
http://content.asce.org/studentcompetition/index.html

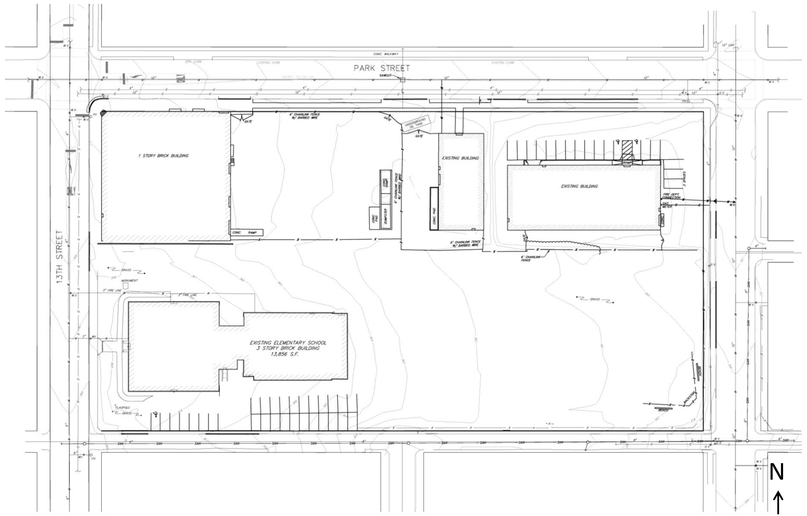
# nexus

AEI Team 2013-02

3 April 2013

Brian LaChance | Mike Palmer | Rachel Barrow
Alex Byard | Melanie Fonner
Brad Frederick | Pat Allen

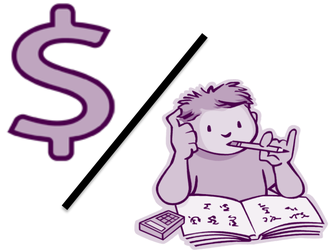
# Competition Challenge





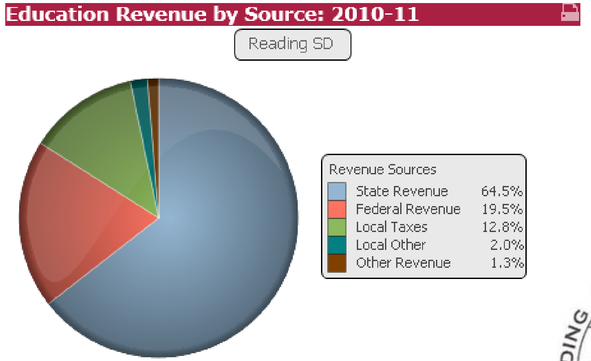
# Reading School District


https://www.google.com/imghp?hl=en&tab=wi



**PA Average- $14,535**

**Reading- $12,989**



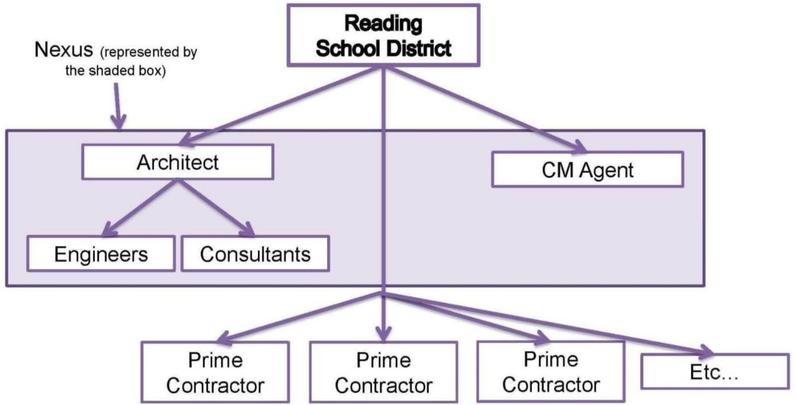

openpagov.org


https://www.google.com/imghp?hl=en&tab=wi

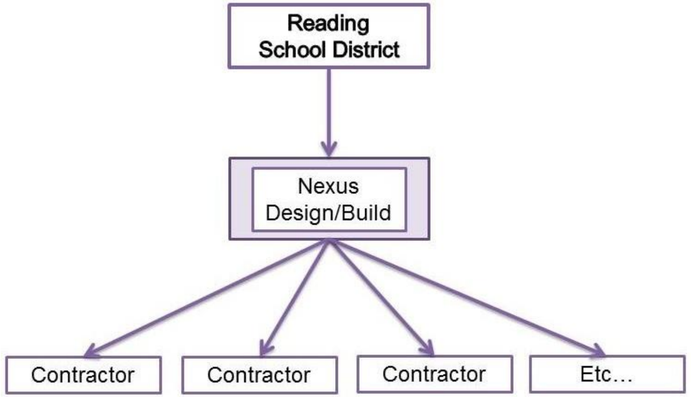
# Delivery Method


https://www.google.com/imghp?hl=en&tab=wi

## CM Agent with Multiple Primes




## Design/Build



# Goals

## Owner Core Values

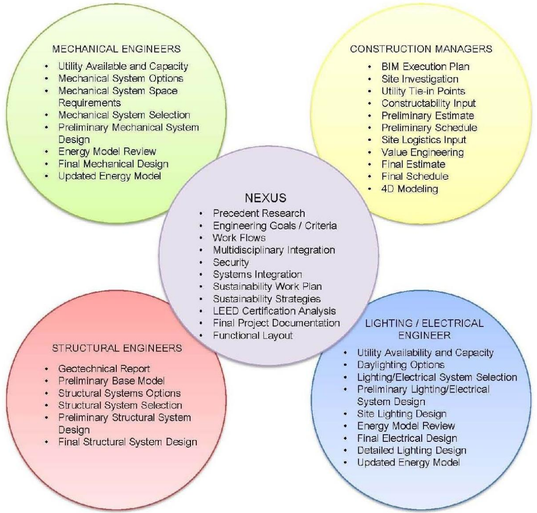
- Safety & Security
- Lifecycle & Maintenance
- Cost Effective

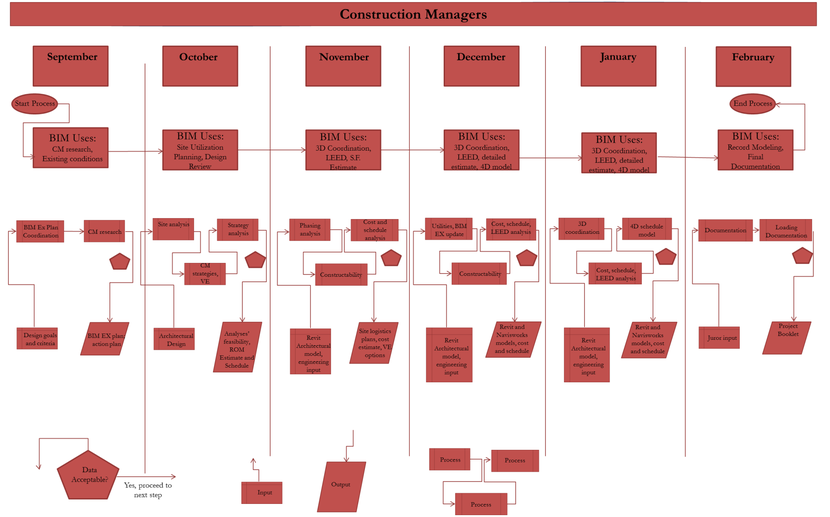
## Nexus Goals

- Integration
- Reduce, Reuse, Recover
- Learning Tool

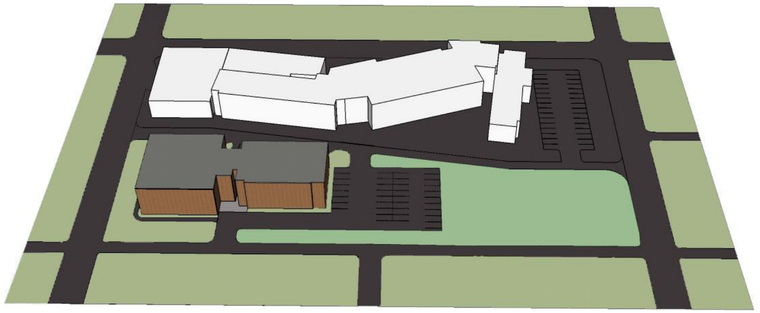
# BIM Execution Plan

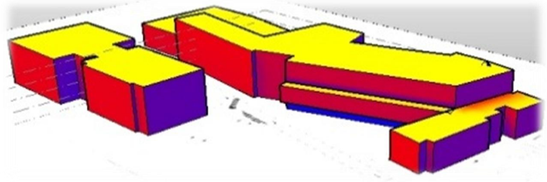
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Structural Engineering** | ASCE | STEEL | | STAAD.Pro | SAP2000 | ETABS | R |
| **Mechanical Engineering** | | | | | | | |
| **Lighting/Electrical Engineering** | | AGI32 | DAYSIM | Radiance | | | Ps |
| **Construction Management** | | | | | | RSMeans | |
| **Integration** | | | | | | | |

