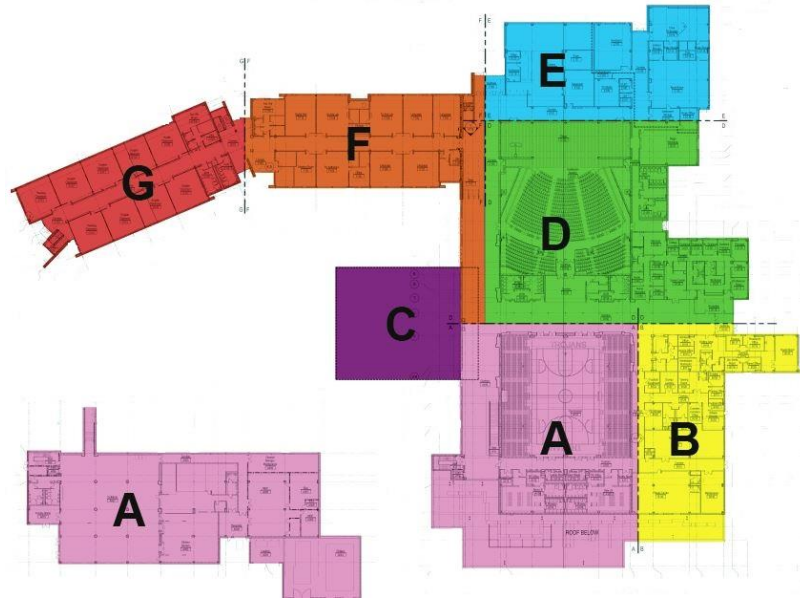


Figure 1: Building Component Diagram (Property of Astorino)

There are a few other facts and features of Cardinal Wuerl North Catholic High School that should be highlighted:

27 Classrooms

Bell Tower on Southeast side with refurbished bell from original North Catholic HS

Chapel in Courtyard

Possible future grotto in southwest

LEED Silver upon completion → 53/110 points

## Major National Model Codes

1. 2009 International Building Code
2. 2009 International Mechanical Code
3. 2009 International Plumbing Code
4. 2009 International Energy Conservation Code
5. National Fire Protection Association (NFPA) 70 – 2008 National Electric Code
6. 2009 International Fire Code
7. 2009 International Fuel Gas Code
8. 2009 International Wildlife-Urban Code
9. 2009 International Performance Code for Buildings and Facilities
10. 2010 ADA

## Accessibility Standards

11. 2009 International Code Council/American National Standards Institute (ANSI) A117.1 – 2003 Accessible & Usable Buildings & Facilities
12. Chapter 11 – 2009 IBC
13. Appendix E – 2009 IBC

## Zoning

This non-public education institution sits on 65 acres of property in the Cranberry Township R-1 - Rural Residential Zoning District. North Catholic was deemed Type IB & IIB Construction due to its steel frame and steel beam/deck roof structure. The Cranberry Planning Advisory Commission approved the project on May 7, 2012 and the Board of Supervisors approved the building on June 28, 2012.

## Historical Requirements

Four stained-glass panels from the original North Catholic High School (also located in Pittsburgh) will be moved from the old school to the newly constructed chapel. These panels will not be a part of the building exterior for preservation/weathering reasons but they will be mounted inside each of the four non-storefront windows on the chapel. Also, the original bell from North Catholic High School is to be refurbished and installed in the new bell tower at CWNCHS.

## Building Enclosure

### Building Facades

There are three primary materials that the building façade consists of; brick, insulated metal panel, and glazed windows held in place by dry-glazed, thermal aluminum frames. The primary building envelope from inside to out is GWB, metal studs, exterior sheathing, spray-applied vapor barrier, rigid insulation, air cavity and brick veneer. There are a few variations of the brick veneer construction throughout the building. At the southern wing wall on the west end of Area G there is brick veneer wrapped around both sides of 8" CMU (typical for all wing walls). The wall construction at the chiller yard on the outside of lower level of Area A is 12" CMU bonded with 4" brick composite wall that is finished with a precast stone cap. The insulated metal panel finish conceals metal studs, exterior sheathing, and spray-applied vapor barrier or bare CMU. These insulated metal panels arrive to the site prefabricated with rigid insulation attached to their unexposed side.



Figure 2: Southwest Rendering (Astorino Property)



Figure 3: Construction Progress Photos (Property of Mascaro Construction)

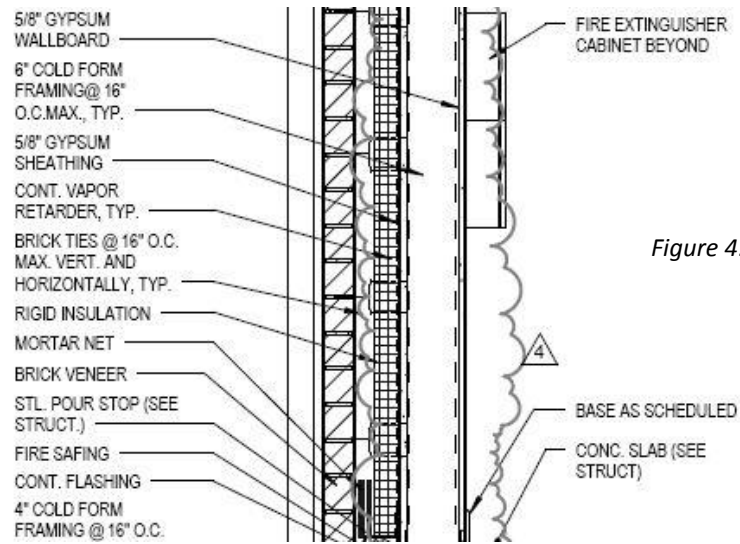


Figure 4: Typical Classroom Wall Section (Astorino Property)

