New Bozeman High School

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Schematic Design Report

September 7, 2017

CTA

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Introduction

The Bozeman Public Schools projected the need for a second high school more than 10 years ago. With the Bozeman High School now accommodating 2,200 students and growing at a rate of more than 100 students per year the School Board asked the public to approve a bond for $125M to construct a new high school and modify the existing high school. The bond passed with two-thirds of the voters approving the request. The new 300,000 square foot high school will accommodate 1,500 students and have the ability to expand to 1,800 students in the future.

The site for the new high school is bound by Oak Street, Flanders Mill Road, Durston Road, and Cottonwood Road. The 57-acre site will contain the new high school, faculty, staff, visitor and student parking, and athletic fields. The site will be connected to the City of Bozeman Sports Complex to the north via a pedestrian tunnel below Oak Street.

The Bozeman Public Schools has assembled a Building Committee to aid the design team and oversee the development of the new high school project. The committee consists of representatives from the School Board, administration, community, and the City of Bozeman. To date, the Building Committee has met five times to review the progress of the design and inform the design team. The results of these efforts are reflected in the following pages.

Core Purpose of the Bozeman School District

"Bozeman Public Schools exist to provide an outstanding education that inspires and ensures high achievement so every student can succeed and make a difference in a rapidly changing world community."

Architectural Design

Design Concept

The Vision

The schematic design process is an iterative cycle between ongoing research, the exploration of ideas, and the act of discovering design solutions never imagined. Initial research leads to exploration; however, further exploration can expose the necessity to return back to research. Discovery of the best solution, or the "a-ha" moment, can happen at any time but is the product of rigor that correctly balances all of the following critical factors for success:

1. The **Vision** of Bozeman Public Schools
2. The priorities of the **Community**
3. The physical **Needs** for the New High School
4. The **Budget** and **Schedule** for construction
5. Standards for **Safety** and **Performance** in school environments

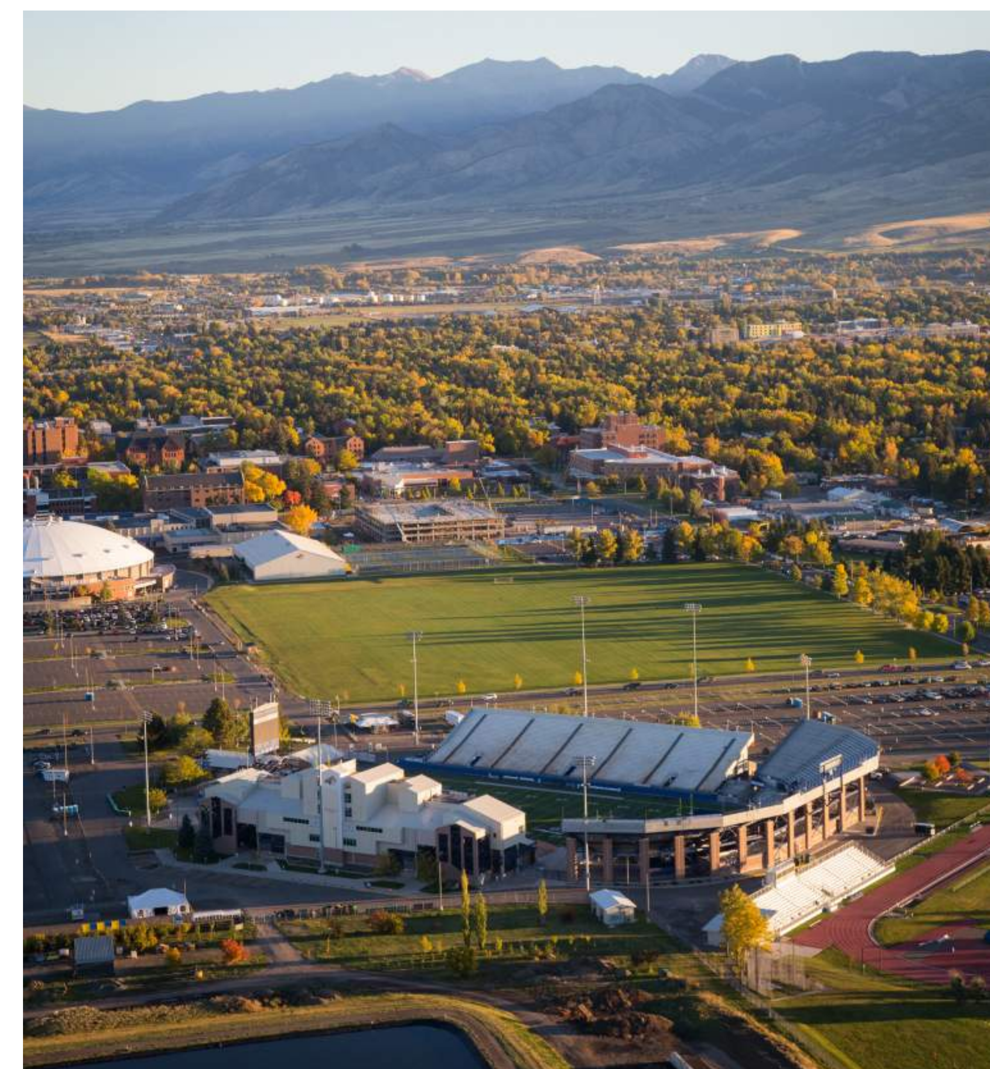
Guiding principles, or "vision goals," were established to guide the design team's decisions, ideas, and concept development. The primary vision goals were identified as follows in no priority order:

Heritage

Bozeman enjoys a distinct heritage and cultural vibrancy. The legacy of the Gallatin Valley extends to the traditions of Native American culture, includes the Lewis and Clark Expedition, and the settlement of the West via the Bozeman Trail. Bozeman also has maintained a constant tradition in academic pursuits with the establishment of Montana State University (MSU) in 1889.

The natural environment surrounding the community continues to be Bozeman's most valuable resource. Surrounded by the Bridger, Spanish Peaks, and Tobacco Root mountains, the Gallatin Valley is also home to the three rivers that make up the Missouri River headwaters, and is within reach of Yellowstone National Park. Outdoor recreation opportunities during all seasons and the beauty of the place remain defining characteristics that influence the cultural vibrancy.

The New High School will acknowledge Bozeman's heritage by being respectful of the traditions of the past, purposefully connecting to the natural environment, but most importantly playing a role in carrying the culture forward into the future.



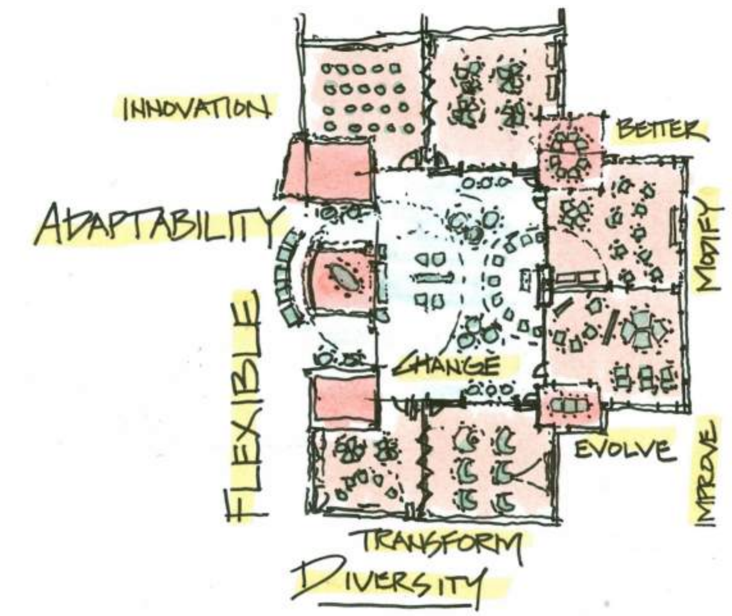
Architectural Design

Design Concept

Community
The New High School will promote engagement with the broader community, neighborhood, and student community on multiple levels. This engagement begins with inviting, comfortable outdoor spaces that issue a welcome invitation to the neighborhood to participate in the learning environment. Spaces that invite shared uses foster collaboration with local businesses through multi-purpose rooms, with the art community through display and performance venues, and with Gallatin College & MSU through technology and curriculum. Internally, the learning environment will foster a sense of community within the student body across age groups, academic pursuits, and diverse activities.

Diversity
The New High School will allow students to be exposed to diverse areas of study through a variety of spaces that accommodate different learning styles for individual focus, project based, small group, and large group learning. No two students are the same, so the environment must meet each individual scholar at their need, both introvert and extrovert, and provide a comfortable, safe environment to excel.

Adaptability
Teaching pedagogies and educational priorities evolve with the world around us. The New High School will be adaptable and flexible to support evolving programs for the next 50 – 100 years. Operable walls, movable furniture, passageways that are large enough to double as programmable space, and thoughtful acoustics allow spaces to be manipulated for multiple uses. Modular planning, construction techniques, and careful building system design provide the opportunity to repurpose space as changes in time dictates and for growth and expansion.

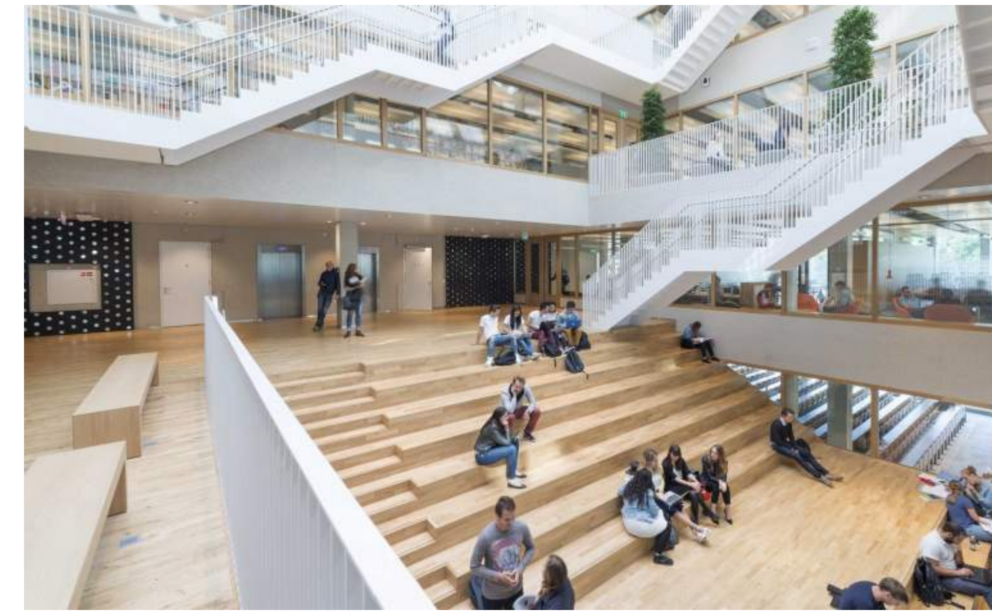


Architectual Design

Design Concept

Discovery
Exploration beyond Montana, outward into the community, and inward into the academic pursuits of the school will lead to a greater discovery of the world in which students live. The New High School will facilitate this exploration through awareness of local influences like industry, agriculture, technology, the City, MSU, and Gallatin College. Looking inward, the environment will expose all students to all varieties of academic disciplines, activities, and possibilities that exist within the school.

Cross Pollination
Collaboration leads to innovation because ideas multiply when we learn from each other. The New High School will be a collaborative learning environment that promotes the exchange of ideas through both planned and chance encounters. Subsequent encounters then spawn new ideas and perspectives.



Design Exploration

The design team tested multiple concepts. Working under the premise of equipping all students with the best learning opportunities and chances for success, the design team looked for overlapping repetitive spaces, shared collaborative opportunities with better space utilization, and ways to turn non-assignable circulation and corridor space into places of social connections and informal learning. This exploration led to efficiencies in use of space to optimize the learning environment and position the project to stay within budget. The studies included explorations in a variety of organizations including two-and three-story options for schools organized around a central core, in an array, and a radial arrangement.