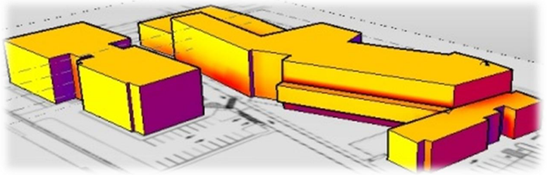


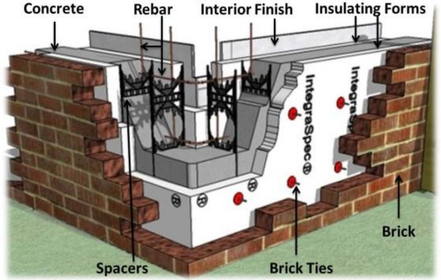



# Collaborative Progression

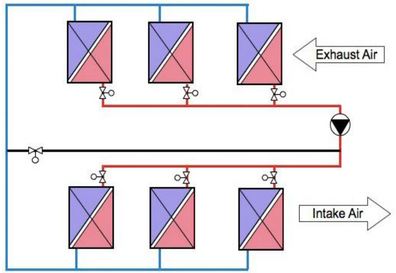






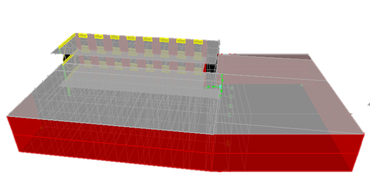


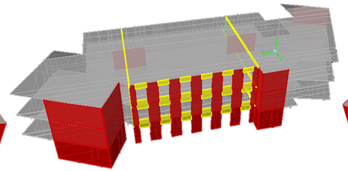

www.integraspec.ie

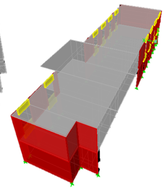


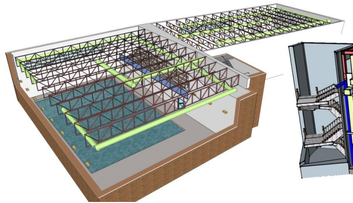

www.konvekta.com

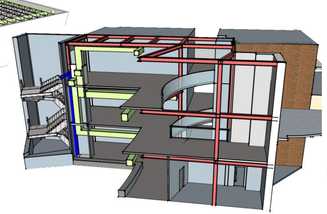
# Collaborative Progression

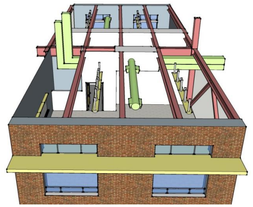








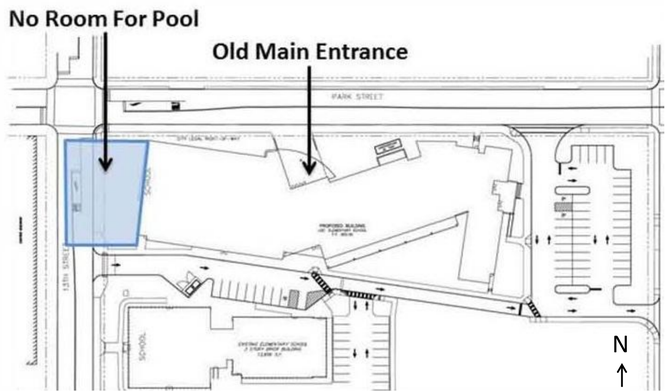


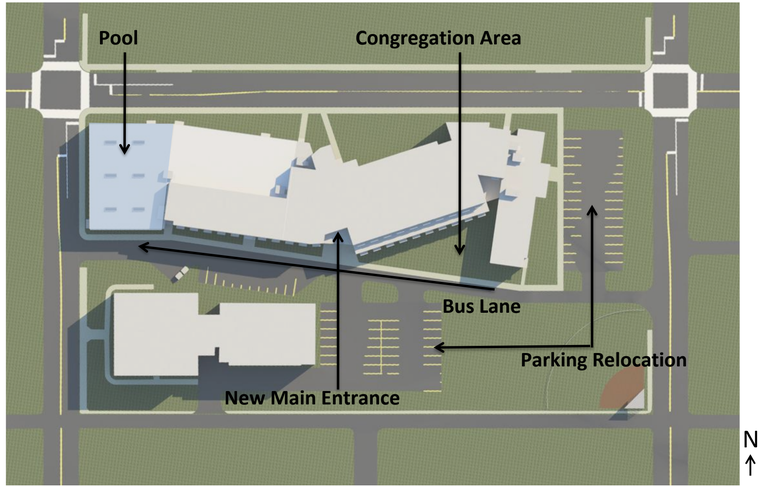



ETABS®

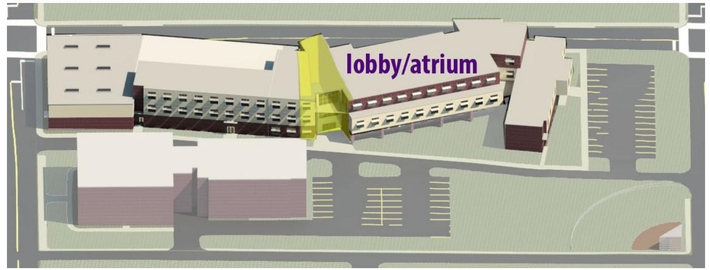
Google SketchUp

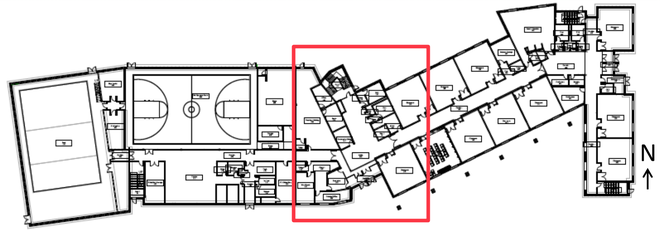
# Site Plan


No Room For Pool
Old Main Entrance
PARK STREET
N

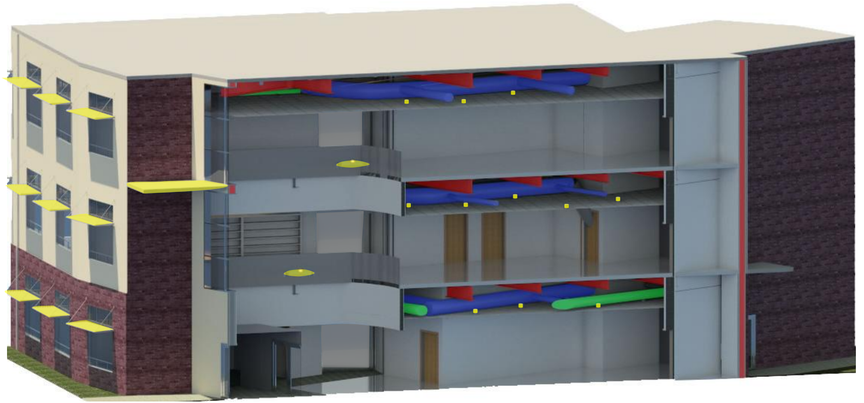

Pool
Congregation Area
Bus Lane
Parking Relocation
New Main Entrance
N

# Main Entrance



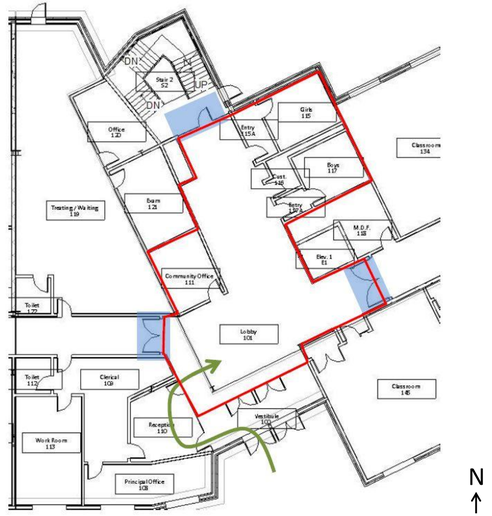

First Floor Plan



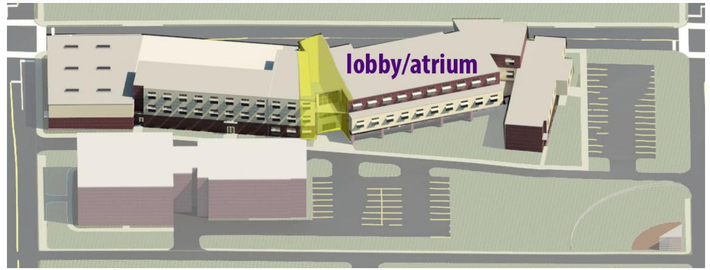
Visitor Entry

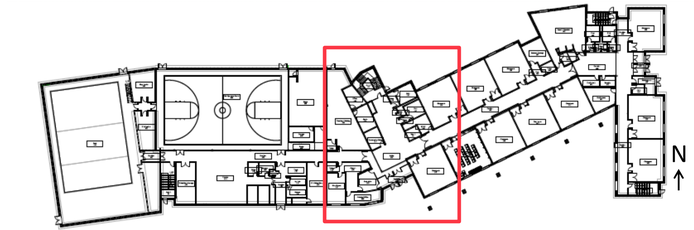
Security/Fire Doors

Secure Perimeter



# Entry Walkthrough



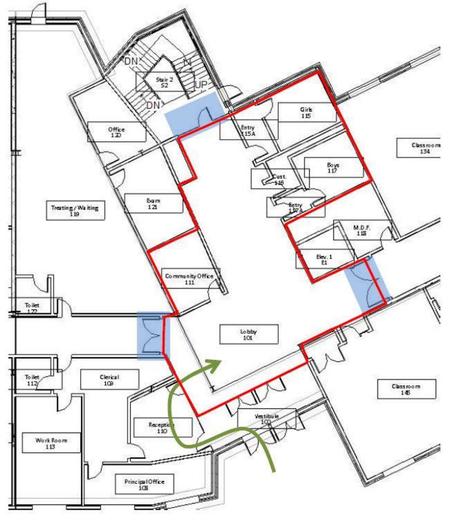




First Floor Plan

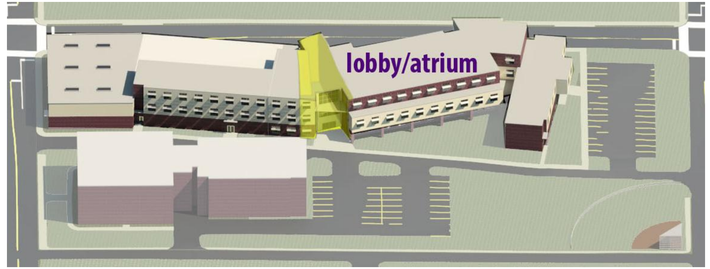
Visitor Entry

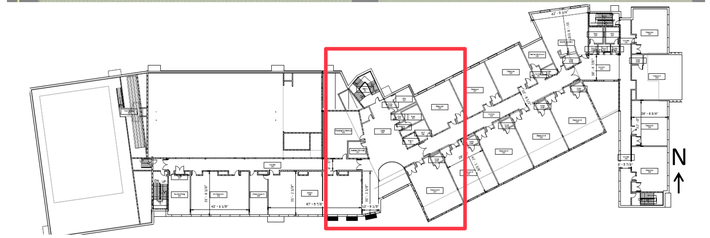
Security/Fire Doors

Secure Perimeter

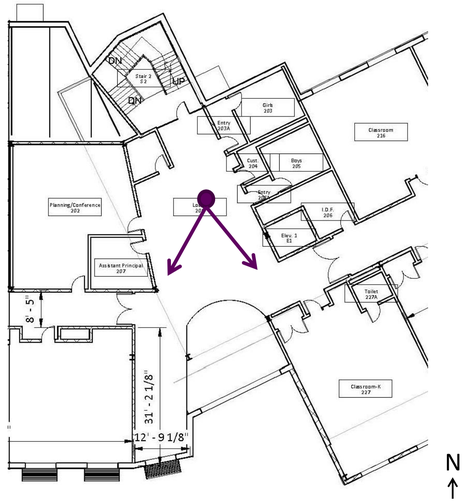


# Second Floor Lobby

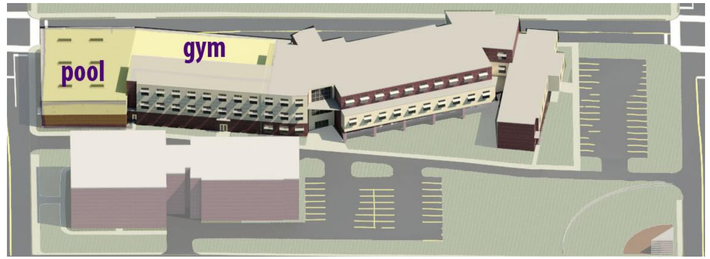


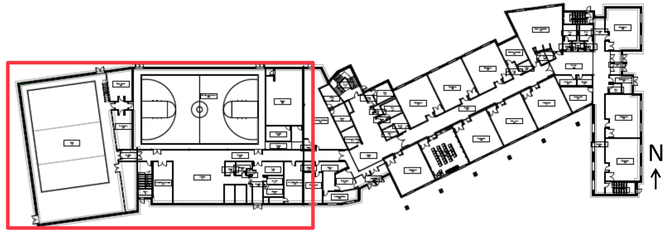




Second Floor Plan

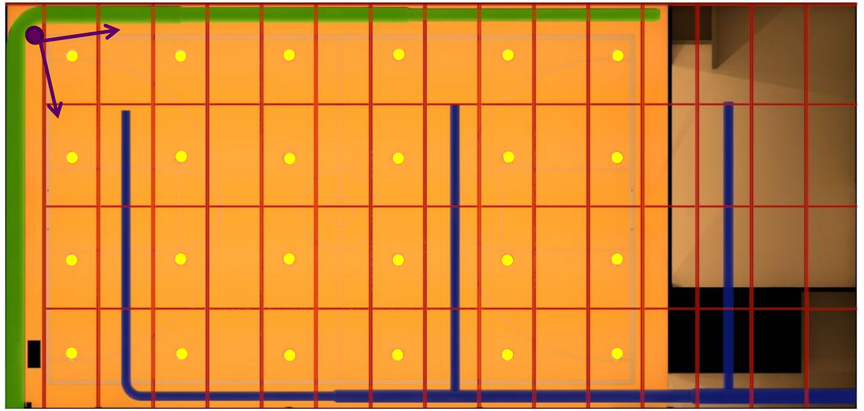