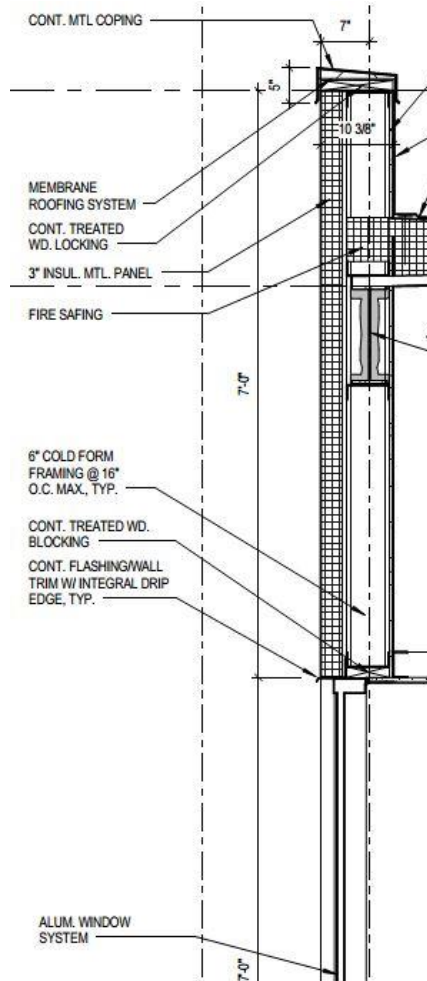


Figure 5: Insulated Metal Panel & Window System Wall Section in Main Corridor D100 (Astorino Property)

### Roofing

There are two primary types of roofing used on this project. TPO (thermoplastic polyolefin) single-ply roofing is the primary roofing system used throughout the building. The TPO extends everywhere on the roof including the parapet caps, MEP/structural penetrations, roof curbs, and everywhere where there isn't a standing-seam metal roof. The typical detail for the TPO roofing shows a 3" layer of rigid insulation resting atop the roof deck, to which the TPO roof membrane is mechanically adhered. The other roofing system used is a standing-seam metal roof located in areas F & G. It is only located on the South parts of these building sections. As the north part of the standing-seam starts to slope upward towards the north elevations of F & G, it is abruptly cut off and a clerestory window/wall plunges downward towards the flat TPO roof. The clerestory overlooks the corridors in the second level of F & G. Since some of the roofs are not very tall in height, roof screens are installed around some of the air-handling units on the roof. Roof screens are used in a total of 3 locations around the south perimeter of the low roof. This is an attempt to preserve the aesthetic features of the façade materials by shielding large mechanical equipment.



*Figure 6: Standing Seam Metal Roofing Photograph from Main Corridor Roof on Area F (Property of Mascaro Construction)*



*Figure 7: TPO Roofing & Roofscreen Photograph taken from Area B Roof (Property of Mascaro Construction)*





Figure 8: Roofing Material Diagram (Property of Astorino)

### **Sustainability Features**

Cardinal Wuerl North Catholic High School is currently on track to receive a LEED Silver Certification (53 points out of a possible 110) through many trailblazing efforts that are unique for a high school under new construction. The extensive thermoplastic polyolefin (TPO) roof system helps to reduce the heat-island effect by having a high reflectivity and emittance. An extensive effort was put into place to reduce the use of high-VOC materials as well as increase the use of regional materials (within 500 miles).

In addition, FSC-accredited & certified wood was used throughout the project for items such as casework and acoustic wall panels. In another effort to increase the indoor air and lighting environment, the design implemented operable windows, advanced heating/cooling controls, the use of MERV-14 main filters and MERV-8 pre-filters, and abundant natural daylighting. In addition to the large windows, some classrooms have windows between rooms in the corner intersecting and perpendicular to the windows. This allows daylight sharing and for dark corners to receive optimum daylighting. Also, 75% or greater by weight (tons) of the waste generated on site will be recycled.

### Sources

- Cover Page Rendering as well as Figures 2, 4 & 5 are property of Astorino.
- Figures 1, 3, 6, 7 & 8 are property of Alec Hanley
- IBC 2009
- Primary Project Team Hyperlink URLs (same order):
  - o <http://diopitt.org/>
  - o <http://www.mascaroconstruction.com/>
  - o <http://www.campaynoconsulting.com/>
  - o <http://www.astorino.com/>
  - o <http://www.cecinc.com/>
  - o <http://www.renickbrothers.com/>
  - o <http://www.lighthouseelectric.com/>
  - o <http://alleghenyx.net/>
  - o <http://interstatefire.com/>