Architectural Design

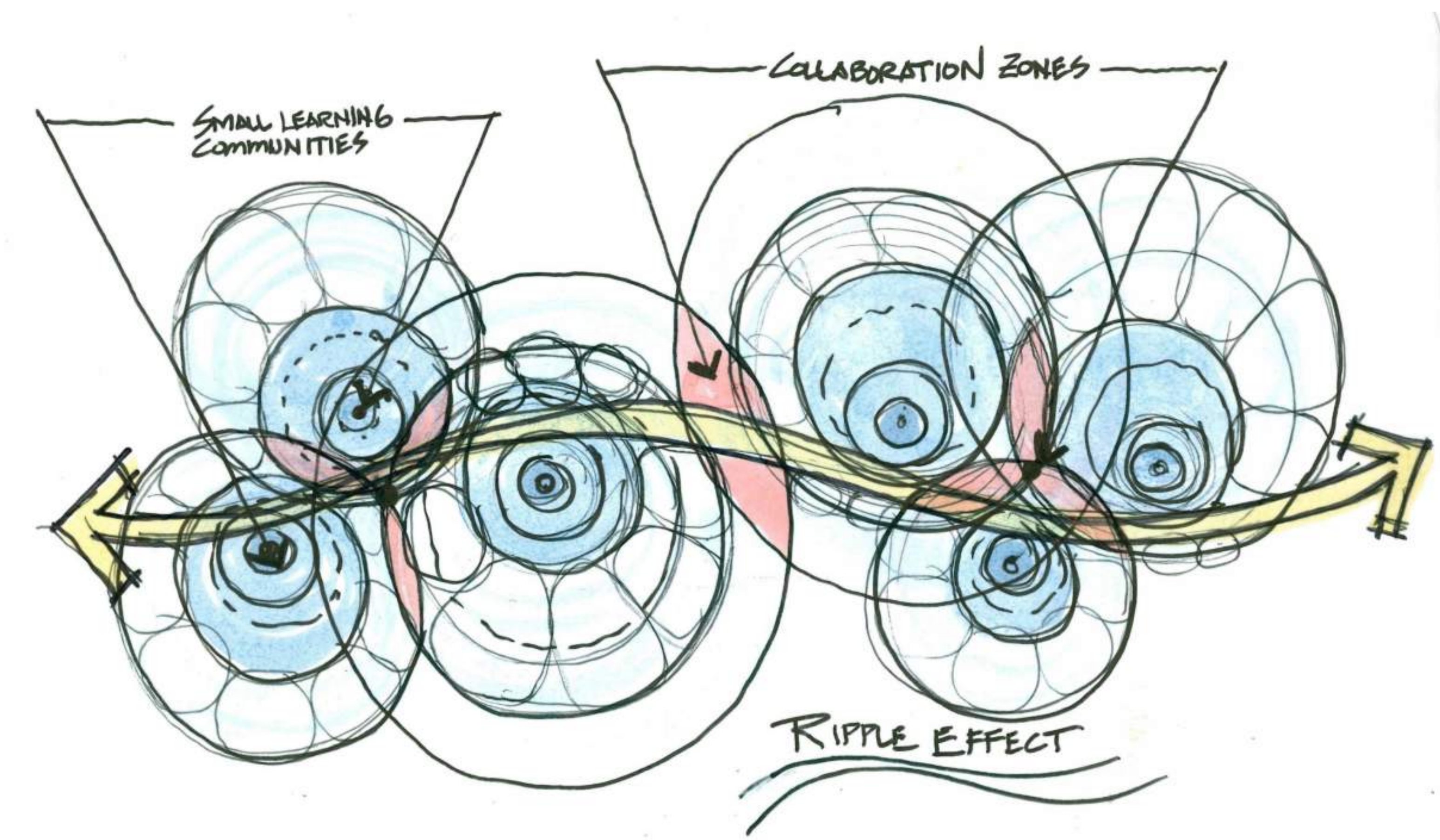
Design Concept

Design Discovery

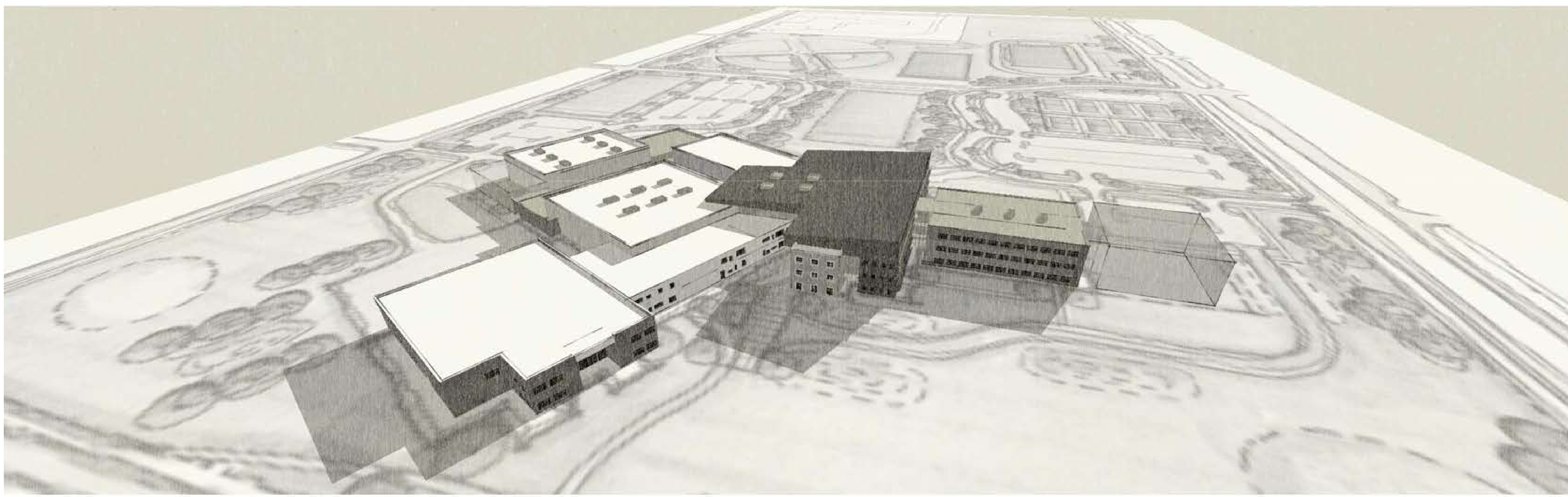
The Building Committee determined that an organization around a central, common space, or "Town Center," provided the best opportunities for balance between the critical factors for success. "Learning Streets" radiate from the Town Center and connect to "Small Learning Communities". Rather than spreading the school across two levels, a more compact three-story solution offers some advantages. These advantages include shorter travel distances from one side of the school to the other, greater opportunities for key spaces to make physical and visual connections to the Town Center, and increased efficiency in the building's systems and energy use.

The collection of forms inherent with the radial organization create more opportunities for architectural interest and more comfortably integrate with the preferred organic approach to the site design. A north / south datum element in the architecture escorts the natural environment and the flow of circulation into and out of the Town Center. This orienting element structures the connection of interior school spaces to the outdoors. Locating administration functions along this datum creates a convenient location to observe flow in and out of the school and makes important connections with students in the Town Center and Small Learning Communities on multiple levels.

To reinforce this connection to the outdoors, the exterior plaza materials, patterns and textures are carried inside under delicate glass walls. The angle of the C.T.E. learning street is oriented 25 degrees from north and is terminated with glass looking toward Sacagawea Peak in the Bridger Range. The learning street leading to the Small Learning Communities looks at the Tobacco Root Mountains to the west, and the glass wall of the Town Center connects viewers to the Spanish Peaks. Windows in the learning communities, especially on the third floor, also allow for these opportunities.