# Multipurpose Room

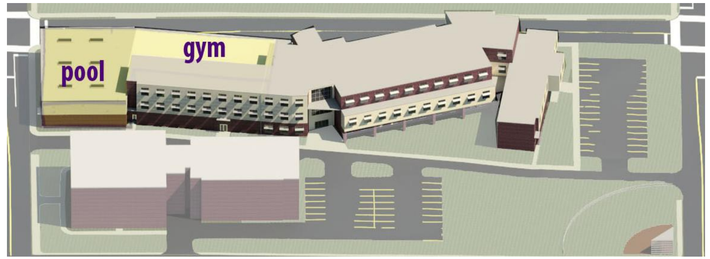


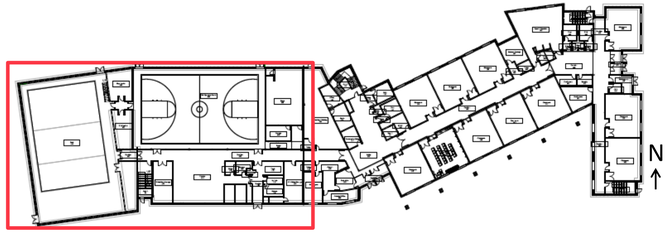




First Floor Plan

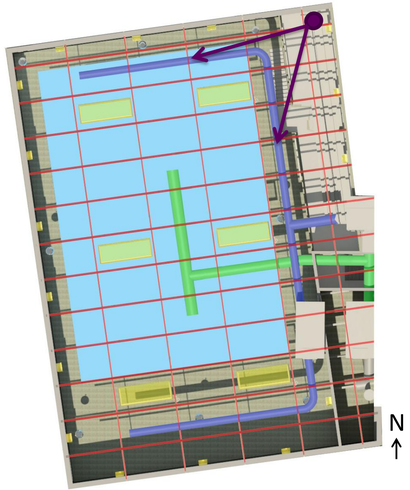



# Pool

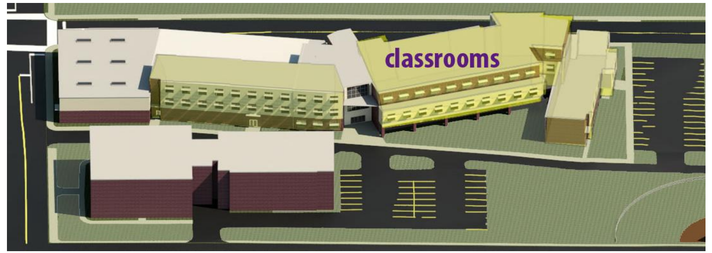


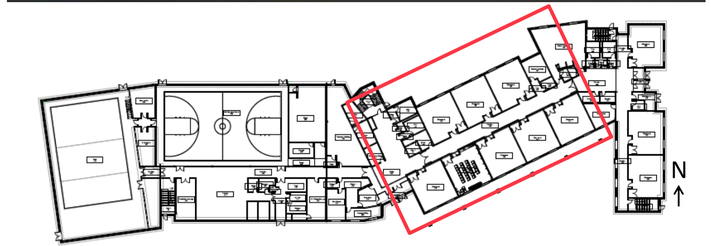




First Floor Plan

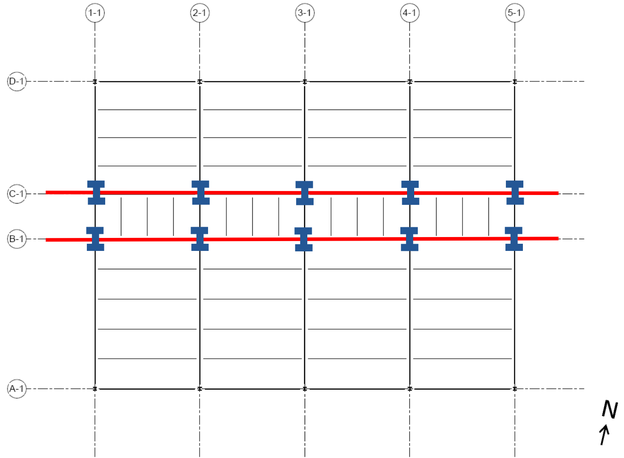


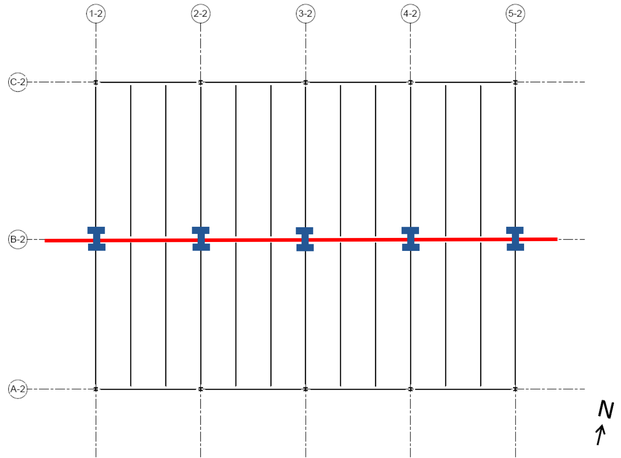

# Classroom




First Floor Plan



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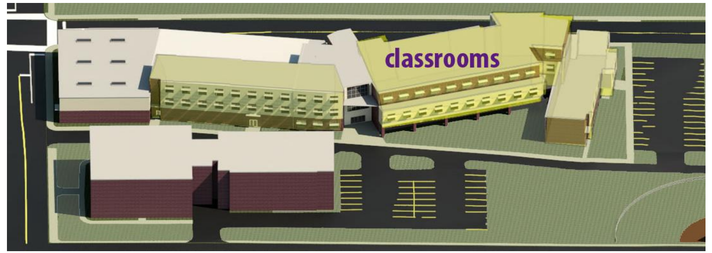
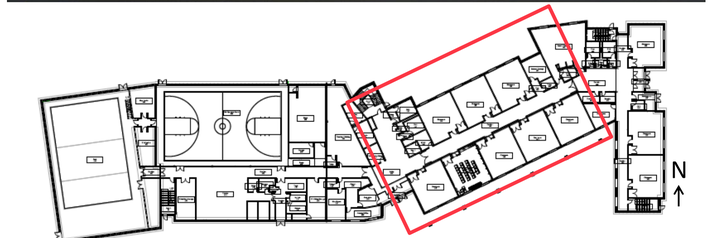
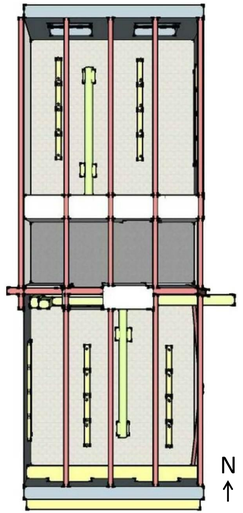
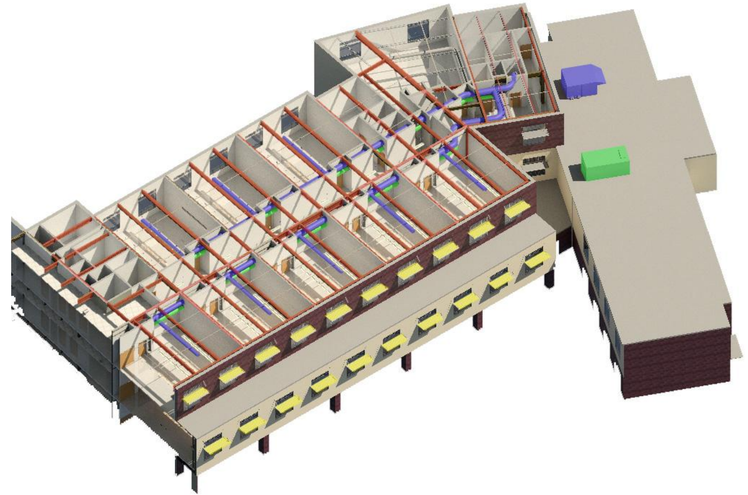



First Floor Plan



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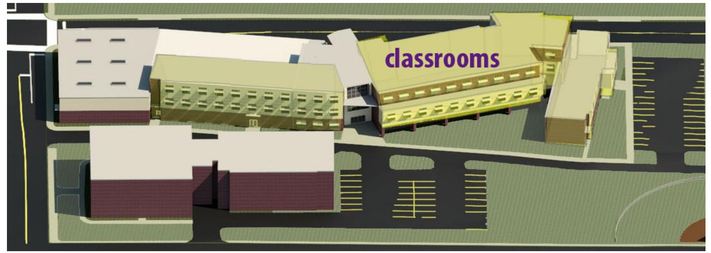
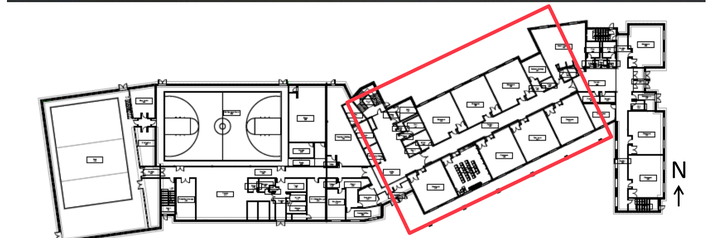
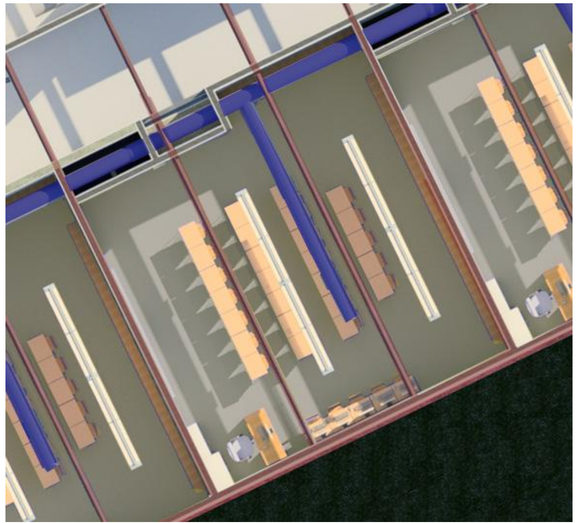


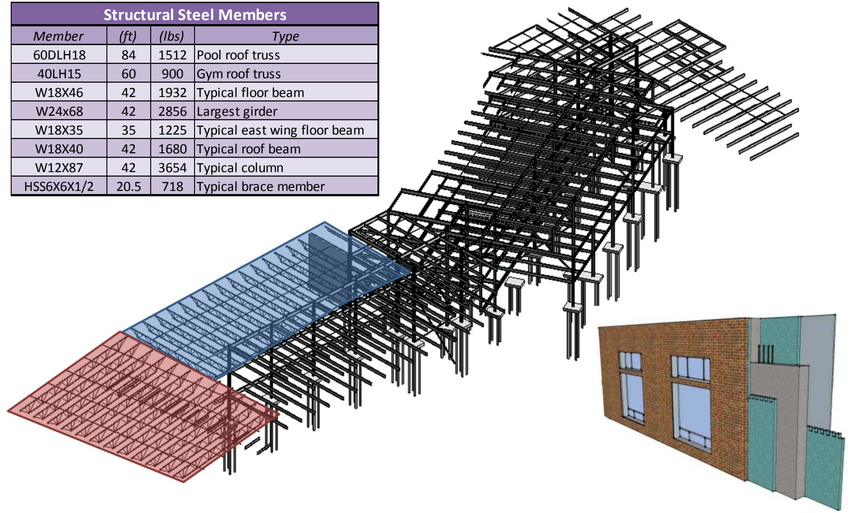



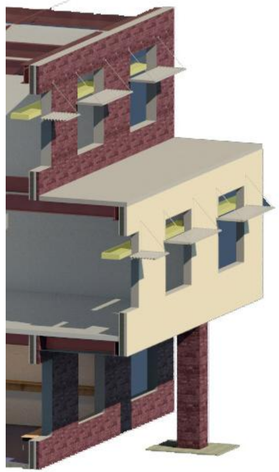

First Floor Plan

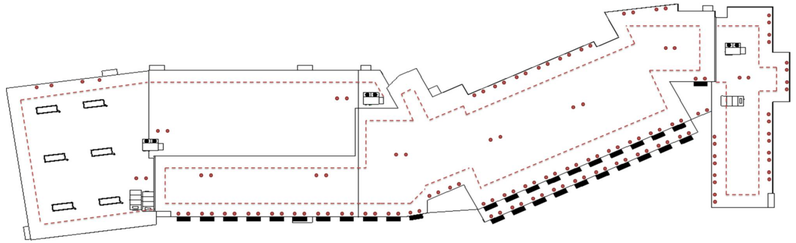



# Constructability

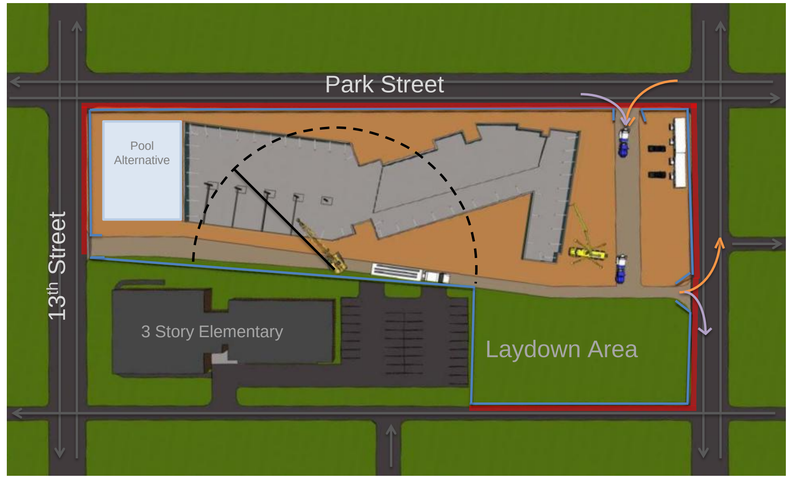
| Structural Steel Members | | | |
|---|---|---|---|
| *Member* | *(ft)* | *(lbs)* | *Type* |
| 60DLH18 | 84 | 1512 | Pool roof truss |
| 40LH15 | 60 | 900 | Gym roof truss |
| W18X46 | 42 | 1932 | Typical floor beam |
| W24x68 | 42 | 2856 | Largest girder |
| W18X35 | 35 | 1225 | Typical east wing floor beam |
| W18X40 | 42 | 1680 | Typical roof beam |
| W12X87 | 42 | 3654 | Typical column |
| HSS6X6X1/2 | 20.5 | 718 | Typical brace member |