OVERALL VIEW FROM SOUTH



OVERALL VIEW FROM NORTH

SOUTH ELEVATION

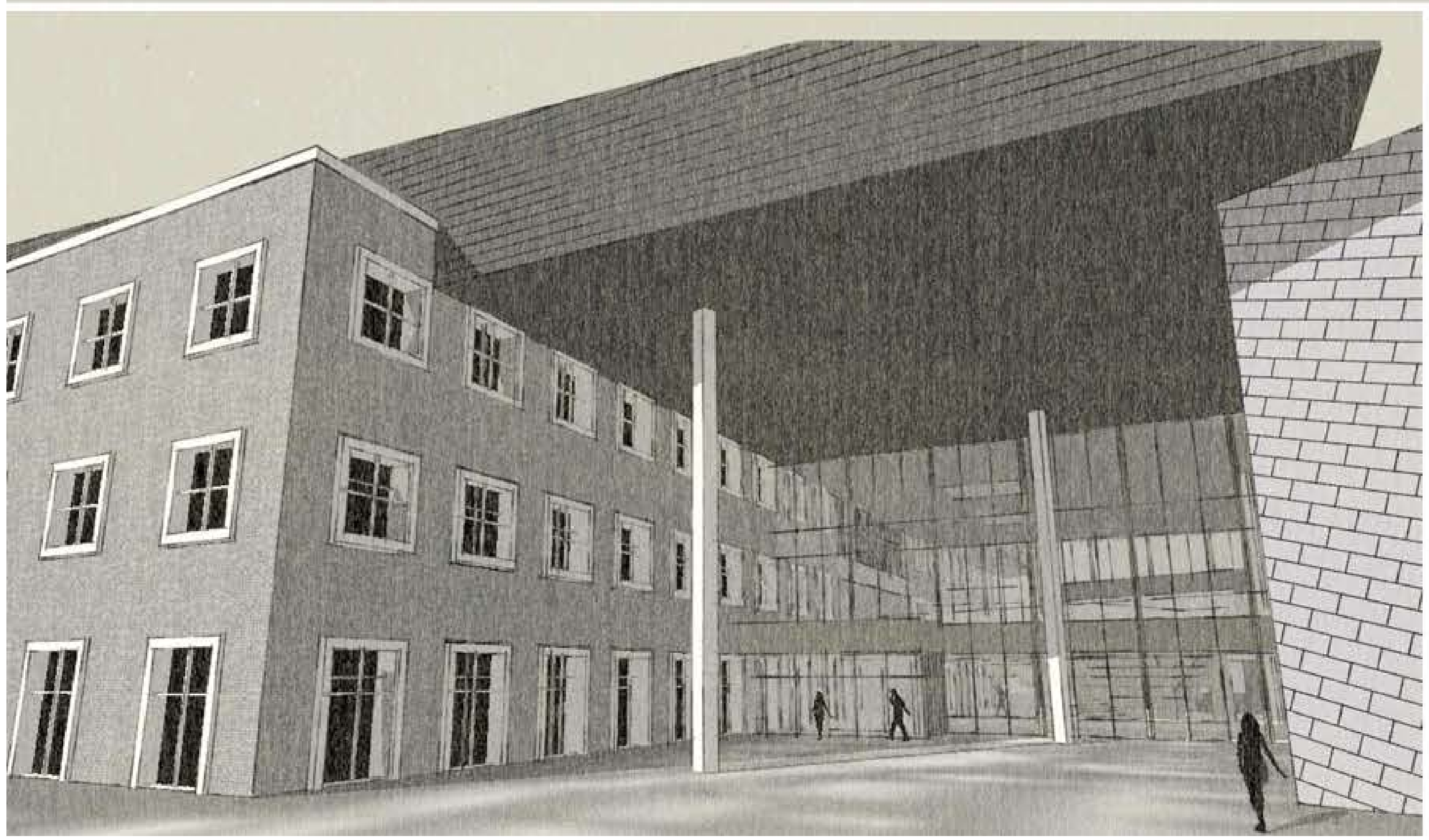
WEST ELEVATION

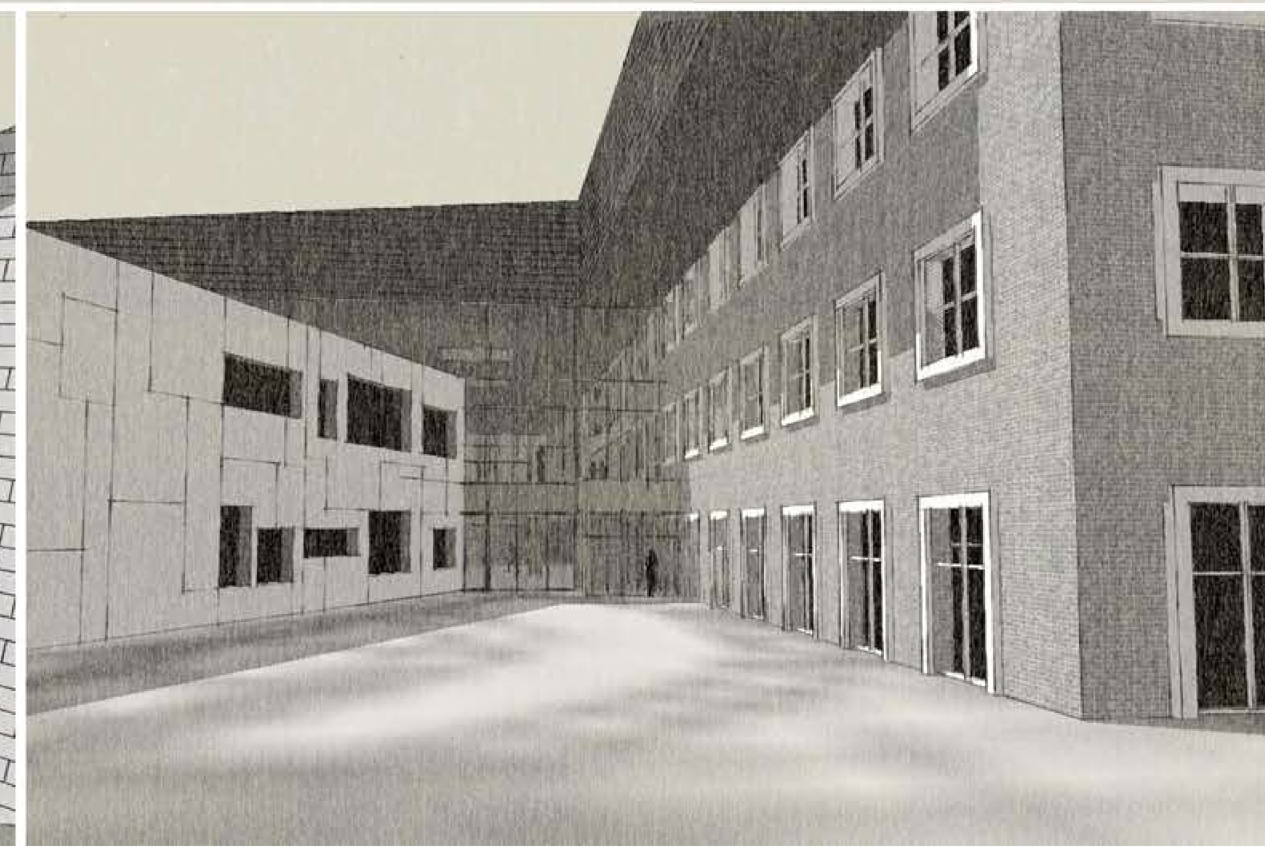
NORTH ELEVATION

EAST ELEVATION

NORTH/SOUTH SECTION

EAST/WEST SECTION

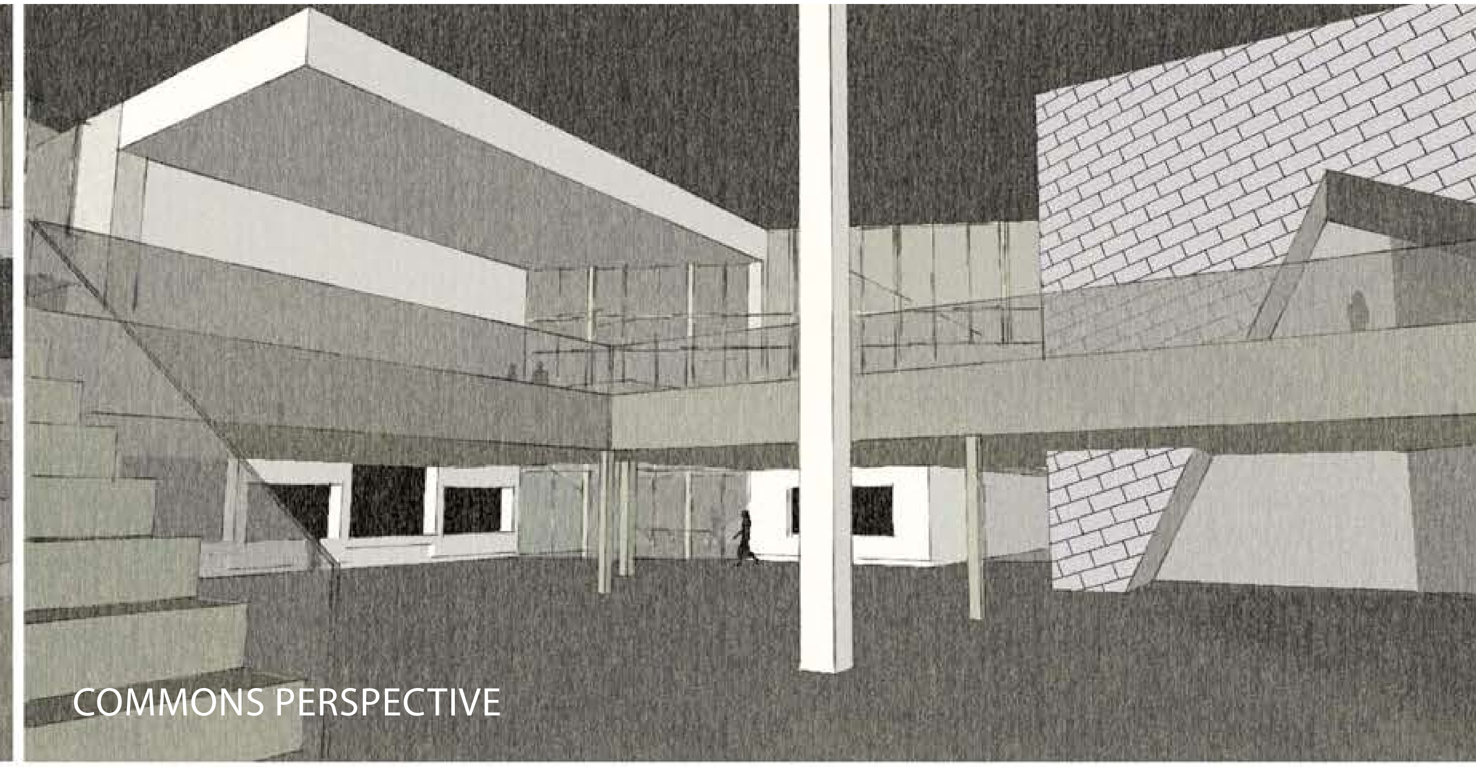


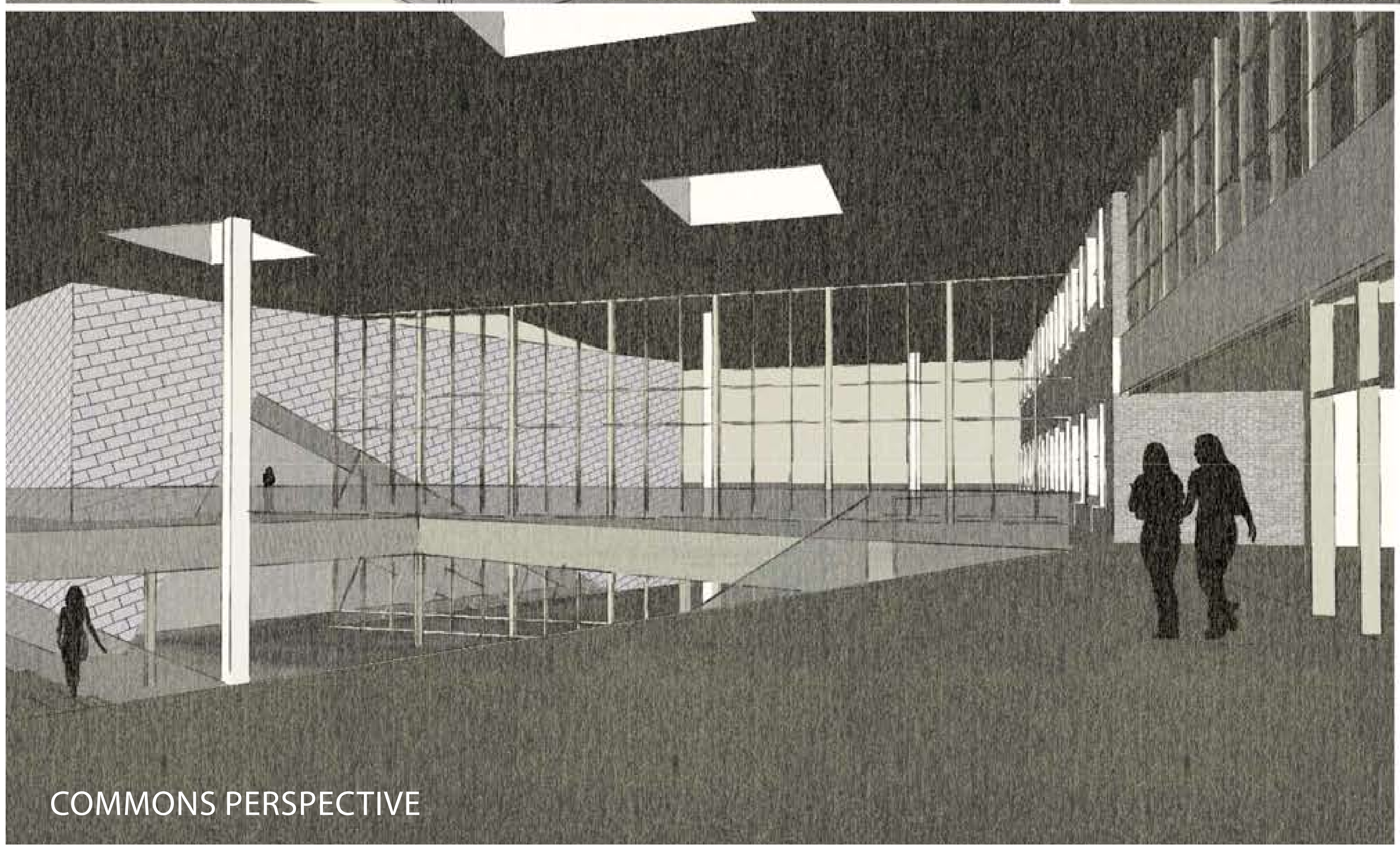


MAIN ENTRY PERSPECTIVE

NORTH ENTRY PERSPECTIVE


COMMONS PERSPECTIVE


COMMONS PERSPECTIVE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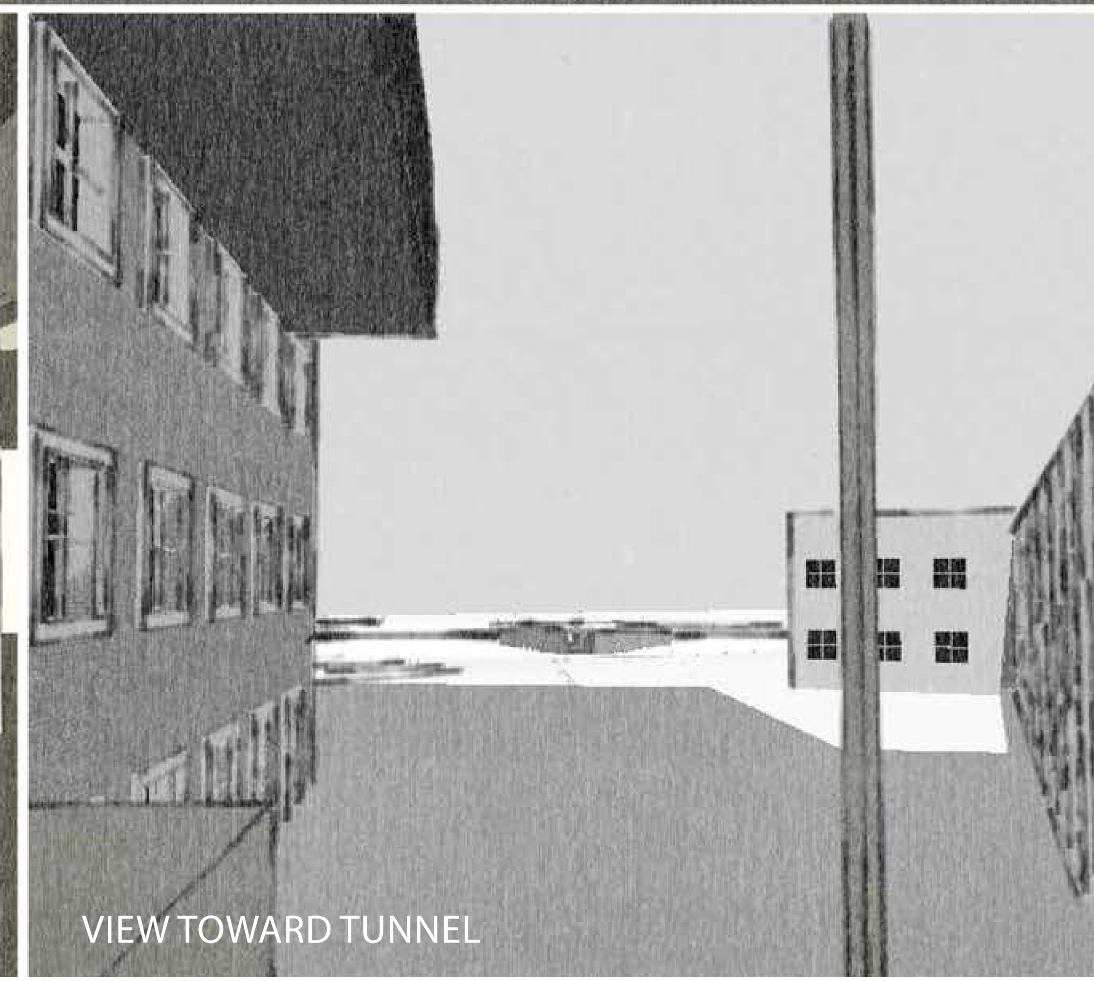
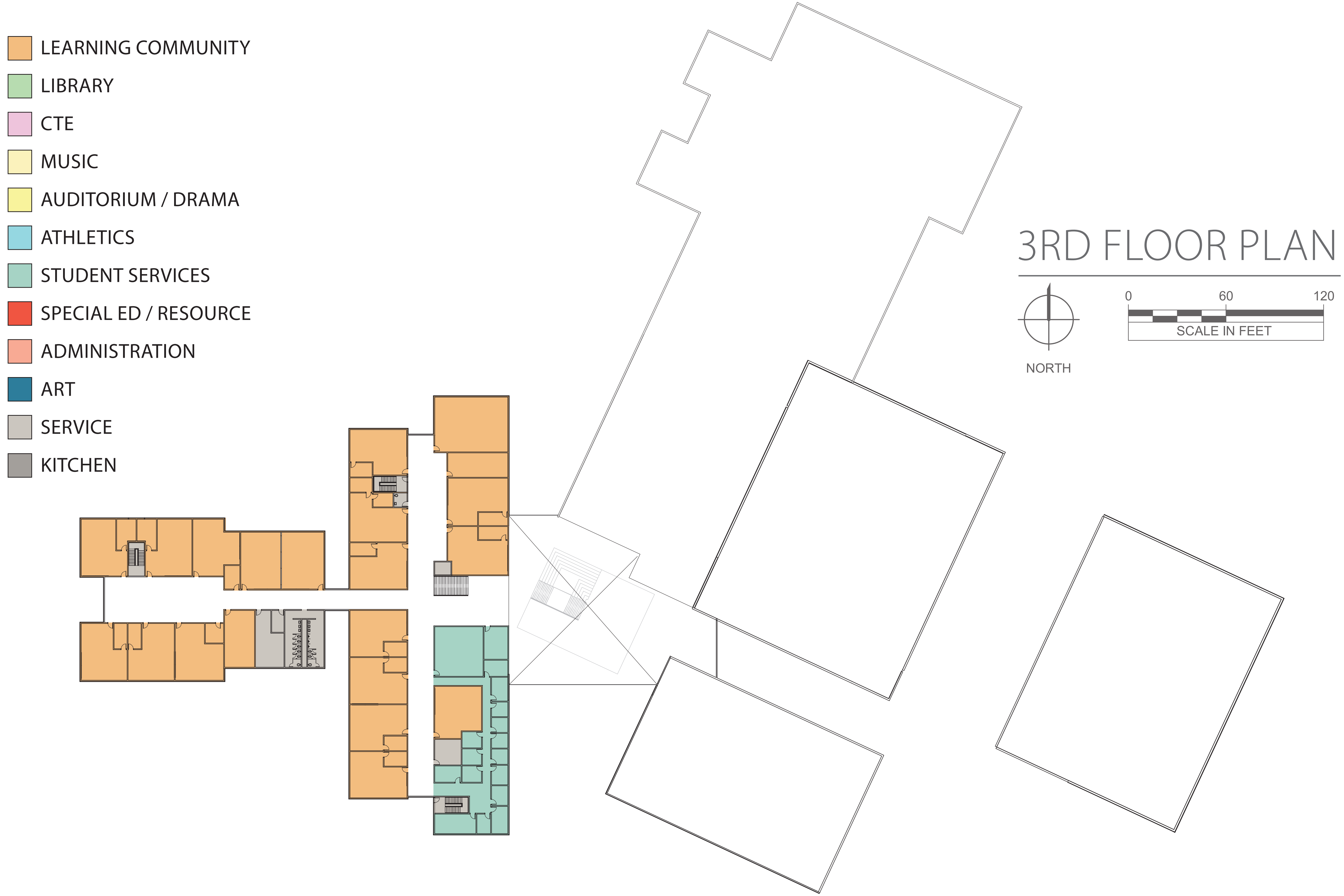

VIEW TOWARD TUNNEL

1ST FLOOR PLAN

- LEARNING COMMUNITY
- LIBRARY
- CTE
- MUSIC
- AUDITORIUM / DRAMA
- ATHLETICS
- STUDENT SERVICES
- SPECIAL ED / RESOURCE
- ADMINISTRATION
- ART
- SERVICE
- KITCHEN

2ND FLOOR PLAN

3RD FLOOR PLAN



Architectural Design

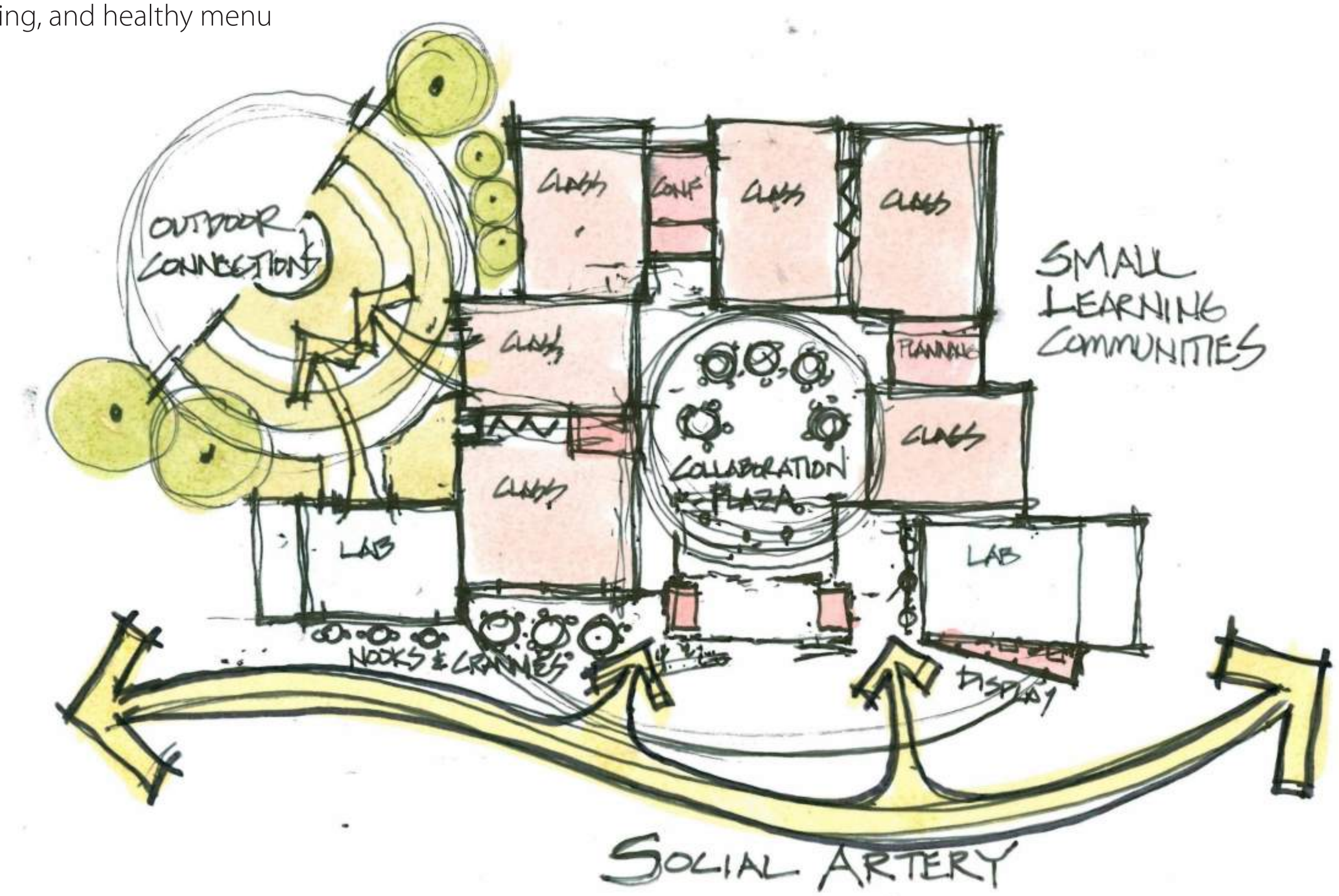
Design Concept

The Town Center
Like a downtown community, the large centralized Student Commons, or "Town Center," is the most dynamic shared space in the school. This three-story volume can be used for a multitude of activities such as the food court, student services, lobby, concessions, presentations, dances and community gatherings. It represents the convergence of the three learning streets--the important social arteries that link the school together and help to create a sense of community.

The Town Center also puts "learning on display" which is accomplished through transparency and key adjacencies. It is not only connected by proximity to administration, learning communities, the library, art, athletics, and auditorium, but also connected visually from vantage points on multiple levels. A variety of student spaces and services exist within central commons including alcoves, stores, and a career center that will make this the favorite social hangout spot.

The Food Court
Multiple restaurant style food court serving windows will offer students a wide selection of tasty, appealing, and healthy menu choices. The multiple windows will be serviced by one primary kitchen. Each window will have a separate point of sale which will help to facilitate quicker lunch service. One of the serving windows closest to the gymnasium will be able to be closed off and entered separately for concession use when needed. Mobile coffee, smoothie, snack, and condiment carts will be able to dock and supply at the primary kitchen and also be able to distribute food at other designated points throughout the school.

Small Learning Communities
Students learn better and are more engaged in education when in smaller learning environments. In these smaller groups they can better collaborate and apply what they learn and get more personalized attention from their peers, mentors, and teachers. For this reason, the New High School design will be divided into smaller learning communities. These communities are comprised of flexible curriculum areas, collaborative plazas, small group conference rooms, and teacher planning areas. These educational neighborhoods are reinforced through the active and applied learning programs and curriculums.



Architectural Design

Design Concept

Flexible Curriculum Areas

The overall design layout lends itself to a variety of curriculum options and flexibilities. Each learning area has a variety of class, presentation, resource, and conference rooms. These can be arranged by department, program, or even cross-curriculum academies.

Collaboration Plazas

Collaboration zones happen in the intersections between learning communities. Classrooms and small meeting areas will open up into collaboration areas. These flexible areas are places where multiple classes can combine on a group project, share resources, collaborate in breakout spaces, and student projects can be presented or displayed.

Teacher Planning Rooms

Teacher planning areas promote the sharing of ideas, planning group projects, acquiring resources, and collaborating on daily education topics. These planning areas are located at the center of each small learning community.

Future Growth

The New High School is master planned for growth and will be adaptable for the fast moving advances of the information age. Areas to the east and west have been identified for the future expansion of learning communities, activities, and electives that will facilitate an additional 300 students. This area could also be used to bring a portion of the growing Bridger Charter Academy to the New High School.

To facilitate future adaptability, modular planning and construction is being utilized where practical. This planning strategy is most effective where furniture, finishes, casework, lighting, and the HVAC system is organized in a repetitive manner like the classrooms and other structured learning spaces. Ceilings will be easily accessible so that future advances in infrastructure can be easily implemented. The heating, plumbing, and electrical infrastructure will be designed to handle future building expansion. Similarly, exterior materials that the design team is investigating are low maintenance modular units like masonry and metal or fiber cement panels for their ease of future deconstruction.

Architectural Design

The Facility

Project Components

- 303,000 Gross Square Feet. This area equates to approximately 202 SF per student, which is in alignment with current high school facility and national standards.
- 8 learning communities each with teacher planning areas, collaboration breakout areas, small group conference rooms, display areas, and lockers.
- 45 academic classrooms
- 9 science labs, and 4 shared prep areas.
- The Commons / Town Center will be surrounded by a variety of student services including administration, library, student store, etc. This area will have direct access into both the competition gym, auditorium, concessions, and food court (with multiple serving windows).
- Kitchen with multiple food court style service windows and necessary support spaces.
- Administration / Student Services: Administration will be de-compartmentalized and distributed for best student access and the ability to adequately monitor the school. Student services will be conveniently located adjacent to or near the Town Center.
- Special Education / Resource: A collaborative teaching model reduced that reduces number of dedicated classrooms. Specialized spaces that are comfortable, easily accessible, conveniently located, and include CCCR/AAS and TAPS/SEB.
- Visual Arts: Includes labs for both 2D and 3D art with indoor and outdoor kilns and plenty of display spaces. Graphics, photography, and metal/jewelry will be provided in the adjacent shared CTE labs.
- Music: Studios for band, orchestra, and choir will be organized around a plaza and practice rooms. These spaces will be located adjacent to the auditorium stage.
- Auditorium: The auditorium will house 750 seats with a stage sized for full music and drama performances. A separate drama classroom is being provided for their own practice space. The auditorium can be used for larger lecture and other academic functions. Acoustics in this area will be versatile for voice and music. The stage will be big enough for both drama and large music performances. Seating, stage control booth, and AV tech areas will be accessible.
- Athletics / Activities / Health: This area includes a primary competition gym, two auxiliary gymnasiums, fitness/weight, wrestling, and 6 locker rooms.
  - o Competition Gymnasium - 2 PE Stations, 2,500 main level seats with room for additional future balcony seats. The floor can provide 1 tournament court, 2 full basketball side courts (with PE station divider curtain), or 3 volleyball side courts.
  - o Two Auxiliary Gymnasiums – Each with1 full court, 200 spectator seats, 2 smaller basketball side courts (with PE station divider curtain).
- Library: Easily accessible from both Town Center and the learning communities. The library will be full of open and inviting technology enriched study and collaborative spaces.
- Career Technical Education: CTE will include labs, classrooms and spaces for Family Consumer Science with a culinary arts lab.
  - o Business, including DECA store
  - o Trades & Industry that includes metal, wood and auto shops
  - o Architectural/engineering lab
  - o Graphic/photo lab
  - o Supporting spaces and contained outside yard.
- Support: Storage, infrastructure, restrooms, maintenance, IT, exterior service, and loading dock.

Architectural Design

Exterior Materials

Building Exterior Design

Building Envelope

Structural Steel Framed Walls

At structural steel locations, the structural steel frame will be inset from the metal stud framing, thus allowing the metal framing to be "balloon" framed. The exterior walls will be comprised of 6" metal stud framing with gypsum based sheathing installed on the exterior face. Then, a self-adhering vapor/ air barrier will be applied directly to the wall sheathing and exterior rigid insulation will be installed over the self-adhering vapor/ air barrier. At finished masonry siding locations, the rigid insulation will occur in the cavity between the sheathing and the masonry. At non-masonry siding locations, metal furring will be used to hold the siding away from the sheathing to create the space for the continuous insulation.

Concrete Masonry Unit (CMU) Walls

At structural CMU locations, the self-adhering vapor barrier will be installed directly to the exterior face of the CMU and exterior rigid insulation will be installed to the self-adhering vapor/ air barrier. At finished masonry siding locations, the rigid insulation will occur in the cavity between the sheathing and the masonry. At non-masonry siding locations, metal furring will be used to hold the siding away from the sheathing to create the space for the continuous insulation.

Exterior Finishes

All exterior siding will be durable and low-maintenance. Siding will consist of:

- Masonry: Masonry siding provides an abuse resistant surface, while providing the warmth of natural materials. A variety of masonry will be studied, including brick, split face CMU, ground face CMU, and cast stone.
- Metal Panels: Metal panels are a less expensive siding solution than masonry. A variety of metal panel profiles and colors will be used to add articulation and interest to the architecture. The metal panels will include a Kynar 500 coating.

Roof Treatments

The roofs will be low-slope with internal roof drains and will consist of a roof membrane, such as 60 MIL TPO or EPDM. The roofs will be comprised of one of two assemblies:

- A sloped structure with a vapor barrier and consistent thickness polyisocyanurate insulation to achieve drainage. The insulation will be mechanically fastened into metal decking. The insulation will be covered by a recovery board, then a gravel ballasted roof membrane.
- A level structure with tapered polyisocyanurate insulation to achieve drainage. The insulation will be mechanically fastened into metal decking. The insulation will be covered by a recovery board, then a gravel ballasted roof membrane.

Exterior Fenestration and Entrances

- Exterior fenestration and primary entrances will be comprised of aluminum storefront frames with anodic coating. Where opening sizes and spans exceed those achievable by storefront systems, aluminum curtain wall will be utilized.
- Secondary doors and frames will be painted hollow metal.
- Glazing will be low-e, double-pane, 1" insulated glass with a low U value.

Architectural Design

Interior Finishes

General Building Interior

Interior Walls

- Throughout the majority of spaces, the interior walls will consist of metal frame construction with painted gypsum board finishes. For classroom spaces requiring higher levels of acoustic isolation, the walls will be constructed with additional layers of gypsum board and batt insulation.
- In areas requiring more durable finishes, such as the gyms, locker rooms, and corridors, ground face and/or painted CMU block will be utilized. All restrooms will have ceramic tile wall finish to the ceiling.
- The walls of the auditorium will be CMU with specialty acoustic wall treatments.
- Magnetic whiteboards will be installed in selective locations in the classrooms, collaborative areas, library, conference, workrooms, and corridors.

Ceilings

- A 2x4 lay-in system with acoustic tiles will be utilized throughout the majority of the building due to their ability to absorb sound and ease of access to building systems located above the ceiling. Gypsum board soffits will be used as necessary to enclose larger ducts and structural beams that cannot be hidden above the ceilings.
- Student restrooms and locker rooms will have painted gypsum board ceilings. This solid ceiling surface prevents unauthorized access into adjacent spaces and prevents concealing items.
- The gymnasiums and auditorium ceiling will be exposed with specialty acoustic treatments.

Flooring

- Classrooms, corridors, administration areas, library, and staff workrooms could include stained concrete, VCT, LVT, or sheet goods. Offices will have carpet.
- Restrooms will have ceramic tile flooring.
- Vestibules will have lay-in walk off mat carpet tiles.
- Mechanical, electrical, custodial, receiving, and storage areas will receive a sealed concrete finish, which has a very low cost and low maintenance for these non-public spaces.
- Data closets and server rooms will have a static-dissipative VCT flooring.
- Floating maple wood floors will be installed all gymnasiums.
- The auditorium will receive a mixture of sealed concrete and carpet.

Doors & Trim

- All door frames will be painted hollow metal; stained solid core wood doors with vision windows will be utilized at classrooms and offices; painted hollow metal doors will be used at utilitarian areas such as mechanical rooms. All doors will be equipped with ADA compliant hardware.

Specific Building Interior

Administration, Student Services & Misc. Office Areas

Finishes:

- Painted gypsum board
- Mixture of carpet & vinyl flooring and rubber base
- Suspended acoustical ceiling
- Blinds at windows for light control and privacy
- Lockable door with vision glass
- Marker boards and tack boards
- Clock & Intercom System

Built-ins:

- Reception Desk: Lower height base cabinets and countertop; small section of stand-up height counter
- Nurse's Office: Lower height base and upper cabinets with countertop, includes drawers and shelves; Cubby for under-counter refrigerator.

Furniture and Equipment by the Bozeman School District:

- Office desks & chairs, file cabinets, bookcases, computers, telephones, paper towel dispensers, soap dispensers

Architectural Design

Interior Finishes

Classrooms

Finishes:

- Painted gypsum board
- Stained concrete, vinyl flooring and rubber base
- Suspended acoustical ceiling
- Blinds at windows for light control and privacy
- Door with vision glass, security classroom lock
- Marker boards and tack boards
- Clock & Intercom System

Built-ins:

- Base and upper cabinets with countertop, includes drawers and shelves
- Teacher wardrobe (coat closet and bookshelves, lockable)
- In Lab Classrooms, the countertops will be of an approved material (epoxy). Appropriate ventilation hoods will be located as needed.
- The Life Skills classroom will have a typical residential kitchen and laundry equipment. It will also have built-in lockable storage cabinets in the room. The Special Education rooms will have cabinets for storage and a counter with sink.
- Lockable instrument cubbies in Music Rooms.

Furniture and Equipment by School District:

- Student desks & chairs, teacher desk & chair, file cabinets, bookcases, computers, telephone, paper towel dispenser, soap dispenser

CTE Classrooms

Finishes:

- Painted gypsum board or CMU block
- Sealed or stained concrete and rubber base
- Suspended acoustical ceiling in offices with exposed deck in the shop areas
- Blinds at windows for light control and privacy
- Door with vision glass, security classroom lock
- Marker boards and tack boards
- Clock & Intercom System

Built-ins:

- Base and upper cabinets with countertop, includes drawers and shelves; double sink w/ bubbler
- Teacher wardrobe (coat closet and bookshelves, lockable)

Furniture and Equipment by School District:

- Student desks & chairs, teacher desk & chair, file cabinets, bookcases, large workbenches, tools, computers, telephones, paper towel dispensers, soap dispensers

Teacher Work Areas / Breakrooms

Finishes:

- Painted gypsum board
- Vinyl flooring and rubber base
- Suspended acoustical ceiling
- Blinds at windows for light control and privacy
- Lockable door with vision glass
- Marker boards and tack boards
- Clock & Intercom System

Built-ins:

- Base and upper cabinets with countertop, includes drawers and shelves. Possible space for coffee maker, microwave, and under-counter refrigerator.