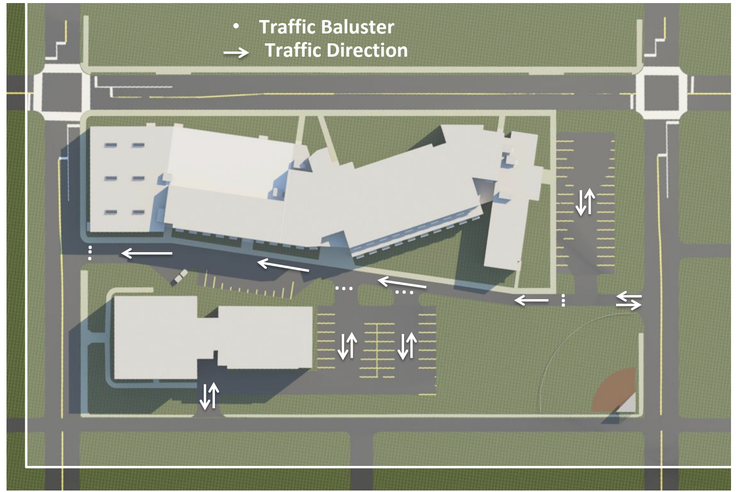


# Safety




N

| Nexus' School Security and Occupant Safety Checklist | | |
|---|---|---|
| Level of Integration | **Significant** | Acceptable |
| Secure Main Entrance | √ | |
| Safe Main Entrance | √ | |
| Parking Lot Balusters | | √ |
| Public Address System | √ | |
| Security Alarms | √ | |
| Intrusion Detection System | √ | |
| Lockdown Security Doors | √ | |
| Manual Window Shades | | √ |
| Video Surveillance | √ | |
| First Floor Bullet-Resistant Glass | √ | |

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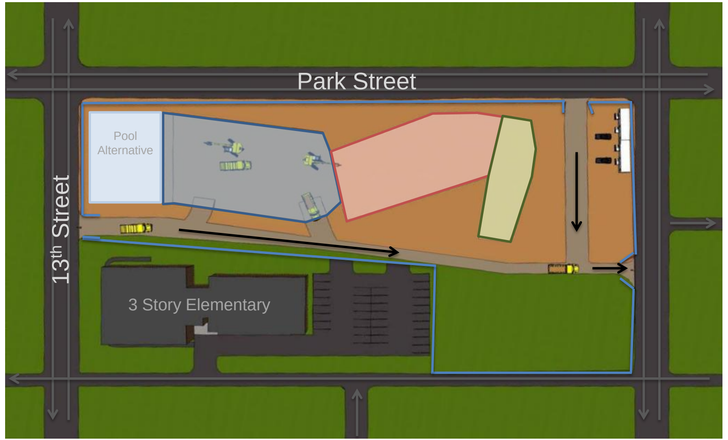
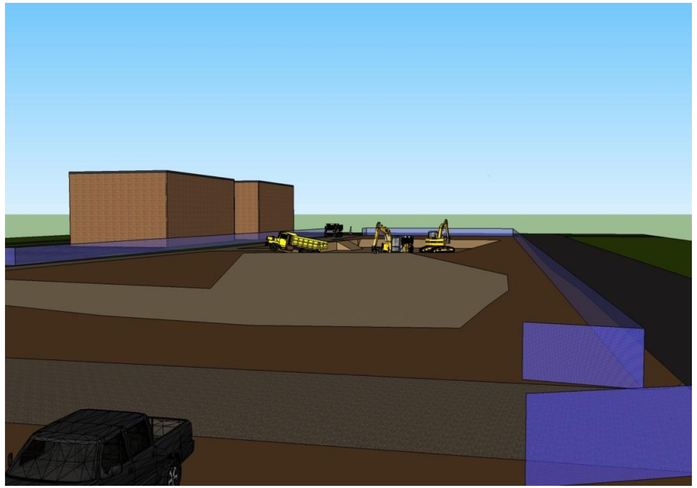
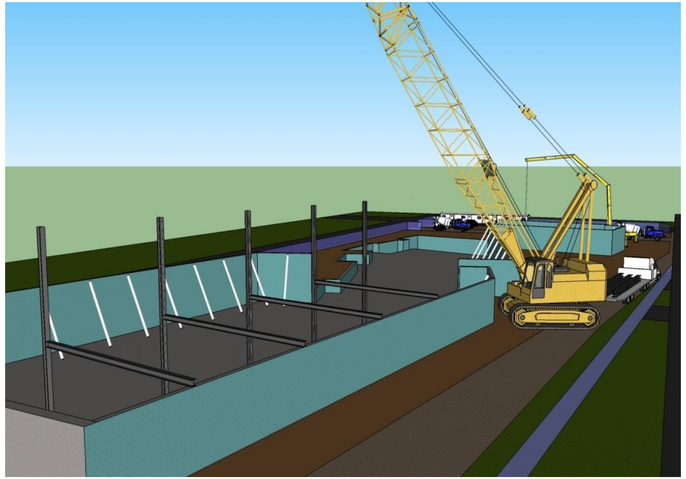
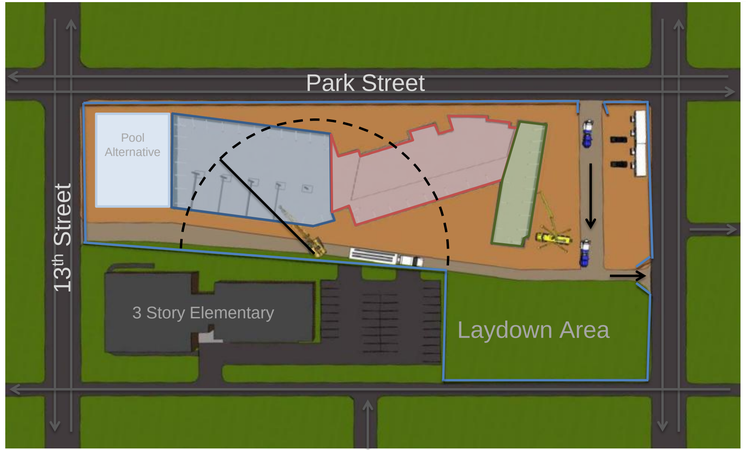
# Site Logistics

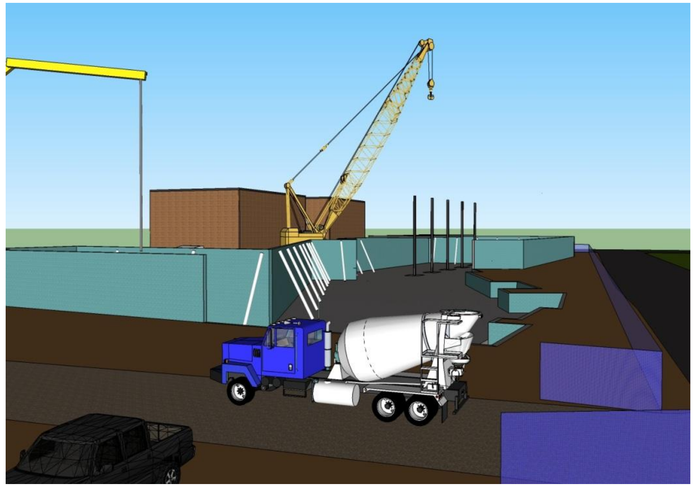


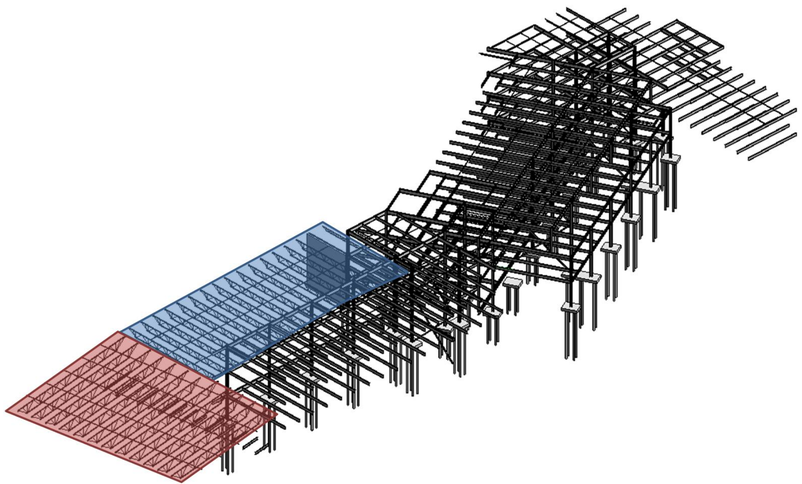
# Site Logistics



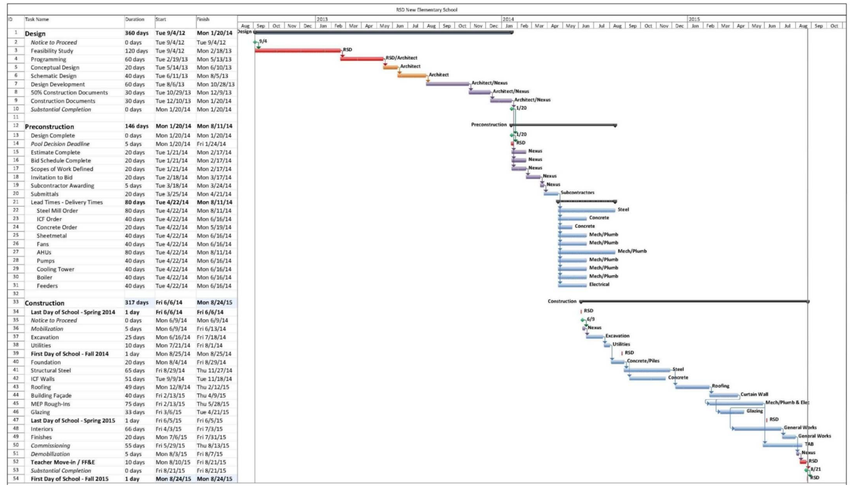


# Schedule



| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Design** | **360 days** | **Tue 5/4/12** | **Mon 1/20/14** |
| 2 | *Notice to Proceed* | 0 days | Tue 5/4/12 | Tue 5/4/12 |
| 3 | Feasibility Study | 120 days | Tue 5/4/12 | Mon 2/18/13 |
| 4 | Programming | 60 days | Tue 2/19/13 | Mon 5/13/13 |
| 5 | Conceptual Design | 20 days | Tue 5/14/13 | Mon 6/10/13 |
| 6 | Schematic Design | 40 days | Tue 6/11/13 | Mon 8/5/13 |
| 7 | Design Development | 60 days | Tue 8/6/13 | Mon 10/28/13 |
| 8 | 50% Construction Documents | 30 days | Tue 10/29/13 | Mon 12/9/13 |
| 9 | Construction Documents | 30 days | Tue 12/10/13 | Mon 1/20/14 |
| 10 | *Substantial Completion* | 0 days | Mon 1/20/14 | Mon 1/20/14 |
| 11 | | | | |
| 12 | **Preconstruction** | **146 days** | **Mon 1/20/14** | **Mon 8/11/14** |
| 13 | Design Complete | 0 days | Mon 1/20/14 | Mon 1/20/14 |
| 14 | *Post Decision Deadline* | 5 days | Mon 1/20/14 | Fri 1/24/14 |
| 15 | Estimate Complete | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 16 | Bid Schedule Complete | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 17 | Scopes of Work Defined | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 18 | Invitation to Bid | 20 days | Tue 2/18/14 | Mon 3/17/14 |
| 19 | Subcontractor Awarding | 5 days | Tue 3/18/14 | Mon 3/24/14 |
| 20 | Submittals | 20 days | Tue 3/25/14 | Mon 4/21/14 |
| 21 | Lead Times - Delivery Times | **80 days** | **Tue 4/22/14** | **Mon 8/11/14** |
| 22 | Steel Mill Order | 80 days | Tue 4/22/14 | Mon 8/11/14 |
| 23 | ICF Order | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 24 | Concrete Order | 20 days | Tue 4/22/14 | Mon 5/19/14 |
| 25 | Sheetmetal | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 26 | Fans | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 27 | AHUs | 80 days | Tue 4/22/14 | Mon 8/11/14 |
| 28 | Pumps | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 29 | Cooling Tower | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 30 | Boiler | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 31 | Feeders | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 32 | | | | |
| 33 | **Construction** | **317 days** | **Fri 6/6/14** | **Mon 8/24/15** |
| 34 | **Last Day of School - Spring 2014** | **1 day** | **Fri 6/6/14** | **Fri 6/6/14** |
| 35 | *Notice to Proceed* | 0 days | Mon 6/9/14 | Mon 6/9/14 |
| 36 | *Mobilization* | 5 days | Mon 6/9/14 | Fri 6/13/14 |
| 37 | Excavation | 25 days | Mon 6/16/14 | Fri 7/18/14 |
| 38 | Utilities | 10 days | Mon 7/21/14 | Fri 8/1/14 |
| 39 | **First Day of School - Fall 2014** | 1 day | Mon 8/25/14 | Mon 8/25/14 |
| 40 | Foundation | 20 days | Mon 8/4/14 | Fri 8/29/14 |
| 41 | Structural Steel | 65 days | Fri 8/29/14 | Thu 11/27/14 |
| 42 | ICF Walls | 51 days | Tue 9/9/14 | Tue 11/18/14 |
| 43 | Roofing | 49 days | Mon 12/8/14 | Thu 2/12/15 |
| 44 | Building Façade | 40 days | Fri 2/13/15 | Thu 4/9/15 |
| 45 | MEP Rough-ins | 75 days | Fri 2/13/15 | Thu 5/28/15 |
| 46 | Glazing | 33 days | Fri 3/6/15 | Tue 4/21/15 |
| 47 | **Last Day of School - Spring 2015** | 1 day | Fri 6/5/15 | Fri 6/5/15 |
| 48 | Interiors | 66 days | Fri 4/3/15 | Fri 7/3/15 |
| 49 | Finishes | 20 days | Mon 7/6/15 | Fri 7/31/15 |
| 50 | *Commissioning* | 55 days | Fri 5/29/15 | Thu 8/13/15 |
| 51 | *Demobilization* | 5 days | Mon 8/3/15 | Fri 8/7/15 |
| 52 | **Teacher Move-In / FF&E** | 10 days | Mon 8/10/15 | Fri 8/21/15 |
| 53 | *Substantial Completion* | 0 days | Fri 8/21/15 | Fri 8/21/15 |
| 54 | **First Day of School - Fall 2015** | **1 day** | **Mon 8/24/15** | **Mon 8/24/15** |




# Schedule

RSD - New Elementary School

| Task Name | Duration | Start | Finish |
|---|---|---|---|
| **Design** | **360 days** | **Tue 9/4/12** | **Mon 1/20/14** |
| *Notice to Proceed* | 0 days | Tue 9/4/12 | Tue 9/4/12 |
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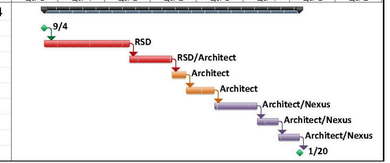


RSD - New Elementary School

| Task Name | Duration | Start | Finish |
|---|---|---|---|
| **Preconstruction** | **146 days** | **Mon 1/20/14** | **Mon 8/11/14** |
| Design Complete | 0 days | Mon 1/20/14 | Mon 1/20/14 |
| *Pool Decision Deadline* | 5 days | Mon 1/20/14 | Fri 1/24/14 |
| Estimate Complete | 20 days | Mon 1/20/14 | Fri 2/14/14 |
| Bid Schedule Complete | 20 days | Mon 1/20/14 | Fri 2/14/14 |
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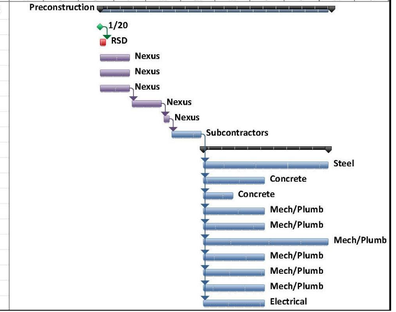


RSD - New Elementary School

| Task Name | Duration | Start | Finish |
|---|---|---|---|
| **Construction** | **317 days** | **Fri 6/6/14** | **Mon 8/24/15** |
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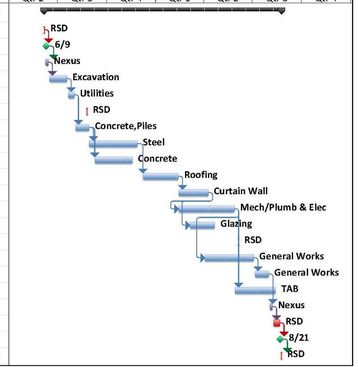
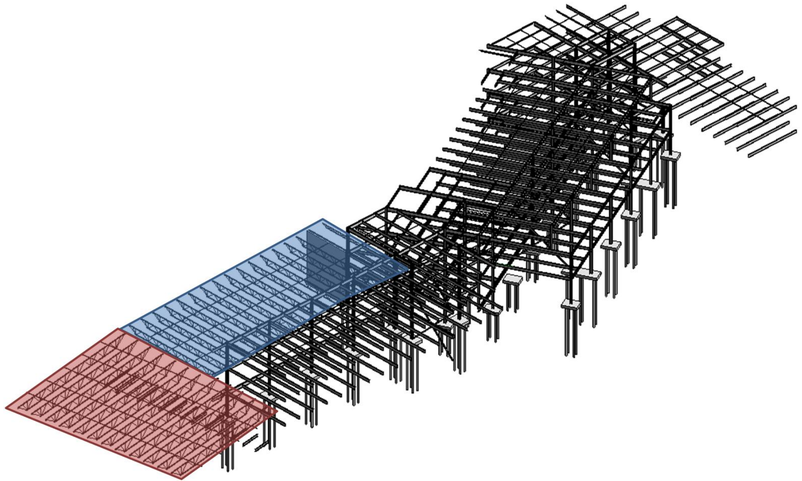
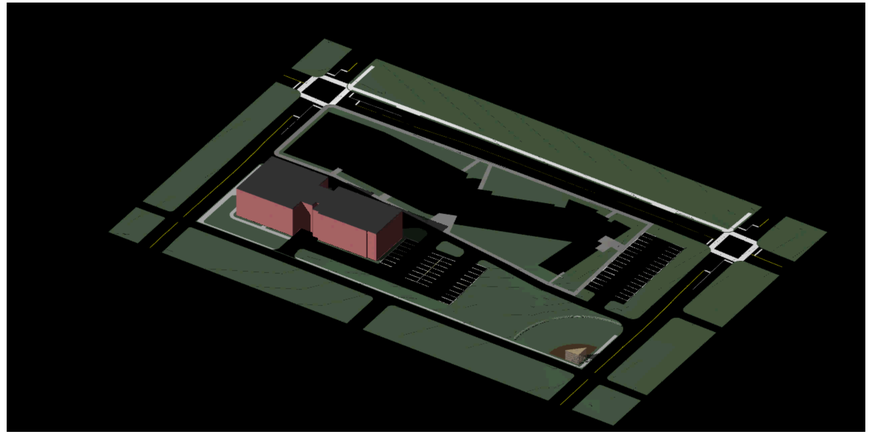


# Navisworks





RSD - New Elementary School

| Task Name | Duration | Start | Finish |
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| **Construction** | **317 days** | **Fri 6/6/14** | **Mon 8/24/15** |
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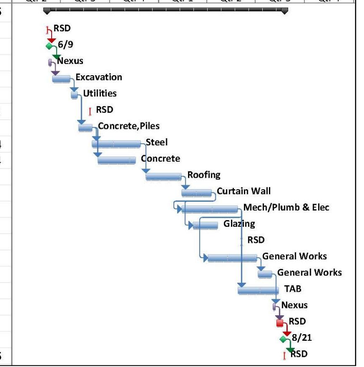
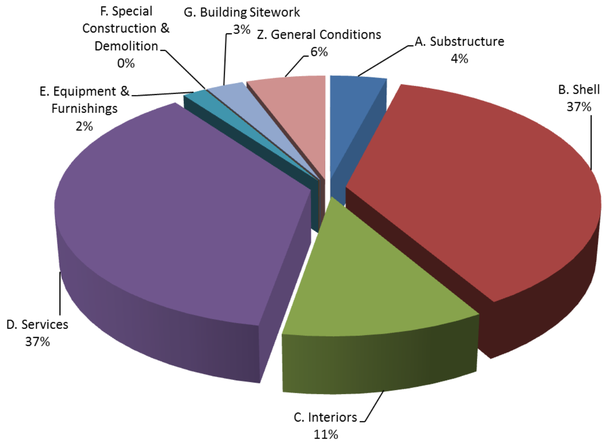


# Cost Estimate

| Cost Estimate | | | |
|---|---|---|---|
| | **Total Cost** | **$ / SF** | **% of Cost** |
| A. Substructure | $ 713,750 | $ 8.02 | 4% |
| B. Shell | $ 6,516,250 | $ 73.22 | 37% |
| C. Interiors | $ 1,970,000 | $ 22.13 | 11% |
| D. Services | $ 6,475,000 | $ 72.75 | 37% |
| E. Equipment & Furnishings | $ 300,000 | $ 3.37 | 2% |
| F. Special Construction & Demolition | $ - | $ - | 0% |
| G. Building Sitework | $ 475,000 | $ 5.34 | 3% |
| Z. General Conditions | $ 997,650 | $ 11.21 | 6% |
| *Uniformat Categories (A-G, Z) | **$ 17,447,650** | **$196.04** | **89,000 SF** |




- **General Works - $1,800,000**
  metal stud interior partitions; gypsum wallboard; casework; finishes; painting; exterior and interior doors; retractable wall systems in gymnasium and stage
- **Concrete - $2,425,000**
  footers; pile caps / column piers; insulated concrete forms; cast-in-place concrete walls; slab-on-decks; slab-on-grades
- **Mechanical and Plumbing - $4,120,000**
  mechanical equipment and units; sheetmetal; piping; domestic and sanitary piping; diffusers, registers, grilles
- **Electrical - $1,575,000**
  electrical equipment; transformers; switchgear; utility connections; conduit; wiring; fixtures; luminaires
- **Data - $350,000**
  cable trays; data and telecommunication wiring; data and telecommunication devices
- **Excavation - $400,000**
  soil excavation; hauling offsite; disposal of contaminated soil
- **Utilities - $125,000**
  underground utility runs and connections
- **Piles - $200,000**
  steel-driven piles
- **Elevator - $175,000**
  elevator
- **Structural Steel - $1,275,000**
  structural steel members (HSS columns and lateral bracing); wide-flange girders and beams; joists; trusses; truss braces; metal decking; shear studs
- **Roofing - $700,000**
  built-up white membrane roofing
- **Curtain Wall - $300,000**
  curtain wall elements in classroom spaces; aluminum panel exterior cladding
- **Masonry - $1,400,000**
  concrete masonry unit infill walls; face-brick exterior cladding
- **Glazing - $850,000**
  glazing elements
- **Carpet - $200,000**
  carpet tiles in the classroom spaces
- **Flooring - $300,000**
  finished concrete flooring in corridors and auxiliary spaces; gymnasium hardwood floor; stage floor
- **Fire Protection - $175,000**
  sprinkler piping and heads
- **Testing, Adjusting, Balancing - $80,000**
  mechanical, plumbing, electrical, and fire protection system commissioning

# Cost Estimate

| Cost Estimate | | | |
|---|---|---|---|
| | Total Cost | $ / SF | % of Cost |
| A. Substructure | $ 713,750 | $ 8.02 | 4% |
| B. Shell | $ 6,516,250 | $ 73.22 | 37% |
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| G. Building Sitework | $ 475,000 | $ 5.34 | 3% |
| Z. General Conditions | $ 997,650 | $ 11.21 | 6% |
| *Uniformat Categories (A-G, Z) | **$ 17,447,650** | **$ 196.04** | **89,000 SF** |

| PlanCon Calculation | |
|---|---|
| Full time equivalent capacity | 875 students |
| Conversion factor | 1.3205 |
| Rated Pupil Capacity | 1155 students |
| Elementary legislated per pupil amount | $4,700 |
| $4,700 x 1155 = | |
| Reimbursable Amount | $5,428,500 |
| | |
| Additional Funding for LEED Silver Certification | $470 |
| $470 x 1155 = | |
| Total Additional Funding for LEED Silver Certification | $542,850 |
| | |
| $5,428,500 + $542,850 = | |
| Total Reimbursable Project Cost | $5,971,350 |
| | |
| | |
| $5,428,500 / $17,500,000 = | |
| Reimbursable Percent | 34.12% |
| Minus 0.5% reduction until final project accounting | 33.62% |
| | |
| Reading School District - Market Value Aid Ratio | 0.9003 |
| | |
| $17,500,000 * 0.3362 * 0.9003 = | |
| **State of Pennsylvania Contribution** | **$5,296,915.05** |

| Value Engineered Finishes | | | |
|---|---|---|---|
| | SF | $/SF | Total |
| Concrete with Epoxy Finish | 21,000 | $ 0.51 | $ 10,710 |
| VCT | 21,000 | $ (4.31) | $ (90,510) |
| Acoustic Ceiling Tile | 55,600 | $ (3.51) | $(195,156) |
| **Total Savings** | | | **$(274,956)** |