Furniture and Equipment by School District:

- Table & chairs, copier/printer, telephones, paper towel dispensers, soap dispensers

Architectural Design

Interior Finishes

Collaborative Plazas
Finishes:
- Painted gypsum board
- Stained concrete flooring and rubber base
- Suspended acoustical ceiling
- Marker boards and tack boards
- Clock & Intercom System

Furniture and Equipment by School District:
- Tables & chairs

Kitchen & Concessions
Finishes:
- Painted gypsum board with FRP
- Sheet vinyl, non-slip resilient flooring or epoxy-resin coating
- Suspended acoustical ceiling; Mylar faced (washable) acoustical panels
- Clock & Intercom System
- See Kitchen Equipment narrative for further detail on equipment

Built-ins:
- None

Furniture and Equipment by School District:
- Tables & chairs, telephones, paper towel dispensers, soap dispensers

Commons
Finishes:
- Painted gypsum board
- Stained concrete/LVT and rubber base
- Suspended acoustical ceiling with gypsum board accent
- Blinds at windows for light control and privacy
- Clock & Intercom System

Furniture and Equipment by School District:
- Tables & chairs

Library-Media Center
Finishes:
- Painted gypsum board
- Vinyl flooring/LVT and rubber base
- Suspended acoustical ceiling
- Blinds at windows for light control and privacy
- Lockable door with vision glass
- Marker boards and tack boards
- Clock & Intercom System

Built-ins:
- Base and upper cabinets with countertop, includes drawers, shelves and sink in Work Room
- Circulation Desk w/ sit-down/stand-up areas, book drop
- Countertop for computer writing-lab

Furniture and Equipment by School District:
- Student chairs, book shelves/stacks
- file cabinets, computers, telephones, paper towel dispensers, soap dispensers

Gymnasium(s)
Finishes:
- Painted CMU block walls
- Floating maple wood floors; painted game-lines
- Exposed acoustical roof deck; sound absorptive surfaces / forms at ceiling and upper walls
- Wall and/or ceiling mounted basketball backstops, volleyball pole floor inserts, wall pads
- Bleachers
- Score board
- Clock & Intercom System

Furniture and Equipment by School District:
- Equipment storage shelving and cabinets/cages; teachers desk and chair, file cabinet

Architectural Design

Interior Finishes

Auditorium

Finishes:

- Painted CMU block walls or gypsum board with acoustical treatments
- Sealed concrete floors with carpet in designated areas
- Exposed acoustical roof deck; sound absorptive surfaces / forms at ceiling and upper walls
- Motorized curtains and projection screen
- Fixed-in-place auditorium-style chairs
- Audio system
- Lighting controls
- Clock & Intercom System

Furniture and Equipment by School District:

- Equipment storage shelving and cabinets/cages; teacher's desk and chair, file cabinet

Locker Rooms

Finishes:

- Painted CMU block walls
- Ceramic tile flooring and 6-inch tile base
- Painted gyp board ceiling
- Lockers & Benches
- Toilet & Urinal partitions, floor-mounted and overhead braced, painted steel with metal brackets, shoes and braces
- Grab bars at ADA water closets
- Toilet paper holders
- Paper towel dispensers
- Soap dispenser
- Mirrors with stainless steel frames
- Trash receptacle
- Toilets; wall-mounted with automatic flush valves
- Urinals; wall-mounted
- Floor drain

Restrooms

Finishes:

- Ceramic wall tile (floor to ceiling); Ceramic tile flooring and 6-inch tile base
- Painted gyp board ceiling
- Student toilet groups will have privacy wall at entry, no doors
- Toilet & urinal partitions, floor-mounted and overhead braced, painted steel with metal brackets, shoes and braces
- Grab bars at ADA water closets
- Toilet paper holders
- Paper towel dispensers
- Soap dispenser
- Mirrors with stainless steel frames
- Trash receptacle
- Group lavatories located outside restrooms; automatic faucets
- Toilets; wall-mounted with automatic flush valves
- Urinals; wall-mounted
- Floor drain

Building Support Areas

Finishes:

- Painted gypsum board walls
- Sheet vinyl or sealed concrete floors with 4-inch rubber base
- Fiberglass reinforced panel (FRP) wall cladding at walls near floor sinks
- Exposed to deck ceilings
- Door with a storeroom lock
- Floor mounted sink with threaded faucet (hose bib) (in Custodial Rooms)
- Mop rack over sink; Broom hooks (in Custodial Rooms)

Furniture and Equipment by School District:

- Metal Shelving Unit for storage

Architectural Design

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Building Code Analysis

Codes and Standards

As of August 23rd, the City of Bozeman has adopted the 2012 International codes with amendments. The most current codes, as adopted by the City of Bozeman at the time of permit submission will be used as the Basis of Design. The following codes and standards are currently applicable to the design:

- 2012 International Building Code (IBC)
- 2012 International Energy Conservation Code (IECC)
- 2012 International Fire Code (IFC)
- 2014 National Electric Code (NEC)
- 2012 National Fire Protection Association (NFPA) Chapter 13, Standard for Installation of Fire Sprinklers
- 2010 Americans Disability Act Standards (ADA)
- 2009 American National Standard Institute (ANSI) A117.9 Accessible and Usable Buildings and Facilities
- 2012 Uniform Plumbing Code and MCA ARM 24.301.351

The following standards are applicable in addition to any other local requirements:

- Underwriters Laboratories (UL)
- Occupational Safety & Health Administration (OSHA)

2012 International Building Code SD Review
FACILITY USE AND OCCUPANCY CLASSIFICATION
IBC CHAPTER 3
Occupancy Classification: Group E (educational)

AREA / HEIGHT / OCCUPANCY (IBC Table 503 And Table 601)
Section 503, Table 503.1
TYPE IB_ with automatic sprinkler system totals include:

- 160' allowable + 20' increase = 180' height
- 5 stories allowable + 1 story increase = 6 stories
- (unlimited) UL SF allowable per story

Height Increases
Section 504.2 Automatic Sprinkler System
Max Building Height Increased by 20 Ft
Max Story Increase = 1
Max Area - See 506.2 & 506.3:
200% Increase for Over 1 Story Above Grade
300% Increase for Single Story Building

Building Area Modification
Section 506.2 : Frontage Increase
Type IB: none applicable for frontage increase : Allowable area per story = UL(unlimited) SF
Gross area provided (levels 1-3 + mechanical level): 302,618 SF

TYPES OF CONSTRUCTION
Section 601 – Fire rating requirements for building elements

Type II B:
Resistive Construction Requirements: IBC Table 601

Element	Type II B
Primary Structural Frame	2
Bearing Walls (Exterior)	2
Bearing Walls (Interior)	2
Non-Bearing Walls (Exterior)	0 (SEE TABLE 602)
Non-Bearing Walls (Interior)	0
Floor Construction & Secondary Members	2
Roof Construction & Secondary Members	2

Architectural Design

Architectural Code

Section 602 – Fire separation distance and exterior wall ratings
GROUP E:
TYPE IIB: X<5' = 1 HR ; 10 </= X < 30' = 0 HR
*** All exterior walls are >30' from property lines.

FIRE AND SMOKE / BUILDING SEPARATIONS / PROTECTION
705 Exterior Wall Requirements
705.8.1.1 - 1.1 and 1.2: Unlimited on first story above grade plane.
705.8 – Openings (% shown below indicates sprinklered/ unprotected openings)

3-5 feet:	15% max openings of wall area
5-10 feet:	25% max openings of wall area
10-15 feet:	45% max openings of wall area
15-20 feet:	75% max openings of wall area
20+ feet:	No Limit max openings of wall area

*** Fire separation is > 20 feet.

706 Fire Walls
Table 706.4: Fire Wall Fire-Resistance Ratings
Group E = 3 hr (unless TYPE II or V construction, then 2 hour rating)

Section 707 – Fire Barriers
707.3.1 – Per 713.4 - Shaft enclosures: 1-HR connecting < 4 stories, 2-HR connecting 4+ stories
707.3.2 – Per 1022.2 -Stair Enclosures: 1-HR connecting < 4 stories, 2-HR connecting 4+ stories
707.3.10 – Fire Areas: Fire barriers or horizontal assemblies shall be 2-HR rated

Section 713 Shaft Enclosures
713.4 – Fire-resistance rating:
1-HR Fire Resistance Rating connecting < 4 stories
- Elevator, stairs, and mechanical chases will be considered as shafts.
- 713.14.1 Exception 4: Elevator lobbies are not required when building is sprinklered.

Section 716 Opening Protectives
716.5.5.1 Glazing in doors: Fire protection rated < 100 sq in., Fire-resistant rated >100 sq in when tested as component of door assembly

INTERIOR FINISH CLASSIFICATIONS
Chapter 8, 803.1.1: Interior Wall and Ceiling Finish Materials
Table 803.9 Fully Sprinklered

Occupancy Group	Exits	Exit Access	Other Spaces /Rooms
E	Class-B	Class-C	Class-C

FIRE PROTECTION SYSTEMS
Section 903 Automatic Sprinkler Systems
903.2.3 Required at group E: Required at fire areas over 12,000 SF, required at floors not at level of exit discharge unless every classroom at that level has at least one exterior door at ground level.
903.2.4 Required at group F-1: if area exceeds 12000 SF
903.2.1 Required at woodworking operations: if area exceeds 2500 SF

905.3.1 – Standpipes
- Required: Top level from lowest point of FD Access below is more than 30'.
- Exception 1: Class I Standpipes in stairwell. To be located in every interior exit stairwell.

906: Portable Fire Extinguishers: Within 75' of travel per NFPA 10
906.1 Within 30' of Commercial Cooking Equipment
907 Fire Alarm and Detection: fire alarm system will be provided.

MEANS OF EGRESS
Section 1004 Occupant Load
Section 1004.1.2 – Occupant Loads

Classroom	= 1 Occupant/20 Net Square Feet
Shops/Vocational Rm	= 1 Occupant/50 Net Square Feet
Exercise Rooms	= 1 Occupant/50 Gross Square Feet
Kitchen (Commercial)	= 1 Occupant/200 Gross Square Feet
Library	
Reading	= 1 Occupant/50 Net Square Feet
Stacks Area	= 1 Occupant/100 Gross Square Feet
Stages and Platforms	= 1 Occupant/15 Net Square Feet
Assembly Tables and Chairs	= 1 Occupant/15 Net Square Feet
Assembly Fixed Seats	= 1 Occupant Per Seat
Storage / Mechanical Equipment	= 1 Occupant/300 Gross Square Feet
Business Areas	= 1 Occupant/100 Gross Square Feet

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Occupant loads	SF	SF Allowed/OCC	Occupant Totals
Total per Floor:			
1st Floor	SF	varies	5446
2nd Floor	SF	varies	1349
3rd Floor	SF	varies	753
TOTAL			**7548**

Section 1005 Means of Egress Sizing
Section 1005.3.1 – Stair Width: =(Exception 1) .2 inch/occupant with sprinkler system

1005.3.2 – Other Egress Components = 0.15/Occupant (Exception 1)

Section 1007 Accessible Means of Egress
Section 1007.1 Accessible spaces shall be provided with not less than one Accessible Means of Egress. Where more than one means of egress is required from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.

Section 1007.3 Stairways

1007.3.1 - 48" clear between handrails not required with fire sprinklers. Stair width must be a minimum of 44" wide (cross-reference with 1009.4)

1007.3.2 - Areas of Refuge not required at stairs with fire sprinklers

Section 1007.4 Elevators

1007.4.2 - Areas of Refuge not required at elevators with fire sprinklers

Section 1015 Exit and Exit Access Doorways
1015.1 Two Exits, or exit access stairways where occupant load exceeds values of Table 1015.1: Occupant load greater than 49 for E Occupancies.
1015.1.1 Three exits or exit access doorways where occupant load is between 501-1000 per space or story. Four exits with Occupant load greater than 1000 per space or story.

Section 1015 Exit and Exit Access Doorway Arrangement
Section 1015.2.1 Exception 2 Required spacing between 2 required exit doors = 1/3 the diagonal dimension.

Section 1016 Exit Access Travel Distance
Table 1016.2 – Exit Access Travel Distance with Sprinkler

Group E = 250 feet

Section 1018 Corridors
Table 1018.1 – Corridor Rating – 0 hours, E Occupancy with Sprinkler System

Table 1018.2 – Group E with a corridor having a required capacity of 100 or more = 72 inches width (minimum)

Architectural Design

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Section 1018.4 – Dead End Corridors shall not exceed 20 feet.
Exception 2: In occupancy…E… with automatic sprinkler system…lengths of dead end corridors not exceed 50 feet.
Exception 3: Dead end corridor shall not be limited in length where the length of the corridor is less than 2.5 times the least width of the dead-end corridor.

1018.6 – Corridor Continuity
Commentary Figure 1018.6 (5) depicts the option for additional doors on the elevator hoistway for maintaining the integrity of the corridor.

Section 1021 Number of Exits and Exit Configuration
1021.2 Two Exits, or exit access stairways from any story where occupant load exceeds values of Table 1021.2(2): Occupant load greater than 49 or travel distance of 75 feet for E Occupancies.
1021.2.4 Three exits or exit access stairways or ramps at stories where occupant load is between 501-1000 per space or story. Four exits with Occupant load greater than 1000 per space or story.

Section 1021.3 Exit Configuration
In accordance with 1015.2.2 Exception 2 Required spacing between 2 required exit doors = 1/3 the diagonal dimension

ACCESSIBILITY
Section 1104 Accessible Route
1104.4 Multistory buildings and facilities: One accessible route provided to all accessible stories.

1109 Facilities:
1109.2 Each toilet room shall be accessible
1109.2.1 In assembly occupancies an accessible family or assisted-use toilet room shall be provided where an aggregate of six or more male and female water closets is required.

1111 Signage: Accessible entrances, Toilet Rooms

PLUMBING FIXTURE ANALYSIS: UPC w/ MT ARM 24.301.351 AMENDMENTS
Educational Secondary:
Water closets: 1 per 100 Male ; 1 per 45 Female
Lavatories: 1 per 2 water closets
Drinking fountains: 1 per floor
Assembly:
Water closets: 1 per 125 Male ; 1 per 75 Female
Lavatories: 1 per 2 water closets
Drinking fountains: 1 per 1000

Sustainable Design Rating Systems

General

The construction of the New Bozeman High School will use best sustainable design practices to achieve a healthy and energy efficient learning environment for Bozeman High School students. Bozeman Public Schools has adopted an amended version of the Montana High Performance Building Standard which is to be applied to their construction projects.

Sustainable Programs Considered

Bozeman Public Schools has reviewed several sustainability programs before selecting Collaborative for High Performance Schools (verified status), these include:

- Collaborative for High Performance Schools
- LEED V4 for Schools
- The Montana High Performance Building Standard
- Green Globes
- Energy Star
- Architecture 2030

Collaborative for High Performance Schools

The Collaborative for High Performance Schools (CHPS) is a nonprofit organization dedicated to improve student performance and the entire educational experience by building the best possible schools.

The CHPS mission is to make schools better places to learn. CHPS was founded in 1999 as a collaboration of California's major utilities to address energy efficiency in schools. The program quickly expanded to address all aspects of school design, construction, and operation.

CHPS provides resources to schools, school districts, and professionals about all aspects of high performance school design, construction, and operation. CHPS develops tools that help make schools:

- Energy, water, and material efficient
- Well-lit
- Thermally comfortable
- Acoustically sound
- Safe
- Healthy
- Easy to operate

These resources include a six-volume best practices manual, training and conferences, a high performance building rating and recognition program, and other tools for creating healthy, green schools.