# Sustainability Analysis

**LEED 2009 for Schools New Construction and Major Renovations**
Project Checklist
Project Name
Date

**Sustainable Sites** — Possible Points: 24

| Y | ? | N | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Construction Activity Pollution Prevention | |
| Y | | | Prereq 2 | Environmental Site Assessment | |
| Y | | | Credit 1 | Site Selection | 1 |
| | | N | Credit 2 | Development Density and Community Connectivity | 4 |
| | | N | Credit 3 | Brownfield Redevelopment | 1 |
| Y | | | Credit 4.1 | Alternative Transportation–Public Transportation Access | 4 |
| Y | | | Credit 4.2 | Alternative Transportation–Bicycle Storage and Changing Rooms | 1 |
| Y | | | Credit 4.3 | Alternative Transportation–Low-Emitting and Fuel-Efficient Vehicles | 2 |
| Y | | | Credit 4.4 | Alternative Transportation–Parking Capacity | 2 |
| Y | | | Credit 5.1 | Site Development–Protect or Restore Habitat | 1 |
| Y | | | Credit 5.2 | Site Development–Maximize Open Space | 1 |
| Y | | | Credit 6.1 | Stormwater Design–Quantity Control | 1 |
| | | N | Credit 6.2 | Stormwater Design–Quality Control | 1 |
| Y | | | Credit 7.1 | Heat Island Effect–Non-roof | 1 |
| Y | | | Credit 7.2 | Heat Island Effect–Roof | 1 |
| Y | | | Credit 8 | Light Pollution Reduction | 1 |
| Y | | | Credit 9 | Site Master Plan | 1 |
| Y | | | Credit 10 | Joint Use of Facilities | 1 |

**Water Efficiency** — Possible Points: 11

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Water Use Reduction–20% Reduction | |
| Y | | | Credit 1 | Water Efficient Landscaping | 2 to 4 |
| Y | | | Credit 2 | Innovative Wastewater Technologies | 2 |
| Y | | | Credit 3 | Water Use Reduction | 2 to 4 |
| Y | | | Credit 4 | Process Water Use Reduction | 1 |

**Energy and Atmosphere** — Possible Points: 33

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Fundamental Commissioning of Building Energy Systems | |
| Y | | | Prereq 2 | Minimum Energy Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| Y | | | Credit 1 | Optimize Energy Performance | 1 to 19 |
| | | N | Credit 2 | On-Site Renewable Energy | 1 to 7 |
| Y | | | Credit 3 | Enhanced Commissioning | 2 |
| Y | | | Credit 4 | Enhanced Refrigerant Management | 1 |
| Y | | | Credit 5 | Measurement and Verification | 2 |
| | | N | Credit 6 | Green Power | 2 |

**Materials and Resources** — Possible Points: 13

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Storage and Collection of Recyclables | |
| | | N | Credit 1.1 | Building Reuse–Maintain Existing Walls, Floors, and Roof | 1 to 2 |
| | | N | Credit 1.2 | Building Reuse–Maintain 50% of Interior Non-Structural Elements | 1 |
| Y | | | Credit 2 | Construction Waste Management | 1 to 2 |

**Materials and Resources, Continued**

| | | | | | |
|---|---|---|---|---|---|
| | | N | Credit 3 | Materials Reuse | 1 to 2 |
| | | N | Credit 4 | Recycled Content | 1 to 2 |
| Y | | | Credit 5 | Regional Materials | 1 to 2 |
| | | N | Credit 6 | Rapidly Renewable Materials | 1 |
| Y | | | Credit 7 | Certified Wood | 1 |

**Indoor Environmental Quality** — Possible Points: 19

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Minimum Indoor Air Quality Performance | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | |
| Y | | | Prereq 3 | Minimum Acoustical Performance | |
| Y | | | Credit 1 | Outdoor Air Delivery Monitoring | 1 |
| Y | | | Credit 2 | Increased Ventilation | 1 |
| Y | | | Credit 3.1 | Construction IAQ Management Plan–During Construction | 1 |
| Y | | | Credit 3.2 | Construction IAQ Management Plan–Before Occupancy | 1 |
| Y | | | Credit 4 | Low-Emitting Materials | 1 to 4 |
| Y | | | Credit 5 | Indoor Chemical and Pollutant Source Control | 1 |
| | | N | Credit 6.1 | Controllability of Systems–Lighting | 1 |
| | | N | Credit 6.2 | Controllability of Systems–Thermal Comfort | 1 |
| Y | | | Credit 7.1 | Thermal Comfort–Design | 1 |
| Y | | | Credit 7.2 | Thermal Comfort–Verification | 1 |
| Y | | | Credit 8.1 | Daylight and Views–Daylight | 1 to 3 |
| Y | | | Credit 8.2 | Daylight and Views–Views | 1 |
| Y | | | Credit 9 | Enhanced Acoustical Performance | 1 |
| Y | | | Credit 10 | Mold Prevention | 1 |

**Innovation and Design Process** — Possible Points: 6

| | | | | | |
|---|---|---|---|---|---|
| | | N | Credit 1.1 | Innovation in Design: Specific Title | 1 |
| | | N | Credit 1.2 | Innovation in Design: Specific Title | 1 |
| | | N | Credit 1.3 | Innovation in Design: Specific Title | 1 |
| | | N | Credit 1.4 | Innovation in Design: Specific Title | 1 |
| Y | | | Credit 2 | LEED Accredited Professional | 1 |
| Y | | | Credit 3 | The School as a Teaching Tool | 1 |

**Regional Priority Credits** — Possible Points: 4

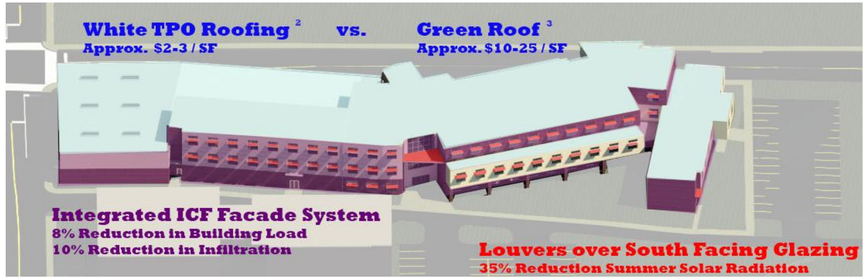
| | | | | | |
|---|---|---|---|---|---|
| | | N | Credit 1.1 | Regional Priority: Specific Credit | 1 |
| | | N | Credit 1.2 | Regional Priority: Specific Credit | 1 |
| | | N | Credit 1.3 | Regional Priority: Specific Credit | 1 |
| | | N | Credit 1.4 | Regional Priority: Specific Credit | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 55 | | | Total | | Possible Points: 110 |

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

| LEED 2009 for Schools | |
|---|---|
| Sustainable Site | 13 |
| Water Efficiency | 7 |
| Energy and Atmosphere | 14 |
| Materials and Resources | 4 |
| Indoor Environmental Quality | 15 |
| Innovation and Design Process | 2 |
| Regional Priority Credits | 0 |
| **Total** | **55** |

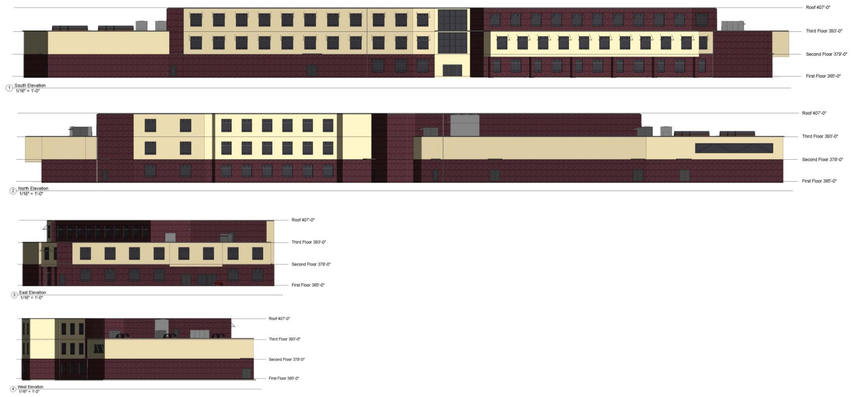

https://www.google.com/imghp?hl=en&tab=wi

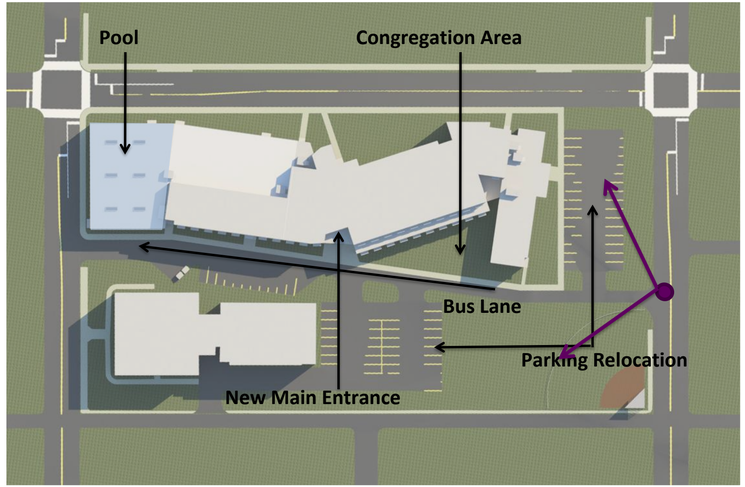


# Conclusion

- Safety & Security
- Lifecycle & Maintenance
- Cost Effective
- Integration
- Reduce, Reuse, Recover
- Learning Tool

# Building Views



# Cost Estimate

| Uniformat Cost Estimate | | | | | | | |
|---|---|---|---|---|---|---|---|
| A. Substructure | $ | 713,780 | A10 Foundations | $ | 400,780 | A1010 Standard Foundations | $ 128,500 |
| | | | | | | A1020 Special Foundations | $ 226,300 |
| | | | | | | A1030 Slab on Grade | $ 123,350 |
| | | | A20 Basement Construction | $ | 164,000 | A2010 Basement Excavation | $ 124,000 |
| | | | | | | A2020 Basement Walls | $ 104,300 |
| B. Shell | $ | 4,396,190 | B10 Superstructure | $ | 1,777,230 | B1010 Floor Construction | $ 1,777,230 |
| | | | | | | B1020 Roof Construction | $ 344,200 |
| | | | B20 Exterior Enclosures | $ | 1,208,300 | B2010 Exterior Walls | $ 1,110,300 |
| | | | | | | B2020 Exterior Windows | $ 635,300 |
| | | | | | | B2030 Exterior Doors | $ 40,300 |
| | | | B30 Roofing | $ | 726,300 | B3010 Roof Coverings | $ 726,300 |
| | | | | | | B3020 Roof Openings | $ 5,300 |
| C. Interiors | $ | 1,870,000 | C10 Interior Construction | $ | 866,300 | C1010 Partitions | $ 456,300 |
| | | | | | | C1020 Interior Doors | $ 364,000 |
| | | | | | | C1030 Fittings | $ 46,000 |
| | | | C20 Stairs | $ | 110,200 | C2010 Stair Construction | $ 110,200 |
| | | | | | | C2020 Stair Finishes | $ 7,300 |
| | | | C30 Interior Finishes | $ | 895,500 | C3010 Wall Finishes | $ 185,300 |
| | | | | | | C3020 Floor Finishes | $ 530,300 |
| | | | | | | C3030 Ceiling Finishes | $ 179,900 |
| D. Services | $ | 8,675,000 | D10 Conveying | $ | 175,300 | D1010 Elevators & Lifts | $ 175,300 |
| | | | | | | D1020 Escalators & Moving Walks | $ - |
| | | | | | | D1090 Other Conveying Systems | $ - |
| | | | D20 Plumbing | $ | 1,430,900 | D2010 Plumbing Fixtures | $ 130,300 |
| | | | | | | D2020 Domestic Water Distribution | $ 530,300 |
| | | | | | | D2030 Sanitary Waste | $ 340,300 |
| | | | | | | D2040 Rain Water Drainage | $ 74,300 |
| | | | | | | D2090 Other Plumbing Systems | $ 896,300 |
| | | | D30 HVAC | $ | 2,830,300 | D3010 Energy Supply | $ - |
| | | | | | | D3020 Heat Generating Systems | $ 140,300 |
| | | | | | | D3030 Cooling Generating Systems | $ 280,300 |
| | | | | | | D3040 Distribution Systems | $ 530,300 |
| | | | | | | D3050 Terminal & Package Units | $ 840,300 |
| | | | | | | D3060 Controls & Instrumentation | $ 530,300 |
| | | | | | | D3070 Systems Testing & Balancing | $ 206,300 |
| | | | | | | D3090 Other HVAC Systems & Equipment | $ 304,300 |
| | | | D40 Fire Protection | $ | 175,300 | D4010 Sprinklers | $ 136,300 |
| | | | | | | D4020 Standpipes | $ 42,300 |
| | | | | | | D4030 Fire Protection Specialties | $ 8,700 |
| | | | | | | D4090 Other Fire Protection Systems | $ - |
| | | | D50 Electrical | $ | 1,826,300 | D5010 Electrical Service & Distribution | $ 551,000 |
| | | | | | | D5020 Lighting and Branch Wiring | $ 1,053,750 |
| | | | | | | D5030 Communications and Security | $ 356,300 |
| | | | | | | D5090 Other Electrical Systems | $ - |
| E. Equipment & Furnishings | $ | 300,000 | E10 Equipment | $ | - | E1010 Commercial Equipment | $ - |
| | | | | | | E1020 Institutional Equipment | $ - |
| | | | | | | E1030 Vehicular Equipment | $ - |
| | | | | | | E1090 Other Equipment | $ - |
| | | | E20 Furnishings | $ | 300,300 | E2010 Fixed Furnishings | $ 230,300 |
| | | | | | | E2020 Moveable Furnishings | $ 130,300 |
| F. Special Construction & Demolition | $ | - | F10 Special Construction | $ | - | F1010 Special Structures | $ - |
| | | | | | | F1020 Integrated Construction | $ - |
| | | | | | | F1030 Special Construction Systems | $ - |
| | | | | | | F1040 Special Facilities | $ - |
| | | | | | | F1050 Special Controls and Instrumentation | $ - |
| | | | F20 Selective Building Demolition | $ | - | F2010 Building Elements Demolition | $ - |
| | | | | | | F2020 Hazardous Components Abatement | $ - |
| G. Building Sitework | $ | 801,000 | G10 Site Preparation | $ | 175,300 | G1010 Site Clearing | $ - |
| | | | | | | G1020 Site Elements and Relocations | $ - |
| | | | | | | G1030 Site Earthwork | $ 125,300 |
| | | | | | | G1040 Hazardous Waste Remediation | $ 50,300 |
| | | | G20 Site Improvements | $ | 531,300 | G2010 Roadways | $ 137,300 |
| | | | | | | G2020 Parking Lots | $ 153,300 |
| | | | | | | G2030 Pedestrian Paving | $ 19,300 |
| | | | | | | G2040 Site Development | $ - |
| | | | | | | G2050 Landscaping | $ 20,300 |
| | | | G30 Site Mechanical Utilities | $ | 75,300 | G3010 Water Supply | $ 13,300 |
| | | | | | | G3020 Sanitary Sewer | $ 19,300 |
| | | | | | | G3030 Storm Sewer | $ 16,300 |
| | | | | | | G3040 Heating Distribution | $ 12,300 |
| | | | | | | G3050 Cooling Distribution | $ 8,300 |
| | | | | | | G3060 Fuel Distribution | $ 13,300 |
| | | | | | | G3090 Other Site Mechanical Utilities | $ - |
| | | | G40 Site Electrical Utilities | $ | 19,300 | G4010 Electrical Distribution | $ 10,300 |
| | | | | | | G4020 Site Lighting | $ 29,300 |
| | | | | | | G4030 Site Communications & Security | $ 19,300 |
| | | | | | | G4090 Other Site Electrical Utilities | $ - |
| | | | G90 Other Site Construction | $ | - | G9010 Service and Pedestrian Tunnels | $ - |
| | | | | | | G9090 Other Site Systems & Equipment | $ - |
| Z. General Conditions | $ | 997,650 | Z10 Design Allowance | $ | - | | |
| | | | Z20 Overhead & Profit | $ | 997,650 | Z2010 Overhead | $ 665,100 |
| | | | | | | Z2020 Profit | $ 332,550 |
| TOTAL | $ | 17,447,650 | | | | | |

| General Conditions Cost Estimate | | | | |
|---|---|---|---|---|
| *Personnel* | Quantity | Unit | Unit Price | Total Cost |
| Project manager | 30 | Week | $ 2,125.00 | $ 63,750 |
| Engineer | 30 | Week | $ 1,300.00 | $ 39,000 |
| Superintendent | 60 | Week | $ 1,975.00 | $ 118,500 |
| Clerk | 30 | Week | $ 420.00 | $ 12,600 |
| | | | | $ 233,850 |
| *Facilities* | Quantity | Unit | Unit Price | Total Cost |
| Trailer (32'x8') | 15 | Month | $ 185.00 | $ 2,775 |
| Dumpster (40 CY, 1 dump/wk.) | 12 | Month | $ 860.00 | $ 10,320 |
| Portable toilet | 15 | Month | $ 180.00 | $ 2,700 |
| Storage (40' x 8') | 15 | Month | $ 385.00 | $ 5,775 |
| Office expenses | 15 | Month | $ 460.00 | $ 6,900 |
| Gravel road (8") | 500 | SY | $ 11.73 | $ 5,865 |
| | | | | $ 34,335 |
| *Protection* | Quantity | Unit | Unit Price | Total Cost |
| Site fence (6' tall) | 4000 | LF | $ 5.16 | $ 20,640 |
| *Temporary Utilities* | Quantity | Unit | Unit Price | Total Cost |
| Heat (w/ fuel, 12hrs., /wk.) | 2700 | CSF * wk. | $ 40.13 | $ 108,351 |
| Lighting | 900 | CSF | $ 14.95 | $ 13,455 |
| Power (lighting, 11.8 KWH)) | 3375 | CSF * mn. | $ 1.65 | $ 5,569 |
| Power (job) | 3375 | CSF * mn. | $ 47.00 | $ 158,625 |
| Water | 15 | Month | $ 63.00 | $ 945 |
| | | | | $ 286,945 |
| *Insurance, Bonds, Taxes* | Quantity | Unit | Unit Price | Total Cost |
| Builder's risk (0.64%) | 0.0064 | Job | | $ 105,280 |
| | | | | $ 105,280 |
| *Mobilization/Demobilization* | Quantity | Unit | Unit Price | Total Cost |
| Mobilization | 6 | /equipment | $ 350.00 | $ 2,100 |
| Demobilization | 6 | /equipment | $ 325.00 | $ 1,950 |
| | | | | $ 4,050 |
| *Fee* | Quantity | Unit | Unit Price | Total Cost |
| 1.9% | 0.019 | Job | | $ 312,550 |
| **General Conditions Total** | | | | **$ 997,650** |
| **Building Direct Cost** (materials put in place) | | | | $ 16,450,000 |
| **Gross Total** (building direct cost + general conditions) | | | | **$ 17,447,650** |
| *Adjustment Factors* | Quantity | Unit | Unit Price | Total Cost |
| PA Sales Tax (6%) | 0.06 | Job | | $ 1,046,859 |
| Available work space (-2%) | -0.02 | Job | | $ (348,953) |
| Good GC/CM management (-2%) | -0.02 | Job | | $ (348,953) |
| Location Factor (0.98) | -0.02 | Job | | $ (348,953) |
| | | | | $ - |
| **Building Net Total** (building direct cost + general conditions) | | | | **$ 17,447,650** |

**all information in this table is referenced from RSMeans Building Construction Cost Data 2013*

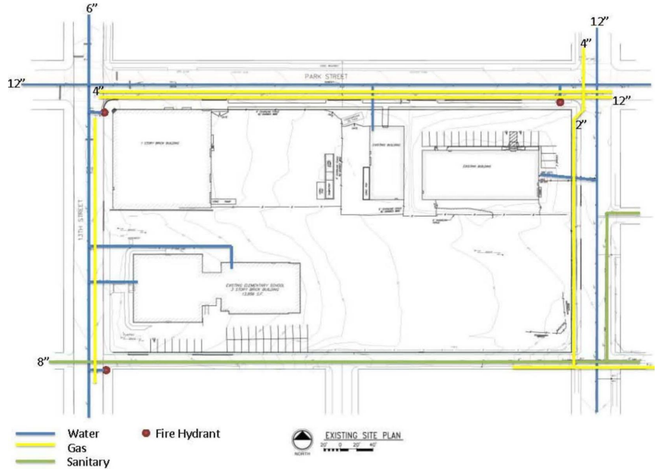
| Phase 2 Pool Cost Estimate | | | | |
|---|---|---|---|---|
| *Personnel* | Quantity | Unit | Unit Price | Total Cost |
| Project manager | 12 | Week | $ 2,125.00 | $ 25,500 |
| Engineer | 12 | Week | $ 1,300.00 | $ 15,600 |
| Superintendent | 12 | Week | $ 1,975.00 | $ 23,700 |
| | | | | $ 64,800 |
| *Facilities* | Quantity | Unit | Unit Price | Total Cost |
| Trailer (32'x8') | 3 | Month | $ 185.00 | $ 555 |
| Dumpster (40 CY, 1 dump/wk.) | 3 | Month | $ 860.00 | $ 2,580 |
| Portable toilet | 3 | Month | $ 180.00 | $ 540 |
| Office expenses | 3 | Month | $ 460.00 | $ 1,380 |
| Gravel road (8") | 100 | SY | $ 11.73 | $ 1,173 |
| | | | | $ 6,228 |
| *Protection* | Quantity | Unit | Unit Price | Total Cost |
| Site fence (6' tall) | 400 | LF | $ 5.16 | $ 2,064 |
| *Temporary Utilities* | Quantity | Unit | Unit Price | Total Cost |
| Lighting | 893 | CSF | $ 14.95 | $ 13,350 |
| Power (lighting, 11.8 KWH)) | 1340 | CSF * mn. | $ 1.65 | $ 2,211 |
| Power (job) | 670 | CSF * mn. | $ 47.00 | $ 31,490 |
| Water | 3 | Month | $ 63.00 | $ 189 |
| | | | | $ 47,240 |
| *Insurance, Bonds, Taxes* | Quantity | Unit | Unit Price | Total Cost |
| Builder's risk (0.64%) | 0.0064 | Job | | $ 15,974 |
| | | | | $ 15,974 |
| *Mobilization/Demobilization* | Quantity | Unit | Unit Price | Total Cost |
| Mobilization | 6 | /equipment | $ 350.00 | $ 2,100 |
| Demobilization | 6 | /equipment | $ 325.00 | $ 1,950 |
| | | | | $ 4,050 |
| *Fee* | Quantity | Unit | Unit Price | Total Cost |
| 1.9% | 0.019 | Job | | $ 47,422 |
| **General Conditions Total** | | | | **$ 187,778** |
| **Building Direct Cost** (materials put in place) | | | | $ 2,495,876 |
| **Gross Total** (building direct cost + general conditions) | | | | **$ 2,683,654** |
| *Adjustment Factors* | Quantity | Unit | Unit Price | Total Cost |
| PA Sales Tax (6%) | 0.06 | Job | | $ 161,019 |
| Available work space (-2%) | -0.02 | Job | | $ (53,673) |
| Good GC/CM management (-2%) | -0.02 | Job | | $ (53,673) |
| Location Factor (0.98) | -0.02 | Job | | $ (53,673) |
| | | | | $ - |
| **Building Net Total** (building direct cost + general conditions) | | | | **$ 2,683,654** |

**all information in this table is referenced from RSMeans Building Construction Cost Data 2013*

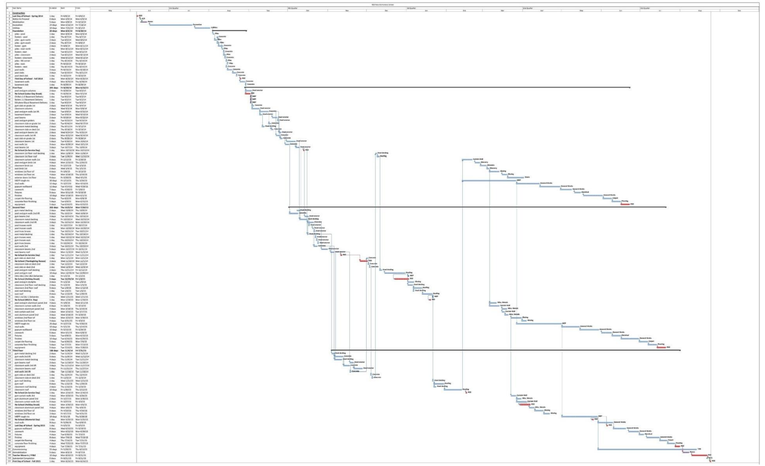
# Cost Estimate

| School Cost Comparison | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Total Cost | Construction Schedule | Total SF | $ / SF | # of Students | $ / Student | SF / Student |
| Mount Nittany Elementary School | $15,700,000 | 16 months | 60,000 | $261.67 | 400 | $ 39,250 | 150 |
| Ferguson Township Elementary School | $16,500,000 | 16 months | 64,500 | $255.81 | 400 | $ 41,250 | 161 |
| **Nexus' Proposed New RSD Elementary School** | **$17,835,545** | **15 months** | **89,000** | **$200.40** | **875** | **$ 20,383** | **102** |