The CHPS program is divided into on the following categories (totaling 250 credits of which 110 are required for certification):

- Integration and Innovation (21 credits)
- Indoor Environmental Quality (82 credits)
- Energy (63 credits)
- Water (20 credits)
- Sites (24 credits)
- Materials and Waste Management (21 credits)
- Operation & Metrics (19 credits)

A preliminary CHPS scorecard is included in the Appendix.

CHPS COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS®

Architectural Design

Food Service

Food Service Program

The Food Service Program will support the New Bozeman High School population of 1,500 to 1,800 students. The kitchen will function as a cook to serve operation and will receive and have storage for all deliveries to support the production schedule. Deliveries from Support Services will include food staples. Secured scramble style service is planned with single entrance and multiple cashier stations. The most important design goals for the project include:

Design Overview

- The new kitchen will support a breakfast and lunch program for the student population.
- The menu will focus on healthy choice entrées accompanied with fresh fruits, vegetables, and milk.
- Deliveries will be brought directly into the kitchen from the adjacent receiving dock. A cart/can wash with hot/cold hose bibb and area drain will be located outside at the receiving dock.
- Dry and cold storage rooms will be located inside the kitchen. Dry storage shelving shall be a combination of the adjustable open wire type and include dunnage racks. Cold storage will consist of a walk-in refrigerator and freezer with coated adjustable wire type shelving as well as dunnage racks. Two mobile refrigerated milk coolers will also be utilized at the serving counters for holding and serving milk.
- On-site prep will be required supported by work tables and sinks with indirect wastes.
- Whenever possible, equipment shall be made portable. Those items with closed bodies shall be set on raised bases. Open base equipment shall be made with tubular stainless steel legs having sanitary gussets and bullet-shaped feet or casters.
- Equipment shall conform to all local and national codes. All items shall be designed to National Sanitation Foundation Standards. Working surfaces and cabinet bases shall be stainless steel, polyethylene, or plastic laminate.
- Natural gas is available and preferred for the cooking equipment. A Type 1 grease exhaust hood will cover the line-up. Work tables, preparation sinks, and hand sinks will support the various work stations.
- Meals will be prepared for a cook to serve operation.
- Students will be served on reusable trays. They will have access to a variety of hot and cold entrées, self-serve refrigerated milk cooler, and a cold variety bar with veggies and fruits.
- A tray return window will be planned for to support the program.
- Warewashing will consist of dishtables, waste collector with spray rinse, an automated warewasher with 180-degree hot water rinse cycle, and a 3-compartment potwashing sink table.

Support

- A manager's office with desk/file cabinet will be located in the kitchen with provisions for phone and data lines.
- A Janitor Closet with mop sink and chemical storage will be located within the kitchen.
- The kitchen waste volume will require a grease removal device sized per code by the plumbing engineer. Space for a dumpster will be provided in the loading dock area.
- A unisex staff toilet will be located within or adjacent to the kitchen.

Finishes

- Kitchen finishes are to be smooth, washable, and light in color. Recommended flooring material is quarry tile with an abrasive surface. If the ceiling is suspended, the tiles used shall be Mylar coated for cleaning. Recommended wall finish is a washable wall board wainscot material, i.e. stainless steel, laminate or FRP minimum up to 8 feet with a semi-gloss painted wall surface continuing up to the ceiling.
- Stainless steel wall flashing will cover the cooking wall surfaces.

Architectural Design

Food Service

Preliminary Equipment List:

- Staff lockers
- Hand washing sinks
- Dry storage room with shelving
- Walk-in freezer with shelving
- Walk-in cooler with shelving
- Prep sink table
- Sheet pan racks
- Utility cart
- Cook's support table
- Canopy hood with fire protection system
- Stainless steel wall flashing
- Double stack convection oven
- Double stack combi-oven/steamers
- Six burner range
- Char broiler
- 30-Gallon tilting skillet
- Baking Oven
- Proofer
- Pizza conveyor oven
- Refrigerated toppings counter
- Cube ice machine with storage bin
- Pass-thru hot/cold cabinet
- Serving line with hot & cold wells
- 2-Tier heated pass-thru merchandising cases
- Mobile milk coolers
- Sandwich making station
- Wrap making stations
- Mobile refrigerated variety bars
- Cashier counters
- Point of sale system (by Owner)
- Waste collector
- Hose reel
- Mobile pot & pan shelving
- Soiled dishtable
- Potwashing 3-compartment sinks
- Mobile waste receptacles
- Conveyor-type warewasher with booster heater
- Vapor exhaust ducts (2)
- Clean dishtable

Foodservice Cost Estimate:

- Cost for basic (necessary) food service equipment $675,000
- Additional cost for "nice to have" labor and time saving equipment $50,000
- Additional cost for other loose equipment (small wares) for FF&E package $50,000

Architectural Design

Security

Site and Building Security

General Security

Utilizing the four principals for Crime Prevention Through Environmental Design (CPTED), the design of the new Bozeman High School will demonstrate the following:

- Natural Surveillance. "See and be seen" is the overall goal when it comes to CPTED and natural surveillance. A person is less likely to commit a crime if they think someone will see them do it.
- Natural Access Control. Natural Access Control is more than a high block wall topped with barbed wire. CPTED utilizes the use of walkways, fences, lighting, signage, and landscape to clearly guide people and vehicles to and from the proper entrances. The goal with this principle is not necessarily to keep intruders out but to direct the flow of people while decreasing the opportunity for crime.
- Territorial Reinforcement. Creating or extending a "sphere of influence" by utilizing physical designs such as pavement treatments, landscaping, and signage that enable users of an area to develop a sense of proprietorship over it is the goal of this CPTED principle. Public areas are clearly distinguished from private ones; potential trespassers perceive this control and are thereby discouraged.
- Continued Maintenance. CPTED and the "Broken Window Theory" suggests that one "broken window" or nuisance, if allowed to exist, will lead to others and ultimately to the decline of an entire neighborhood or campus. Neglected and poorly maintained properties are breeding grounds for criminal activity.

Site/Exterior

- The wayfinding for the site and building will be clearly identified so that as people enter the grounds, they know where to park and which doors they are supposed to enter (or not enter). Proper location of the parking will also allow the staff to easily view people who are entering the area and be able to observe them as they approach the building.
- Clear signage shall be posted identifying visitor parking, staff parking, student parking, handicap parking, bus parking, deliveries, and drop-off. While this identification is very important, it is also important not to 'overly designate' parking spots. For example, the Principal, Vice Principal, and SRO should not have designated parking spots. By doing so, it clearly identifies when they are on or off campus (is their car in the spot or is the spot empty?), something that should not be announced to the students or visitors.
- The access drives will maintain a curving nature to help slow traffic, rather than straight lanes which allow drivers to speed up.
- As pedestrians walk from their cars towards the front of the building, they will need to cross the access drives that are winding throughout the campus. Pedestrians will be funneled to designated crosswalks, both for the safety of the person on foot and also the drivers. At these points, raised crosswalks (speed humps) will be used to elevate the walker for better visibility. The use of chokers (curb extensions on both sides of the road that narrow the street at the crosswalk) will also be implemented to further slow traffic at the crosswalks.
- The secondary roadways that are leading to the backside of the building (specifically the route for the fire department access on the west side of the building) will be blocked off with detachable bollards to prevent anyone from driving on the road, since it will most likely become a highly visible pedestrian path.
- The parking lots will have islands with landscaping to break up the large expanses of asphalt. This landscaping helps to direct and/or slow traffic throughout the parking lots, rather than letting them cut across large open areas at high speeds.
- Fencing will be used around the campus to clearly delineate the school's property. The fencing will be open to allow for transparency and surveillance while still offering a buffer of privacy from the surrounding public.
- Landscaping materials will be carefully selected to ensure that as the plants and trees mature they do not become overgrown and begin to block visibility around the campus thus creating 'black-holes.' Properly placed landscaping easily defines a territory, controls access to certain areas, and creates a sense of ownership to the campus.
- The campus and exterior of the building will be properly lighted to help illuminate walkways and parking lots as well as areas that should not be populated by people (eliminating concealment opportunities). The lighting used will allow users to feel safe while also deterring mischief after-hours.

Architectural Design

Security

Building's Interior

- At the main front door, a secure vestibule will be designed to force all visitors to check-in at the office before they proceed further into the building.
- Extensive glazing at the office and associated spaces which face out towards the parking lots will be utilized so the staff can clearly observe who is approaching the building.
- The Principal's and Vice Principal's office will have secondary exits out of the office area so that staff are not trapped during an incident.
- The elevator will be centrally located so that it can be easily observed. Use of the elevator will be limited (provide card access control).
- All perimeter doors, except the main door at the office, will be exit-only doors to ensure that students and/or visitors cannot enter the building unless authorized by the office staff. Signs will be posted on all secondary doors stating "All visitors must check in through the Main Office. This door will not be opened by staff or students." Each exterior door will also be clearly numbered.
- Each 'wing' of the building will be compartmentalized in case of an incident to prevent an intruder from proceeding throughout the building. The compartmentalization also allows the building to be used for after-hour events, such as in the gym, auditorium, or library, while still securing the rest of the building.
- Classrooms that look into the corridors will have windows in order to allow for 'Natural Surveillance' of activity in the corridors. This visibility can help to deter bullying that occurs in unsupervised areas. The exterior windows in the classrooms will also allow for 'Natural Surveillance' to the parking lots and access drives.
- Lockers will be recessed to eliminate hiding areas along the corridors.
- At areas where 90 degree angles are created in the corridors, specifically at niches for doors, the angles will be changed to 45 degrees (chamfered corners) to eliminate the creation of a hiding spot.
- The corridors and stairs will be designed to be wider than code minimum to allow as much space as possible for the students to circulate without feeling squeezed together, which can often lead to fights.
- The sinks in group restrooms will be located in the corridors (not inside the restroom). This placement helps to move the students in and out of the restroom quicker and allows for easier supervision. No doors will be provided at the entrances to the restrooms.
- In equipment storage areas, including musical instrument storage, lockable storage will be provided to curtail theft.
- Within the cafeteria, a well-defined control point (unobstructed surveillance spot) will be established. The serving line/kitchen will be easily locked down when not in use. The cashier area will be clearly visible (not hidden).

Civil / Site Design

Civil Design

Geotechnical

Summary

The geotechnical investigation for the proposed high school to be located southwest of the future intersection between Oak Street and Flanders Mill Road in Bozeman, Montana, encountered surficial native lean clay and topsoil overlying native gravels. The site poses no significant geotechnical concerns provided the recommendations provided in the geotechnical report and all applicable building code standards are incorporated into the final design and construction for the project. The site is suitable for the use of conventional shallow foundations bearing on properly compacted native gravels and designed using a maximum allowable bearing pressure of 3,000 pounds per square foot (psf). Based on preliminary finished floor elevations, four to twelve feet of fill will be required below the proposed school footprint.

Building Pad and Foundation Preparation

Weak clay soils with high moisture will need to be removed and replaced with structural fill below the building footprint. The depth to gravel varies between three and seven feet across the proposed structure. Based on preliminary finished floor elevations, between four and twelve feet of structural fill will be required below the structure. Two gradations for structural fill have been provided. All structural fill within two feet below bottom of footings should be 3-inch minus structural fill. All fill two feet below bottom of footing and deeper can be a less expensive 6-inch minus pit run gravel. Use of onsite native gravel is acceptable and generally meets the requirements of 6-inch minus pit run gravel (screening likely required). Building pad and foundation preparation should be constructed in accordance with the project geotechnical report. Figure SD01 shows the depth to gravel and amount of fill necessary for the building foundation.

Parking Lots

Parking lots will be constructed in accordance with the project geotechnical report.

Section Component	Section
Asphaltic Concrete Pavement	3"
1.5-inch minus Crushed Base Course	6"
6-inch minus Subbase	14"
Tensar TX 140 Geogrid over Mirafi 600X	
Total (inches)	**23"**

Streets and Access Drives

Arterials

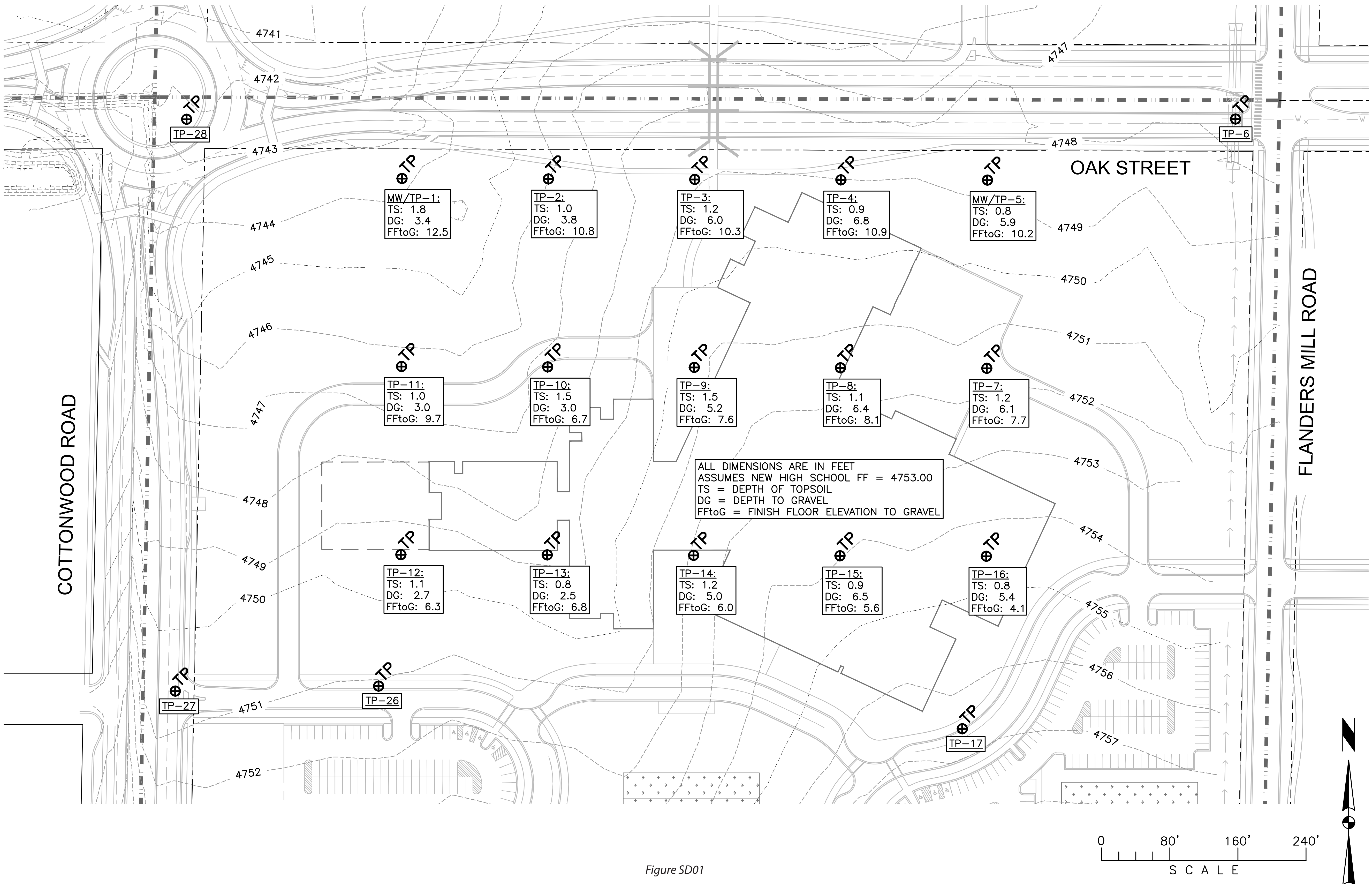
Arterials will be constructed in accordance with the project geotechnical report.

Section Component	Section
Asphaltic Concrete Pavement	4"
1.5-inch minus Crushed Base Course	6"
4-inch minus Subbase	20"
Mirafi 600X	
Total (inches)	**30"**

Local Streets and Access Drives

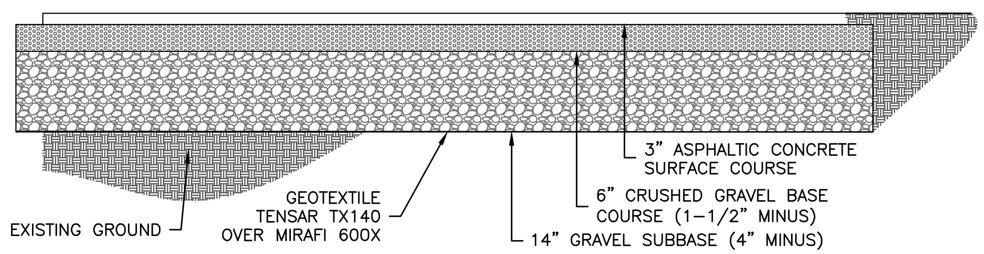
Local streets and access drives will be constructed in accordance with the geotechnical report. See above section on Parking Lots for typical section.

Figures SD02 and SD03 summarize the pavement sections for the project.

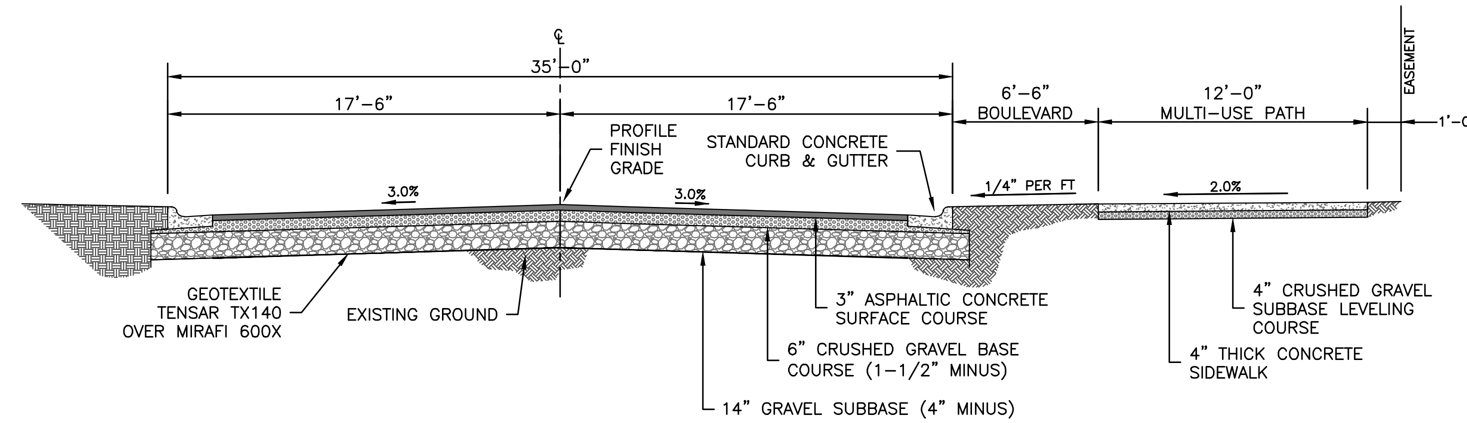


OAK STREET
COTTONWOOD ROAD
FLANDERS MILL ROAD
TP-28
TP-6
MW/TP-1: TS: 1.8 DG: 3.4 FFtoG: 12.5
TP-2: TS: 1.0 DG: 3.8 FFtoG: 10.8
TP-3: TS: 1.2 DG: 6.0 FFtoG: 10.3
TP-4: TS: 0.9 DG: 6.8 FFtoG: 10.9
MW/TP-5: TS: 0.8 DG: 5.9 FFtoG: 10.2
TP-11: TS: 1.0 DG: 3.0 FFtoG: 9.7
TP-10: TS: 1.5 DG: 3.0 FFtoG: 6.7
TP-9: TS: 1.5 DG: 5.2 FFtoG: 7.6
TP-8: TS: 1.1 DG: 6.4 FFtoG: 8.1
TP-7: TS: 1.2 DG: 6.1 FFtoG: 7.7
ALL DIMENSIONS ARE IN FEET
ASSUMES NEW HIGH SCHOOL FF = 4753.00
TS = DEPTH OF TOPSOIL
DG = DEPTH TO GRAVEL
FFtoG = FINISH FLOOR ELEVATION TO GRAVEL
TP-12: TS: 1.1 DG: 2.7 FFtoG: 6.3
TP-13: TS: 0.8 DG: 2.5 FFtoG: 6.8
TP-14: TS: 1.2 DG: 5.0 FFtoG: 6.0
TP-15: TS: 0.9 DG: 6.5 FFtoG: 5.6
TP-16: TS: 0.8 DG: 5.4 FFtoG: 4.1
TP-27
TP-26
TP-17
0 80' 160' 240'
SCALE
N

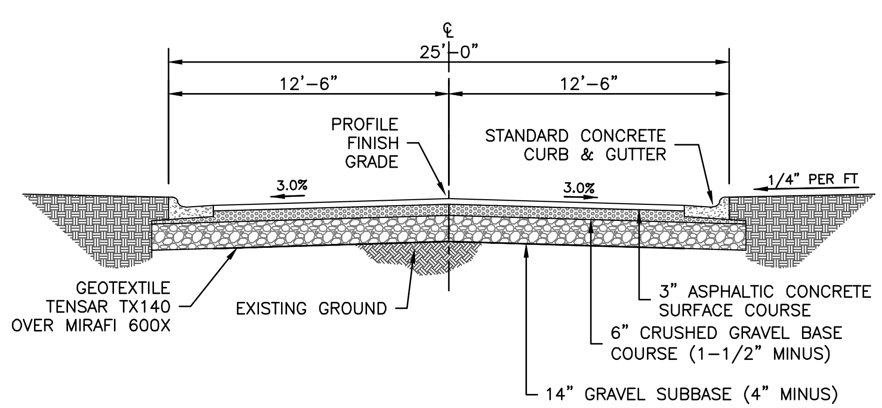
Figure SD01



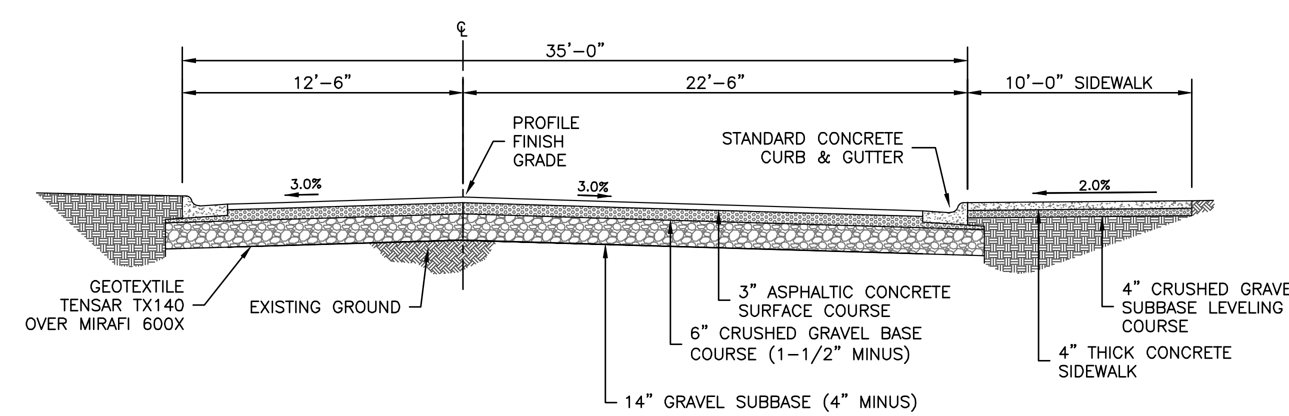
PARKING AREA (TYPICAL)



35' WIDE ROAD SECTION (TYPICAL)

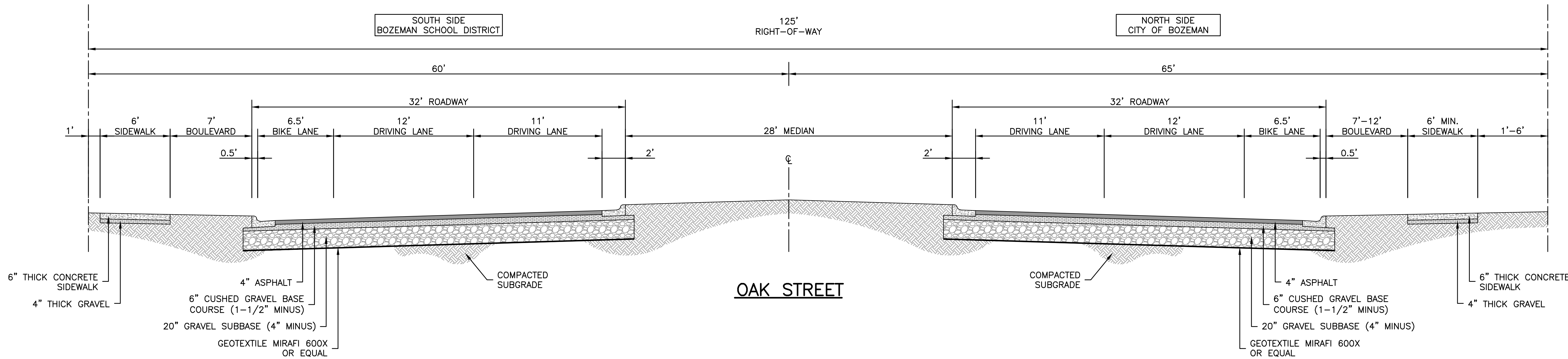


25' WIDE ACCESS ROAD (TYPICAL)



25' WIDE ACCESS ROAD W PULLOUT (TYPICAL)

Figure SD02


SOUTH SIDE
BOZEMAN SCHOOL DISTRICT
125'
RIGHT-OF-WAY
NORTH SIDE
CITY OF BOZEMAN
60'
65'
32' ROADWAY
32' ROADWAY
1'
6'
SIDEWALK
7'
BOULEVARD
6.5'
BIKE LANE
12'
DRIVING LANE
11'
DRIVING LANE
28' MEDIAN
11'
DRIVING LANE
12'
DRIVING LANE
6.5'
BIKE LANE
7'-12'
BOULEVARD
6' MIN.
SIDEWALK
1'-6'
0.5'
2'
2'
0.5'
6" THICK CONCRETE
SIDEWALK
4" THICK GRAVEL
4" ASPHALT
6" CUSHED GRAVEL BASE
COURSE (1-1/2" MINUS)
20" GRAVEL SUBBASE (4" MINUS)
GEOTEXTILE MIRAFI 600X
OR EQUAL
COMPACTED
SUBGRADE
OAK STREET
COMPACTED
SUBGRADE
4" ASPHALT
6" CUSHED GRAVEL BASE
COURSE (1-1/2" MINUS)
20" GRAVEL SUBBASE (4" MINUS)
GEOTEXTILE MIRAFI 600X
OR EQUAL
6" THICK CONCRETE
SIDEWALK
4" THICK GRAVEL

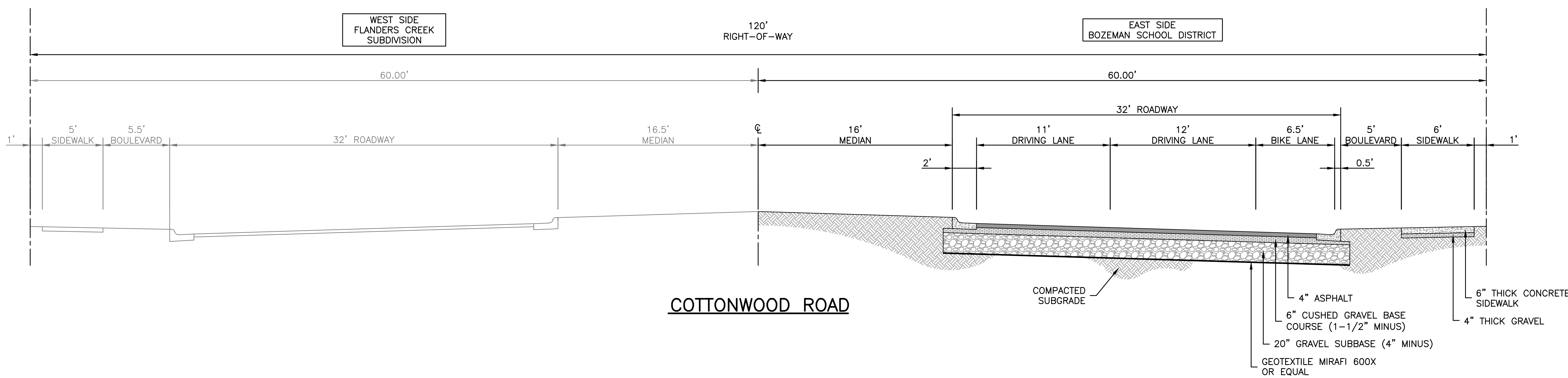

WEST SIDE
FLANDERS CREEK
SUBDIVISION
120'
RIGHT-OF-WAY
EAST SIDE
BOZEMAN SCHOOL DISTRICT
60.00'
60.00'
32' ROADWAY
1'
5'
SIDEWALK
5.5'
BOULEVARD
32' ROADWAY
16.5'
MEDIAN
16'
MEDIAN
11'
DRIVING LANE
12'
DRIVING LANE
6.5'
BIKE LANE
5'
BOULEVARD
6'
SIDEWALK
1'
2'
0.5'
COTTONWOOD ROAD
COMPACTED
SUBGRADE
4" ASPHALT
6" CUSHED GRAVEL BASE
COURSE (1-1/2" MINUS)
20" GRAVEL SUBBASE (4" MINUS)
GEOTEXTILE MIRAFI 600X
OR EQUAL
6" THICK CONCRETE
SIDEWALK
4" THICK GRAVEL

Figure SD03

Civil / Site Design

Groundwater
Groundwater is generally high in the area. Dewatering of foundation excavations, some road embankments, and utilities should be anticipated. Due to high groundwater and elevated soil moistures, compaction of native lean clay may be difficult without considerable moisture conditioning.