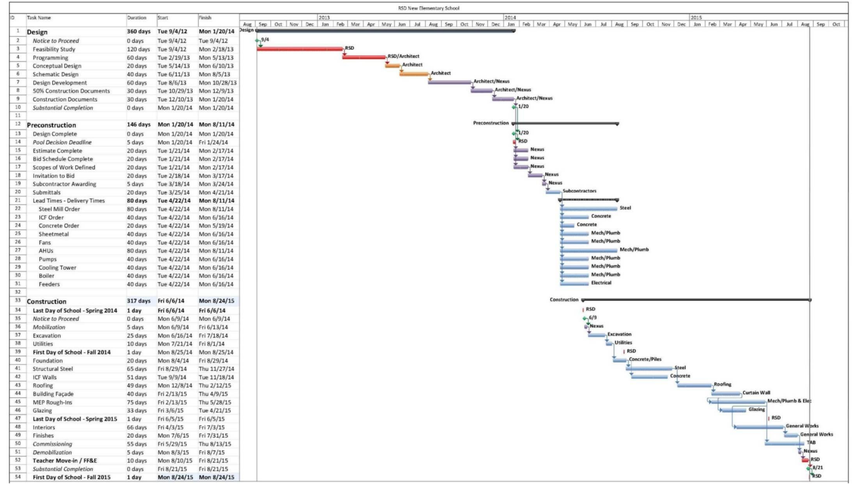
| Pool Phase 1 | |
|---|---|
| SF | 8,925 |
| $/SF | $ 225.50 |
| Total Cost | **$2,012,588** |
| **Pool Phase 2** | |
| SF | 8,925 |
| $ / SF | $ 300.69 |
| Total Cost | **$2,683,654** |
| **Variance** | |
| | **$ 671,067** |



# Schedule

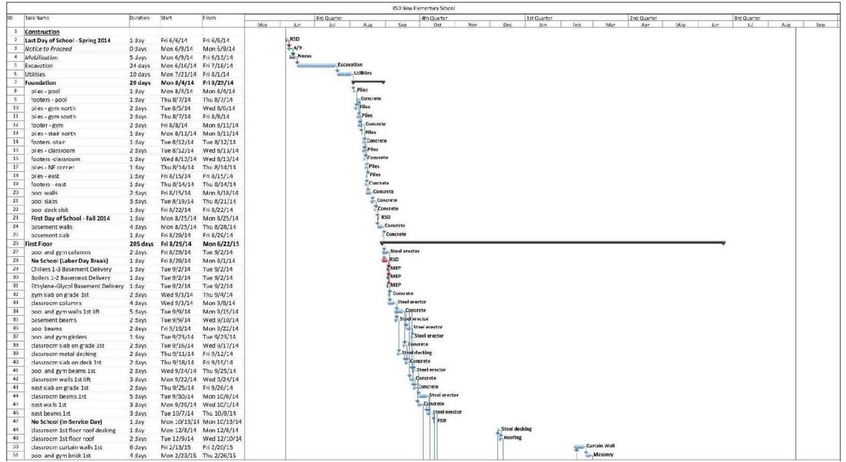


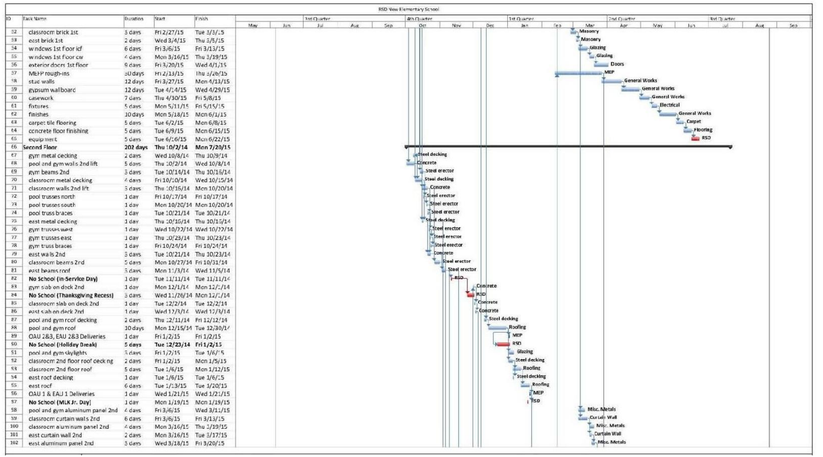
| Long Lead Items | |
|---|---|
| **Items** | **Months** |
| Steel Mill Order | 4 |
| Insulated Concrete Form Order | 2 |
| AHU's | 4 |
| Pumps & Boilers | 2 |
| Switchgear | 3 |



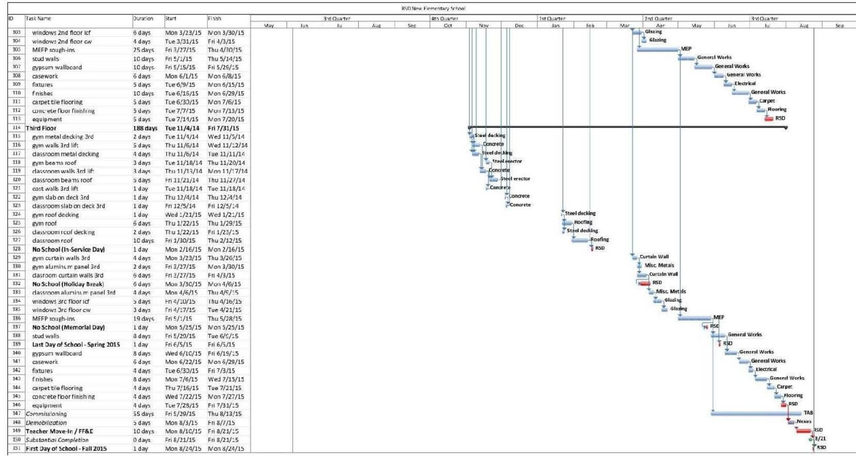

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Design** | **360 days** | **Tue 9/4/12** | **Mon 1/20/14** |
| 2 | *Notice to Proceed* | 0 days | Tue 9/4/12 | Tue 9/4/12 |
| 3 | Feasibility Study | 120 days | Tue 9/4/12 | Mon 2/18/13 |
| 4 | Programming | 60 days | Tue 2/19/13 | Mon 5/13/13 |
| 5 | Conceptual Design | 20 days | Tue 5/14/13 | Mon 6/10/13 |
| 6 | Schematic Design | 40 days | Tue 6/11/13 | Mon 8/5/13 |
| 7 | Design Development | 60 days | Tue 8/6/13 | Mon 10/28/13 |
| 8 | 50% Construction Documents | 30 days | Tue 10/29/13 | Mon 12/9/13 |
| 9 | Construction Documents | 30 days | Tue 12/10/13 | Mon 1/20/14 |
| 10 | *Substantial Completion* | 0 days | Mon 1/20/14 | Mon 1/20/14 |
| 11 | | | | |
| 12 | **Preconstruction** | **146 days** | **Mon 1/20/14** | **Mon 8/11/14** |
| 13 | Design Complete | 0 days | Mon 1/20/14 | Mon 1/20/14 |
| 14 | *Pool Decision Deadline* | 5 days | Mon 1/20/14 | Fri 1/24/14 |
| 15 | Estimate Complete | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 16 | Bid Schedule Complete | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 17 | Scopes of Work Defined | 20 days | Tue 1/21/14 | Mon 2/17/14 |
| 18 | Invitation to Bid | 20 days | Tue 2/18/14 | Mon 3/17/14 |
| 19 | Subcontractor Awarding | 5 days | Tue 3/18/14 | Mon 3/24/14 |
| 20 | Submittals | 20 days | Tue 3/25/14 | Mon 4/21/14 |
| 21 | Lead Times – Delivery Times | **80 days** | **Tue 4/22/14** | **Mon 8/11/14** |
| 22 | Steel Mill Order | 80 days | Tue 4/22/14 | Mon 8/11/14 |
| 23 | ICF Order | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 24 | Concrete Order | 20 days | Tue 4/22/14 | Mon 5/19/14 |
| 25 | Sheetmetal | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 26 | Fans | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 27 | AHUs | 80 days | Tue 4/22/14 | Mon 8/11/14 |
| 28 | Pumps | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 29 | Cooling Tower | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 30 | Boiler | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 31 | Feeders | 40 days | Tue 4/22/14 | Mon 6/16/14 |
| 32 | | | | |
| 33 | **Construction** | **317 days** | **Fri 6/6/14** | **Mon 8/24/15** |
| 34 | **Last Day of School - Spring 2014** | **1 day** | **Fri 6/6/14** | **Fri 6/6/14** |
| 35 | *Notice to Proceed* | 0 days | Mon 6/9/14 | Mon 6/9/14 |
| 36 | *Mobilization* | 5 days | Mon 6/9/14 | Fri 6/13/14 |
| 37 | Excavation | 25 days | Mon 6/16/14 | Fri 7/18/14 |
| 38 | Utilities | 10 days | Mon 7/21/14 | Fri 8/1/14 |
| 39 | **First Day of School - Fall 2014** | 1 day | Mon 8/25/14 | Mon 8/25/14 |
| 40 | Foundation | 20 days | Mon 8/4/14 | Fri 8/29/14 |
| 41 | Structural Steel | 65 days | Fri 8/29/14 | Thu 11/27/14 |
| 42 | ICF Walls | 51 days | Tue 9/9/14 | Tue 11/18/14 |
| 43 | Roofing | 49 days | Mon 12/8/14 | Thu 2/12/15 |
| 44 | Building Façade | 40 days | Fri 2/13/15 | Thu 4/9/15 |
| 45 | MEP Rough-Ins | 75 days | Fri 2/13/15 | Thu 5/28/15 |
| 46 | Glazing | 33 days | Fri 3/6/15 | Tue 4/21/15 |
| 47 | **Last Day of School - Spring 2015** | 1 day | Fri 6/5/15 | Fri 6/5/15 |
| 48 | Interiors | 66 days | Fri 4/3/15 | Fri 7/3/15 |
| 49 | Finishes | 20 days | Mon 7/6/15 | Fri 7/31/15 |
| 50 | Commissioning | 55 days | Fri 5/29/15 | Thu 8/13/15 |
| 51 | *Demobilization* | 5 days | Mon 8/3/15 | Fri 8/7/15 |
| 52 | **Teacher Move-in / FF&E** | 10 days | Mon 8/10/15 | Fri 8/21/15 |
| 53 | *Substantial Completion* | 0 days | Fri 8/21/15 | Fri 8/21/15 |
| 54 | **First Day of School - Fall 2015** | **1 day** | **Mon 8/24/15** | **Mon 8/24/15** |

# Schedule


RSD New Elementary School
1st Quarter
4th Quarter
1st Quarter
2nd Quarter
3rd Quarter
May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
RSD
A/V
Demo
Excavation
Utilities
Piles
Concrete
Steel erector
Curtain Wall
Masonry
Steel decking
Roofing


RSD New Elementary School
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Masonry
Glazing
Doors
MEP
General Works
Electrical
Carpet
Flooring
RSD
Steel decking
Concrete
Steel erector
Roofing
Curtain Wall
Misc. Metals


RSD New Elementary School
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Masonry
Glazing
Doors
MEP
General Works
Electrical
Carpet
Flooring
RSD
Steel decking
Concrete
Steel erector
Roofing
Curtain Wall
Misc. Metals


RSD New Elementary School
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Glazing
Glazing
MEP
General Works
General Works
Interior Works
Electrical
General Works
Carpet
Flooring
RSD
Steel decking
Concrete
Steel erector
Roofing
Curtain Wall
Misc. Metals
RSD
TBA
Pavers
RSD
TBA
RSD

# Conclusion

- Safety & Security
- Lifecycle & Maintenance
- Cost Effective
- Integration
- Reduce, Reuse, Recover
- Learning Tool