Use of Native Materials
Use of native gravel material could be incorporated into the project. The following should be considered if native materials are used:

- Native gravel should be screened through an appropriate screen to remove oversized material per the geotechnical report.
- Native gravel could be utilized as general road embankment under parking lots, access drives, and city streets.
- Native gravel could be utilized as subbase gravel below parking lots and access drives. Native gravel should not be utilized as subbase under city streets.
- Native gravel could be utilized as building structural fill excluding material within two feet of footings.
- Native gravel, once excavated, should be allowed adequate time to drain prior to using.
- Material used to replace native gravel may not allow precipitation and irrigation to infiltrate in a similar manner as in-situ soils. Additional topsoil thicknesses or soil conditioning may be necessary to prevent objectionable moisture in playing fields or other areas where native gravel was mined.

Site Grading
The site generally slopes from south to north. A ridge running north/south bisects the property into an east and west drainage basin. In order to minimize cut and fill on the site, the site will be graded to generally follow existing topography. Due to high groundwater, the preliminary finished floor elevation has been set at approximately 4,753 feet. Due to the size of the building footprint, the south side of the building will have a finished floor elevation approximately two feet below existing ground while the north and west sides of the building will have a finished floor elevation three to six feet above existing ground. Considerable fill will be required in the northwest corner of the project site. This area experienced groundwater to within 0.5 feet of the ground surface. To accommodate a new detention pond in this area, the ground surface will be raised to create the pond. This will tie in nicely with the adjacent Cottonwood Road and new building which will be elevated in the area. We anticipate excess overburden soils removed from the building, parking lot, and streets areas will be used in this non-structural area. Figure SD04 provides a summary of the project site grading and drainage.

Storm Drainage
New School and Parking Lots
As a result of the site grading and east/west drainage basins, two regional detention ponds located at the northwest and northeast corners of the school property will be necessary. The east detention pond will discharge to the existing roadside ditch that runs parallel to Flanders Mill Road. The west detention pond will discharge to a tributary of Baxter Creek approximately ¼ mile west of the project site. Strategic retention and infiltration areas will be incorporated around parking lots to minimize storm water runoff. Storm drain piping and infrastructure (inlets and manholes) will be necessary to convey storm water to the ponds. Building roof drains will tie into the storm drain piping system and discharge directly to the detention ponds.

Public Roadways
Public roadways (Cottonwood Road and Oak Street) will require storm drain infrastructure to meet City of Bozeman design requirements. Inlets and piping will be placed along the road as required. The regional detention ponds located in the northwest and northeast corners will be sized to accommodate runoff from these roadways.

Sports Fields
Several of the sports fields are proposed to have under drainage systems. These underdrains will collect infiltration from precipitation and irrigation and are proposed to connect into the project storm drainage system.

City of Bozeman Sports Complex
The shared parking lot located in the City of Bozeman Sports Complex will also require a detention pond. We anticipate this pond will be located northeast of the parking lot and discharge to the roadside ditch along Flanders Mill Road.

The schematic layout of the project utilities including the storm drain system can be seen in Figure SD05.

Civil / Site Design

Wastewater System

The scope of the wastewater improvements for the site are unknown and will not be completely known until the City of Bozeman determines if the existing downstream lift station (Baxter Meadows Lift Station) is capable of supporting the new high school. If the lift station is capable of supporting the new school, wastewater infrastructure would include installation of a service to the existing 21-inch outfall sewer located in Cottonwood Road. An existing 8-inch sewer stub has been extended to the property. We anticipate multiple 4 to 6-inch sewer discharge points from the school that would tie into a manhole and extend to the existing sewer stub with 8-inch sewer service piping. Service pipe will consist of the following materials:

- SDR 26 PVC sewer pipe for 4 and 6-inch service pipe.
- SDR 35 PVC sewer pipe for 8-inch service pipe.
- 48" Diameter precast concrete manholes meeting City of Bozeman specifications.

If it is determined that the existing Baxter Meadows lift station is not capable of supporting the flow generated from the school, the preferred option would be to utilize a temporary lift station and pump wastewater to the intersection of Flanders Mill Road and Annie Street. This would require a 100 gpm lift station with redundant pumps which would be connected to the school's primary and backup power. Because it is a temporary lift station, we anticipate utilizing a package lift station similar to the Flygt 48-inch diameter duplex pump basin with 100 gpm grinder pumps.

Figure SD05 shows a schematic of the proposed sewer system. Flygt package lifts station cut sheets are also attached.

Water System

City Required Water System Improvements

The proposed water system improvements include City required water main extensions. This is necessary to provide adequate water flow and pressure to the school while looping the water mains to provide redundancy. The City of Bozeman Water Master Plan indicates a 12-inch water main located in the Oak Street right-of-way. This main will connect into the existing water system at the intersection of Cottonwood Road and Flanders Mill Road. An 8-inch water main is also needed in the Annie Street corridor. This main provides looping of the City water system and will connect into the existing water system at Cottonwood Road and Flanders Mill Road.

Internal Water System Improvements

An internal water main loop will be required to provide service to the school (domestic and fire services) and fire hydrants. See Figure SD05 for the schematic water layout.

Summary of Materials

All water piping shall meet the City of Bozeman standards.

- Oak Street Water Main: 12-inch, class 51, ductile iron pipe meeting AWWA C151.
- Anne Street Water Main: 8-inch, class 51, ductile iron pipe meeting AWWA C151.
- Internal Water Main: 8-inch, class 51, ductile iron pipe meeting AWWA C151.
- Domestic Service: 4-inch, class 51, ductile iron pipe meeting AWWA C151.
- Fire Service: 6-inch, class 51, ductile iron pipe meeting AWWA C151.
- Joint Restraint and Thrust Blocks: Per City of Bozeman.
- Fire Hydrants: Per City of Bozeman.
- Fittings and Valves: Per City of Bozeman.

Civil / Site Design

Irrigation

The current Montana Department of Natural Resources guidelines for exempt wells for lots over 20-acres is as follows:

“For lots that are greater than or equal to 20 acres, either in existence prior to October 17, 2014 or created after that date, then any wells within 1,320 feet of one another on a lot are considered to be a combined appropriation.”

Given this guidance and the proposed project area, two new exempt wells can be placed on the northern lot at opposite corners diagonal to each other. Additional exempt wells cannot be placed on the southern lot where the elementary school is located without being considered a combined appropriation. The existing irrigation wells installed with the elementary school were located such that a separation distance of 1,320 feet cannot be met. Two exempt wells will provide for 20 acre-feet of water per year or 6,517,000 gallons. This is considerably less irrigation water than required to irrigate the large, landscape intense campus (approximately 46,300,000 gallons). In order to increase the irrigation capacity by 39,783,000 gallons or 122 acre-feet, the following options are available:

- City Water Supply – The city water supply can be used for irrigation. City of Bozeman costs associated with using municipal water for irrigation include the initial purchase of water rights followed by monthly usage of metered water. Cash-in-lieu of water rights are assessed at a rate of $6,000 per acre-foot by the City of Bozeman. This would result in a one-time charge of $732,000 for cash-in-lieu of water rights on top of the metered water user rate of $1.74 per hundred cubic feet or approximately $92,500 yearly.
- Consult with a Water Rights Attorney regarding the following options:
    - Purchasing water rights from Maynard Ditch Company.
    - Purchasing water rights from another entity or person.
    - Diverting overflow ditch water along Flanders Mill into a reservoir on the property.
- Share irrigation methods with the City of Bozeman Sports Park.

Transfer and purchase of water rights is a complex and often times lengthy process. High priority should be placed on determining where irrigation water is going to be generated or landscaping should be done to minimize irrigation demand.

Schematic design cost estimating has assumed a central well will be utilized. Water rights will need to be located and purchased for this option. Water rights purchase costs are not included in the Schematic design estimate but are roughly in the $4,000-$6,000 per acre-foot range.

Site Access and Circulation

Site access and circulation includes two internal road loops. The two loops are connected by a one-way bus drop off in front of the school. During normal school hours, only busses will be allowed to utilize the bus drop off area. During after hour events, this area will be used for curbside drop off and allow circulation from the east parking area to the west. There will be no internal connection from the west parking lot to the east parking lot. Buses will access the school off Flanders Mill Road and exit the school on Cottonwood Road. A minimum of twelve bus drop off spaces, 40 feet in length, have been provided in the schematic layout. The east access loop provides access to the student parking lot while the west access loop provides access to the staff parking lot. A minimum of 50 parent drop off spaces, 20-feet in length, have been provided and are split between the two drop off lanes on each side of campus. Two fire/service drives meeting the requirements of the International Fire Code will provide access to the north side of the school building. These routes will consist of paved access drives with concrete edging. General traffic and pedestrian circulation routes can be seen on Figure SD06.

Oak Street Tunnel

Based on discussions with the Building Design Committee, the Oak Street tunnel will be a precast tunnel located above the normal water table (as measured spring/summer 2017). The general tunnel configuration and preliminary details can also be seen on Figures SD07 and SD08.

- 8’Hx10’W (minimum) precast tunnel (NPCA certified) capable of supporting HS20 traffic with no cover.
- Tunnel joints to be wrapped and three sides of tunnel to have Miradrain Mat and CCW-525 waterproofing.
- 1.5-inch base course backfill meeting MPWSS backfill within 24-inches of tunnel.
- 6-inch slotted drain sloped to daylight on the north side of Oak Street.
- Geogrid and fabric over the top of the tunnel to minimize differential settlement at crossing.
- LED area lighting in the tunnel will be provided.

Civil / Site Design

Street Lighting

Cottonwood Road

- Lights on east side of road only.
- Light spacing of 140 feet.
- 25-foot luminaire height.
- 6-foot mast arm.
- Powder coated.
- 2'-0" x 4'-6" foundation with breakaway base.
- Luminaire is high efficacy LED type II Distribution.

Oak Street

- Lights on north and south side.
- Light spacing of 340 feet on each side.
- 40-foot luminaire height.
- 10-foot mast arm.
- Powder coated.
- 2'-0" x 4'-6" foundation with breakaway base.
- Luminaire is Type 3S 180w LED.

Roundabout Signals

- 8 HAWK signals. One for each entrance and exit from the roundabout.
- 8 Lights for roundabout lighting.
- 40-foot lumen mount height.
- 35 to 40-foot signal mast length.
- 10-foot lumen mast length.
- 2'-0" x 3'-0" luminaire foundation with breakaway base.
- 2'-6" x 8'-0" signal base.
- Pedestrian push buttons on all poles.
- Three vehicle signal indications per signal mast (24 total).
- Luminaire is Type 3S 180w LED.

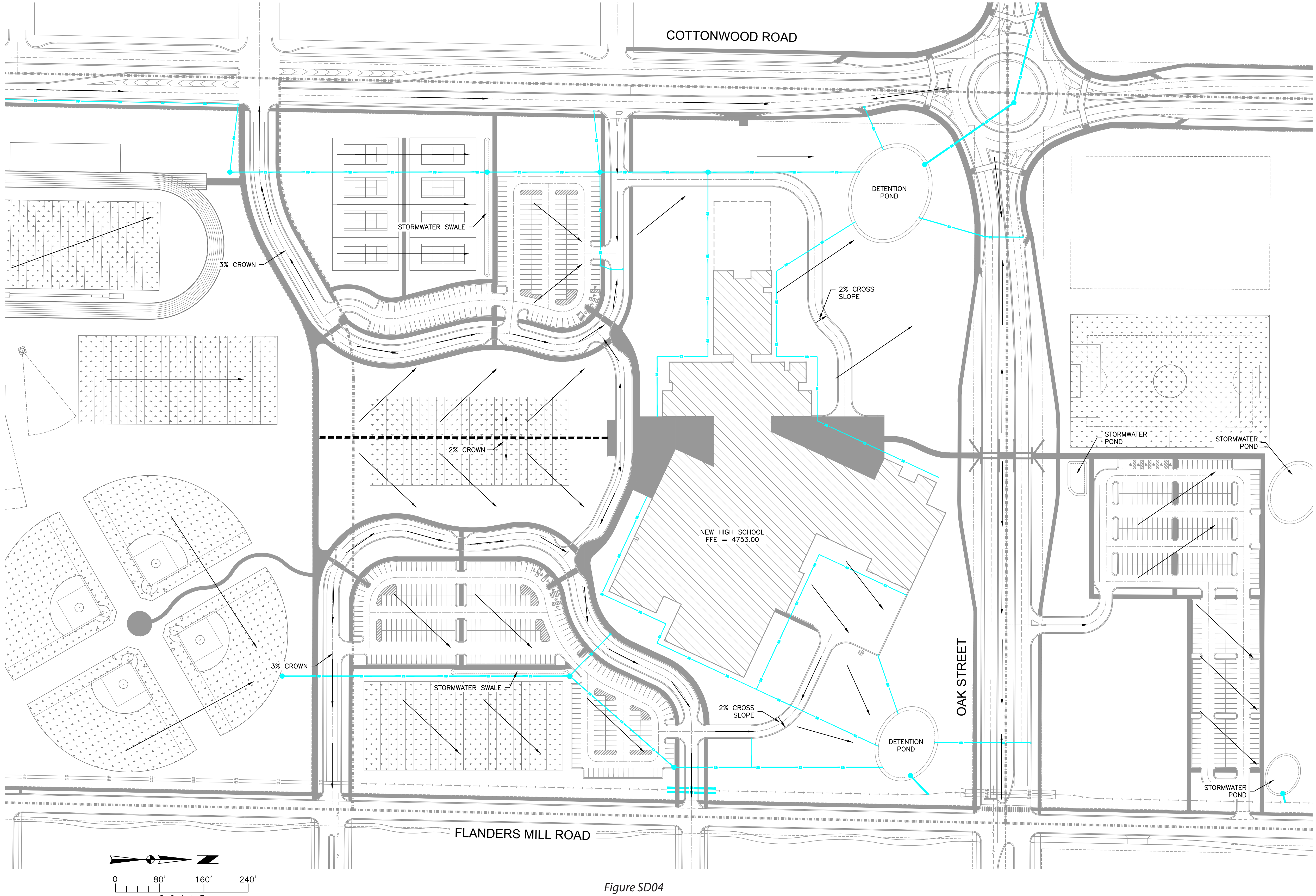

COTTONWOOD ROAD
DETENTION POND
STORMWATER SWALE
3% CROWN
2% CROSS SLOPE
2% CROWN
STORMWATER POND
STORMWATER POND
NEW HIGH SCHOOL
FFE = 4753.00
OAK STREET
3% CROWN
STORMWATER SWALE
2% CROSS SLOPE
DETENTION POND
STORMWATER POND
FLANDERS MILL ROAD
0
80'
160'
240'
SCALE

Figure SD04

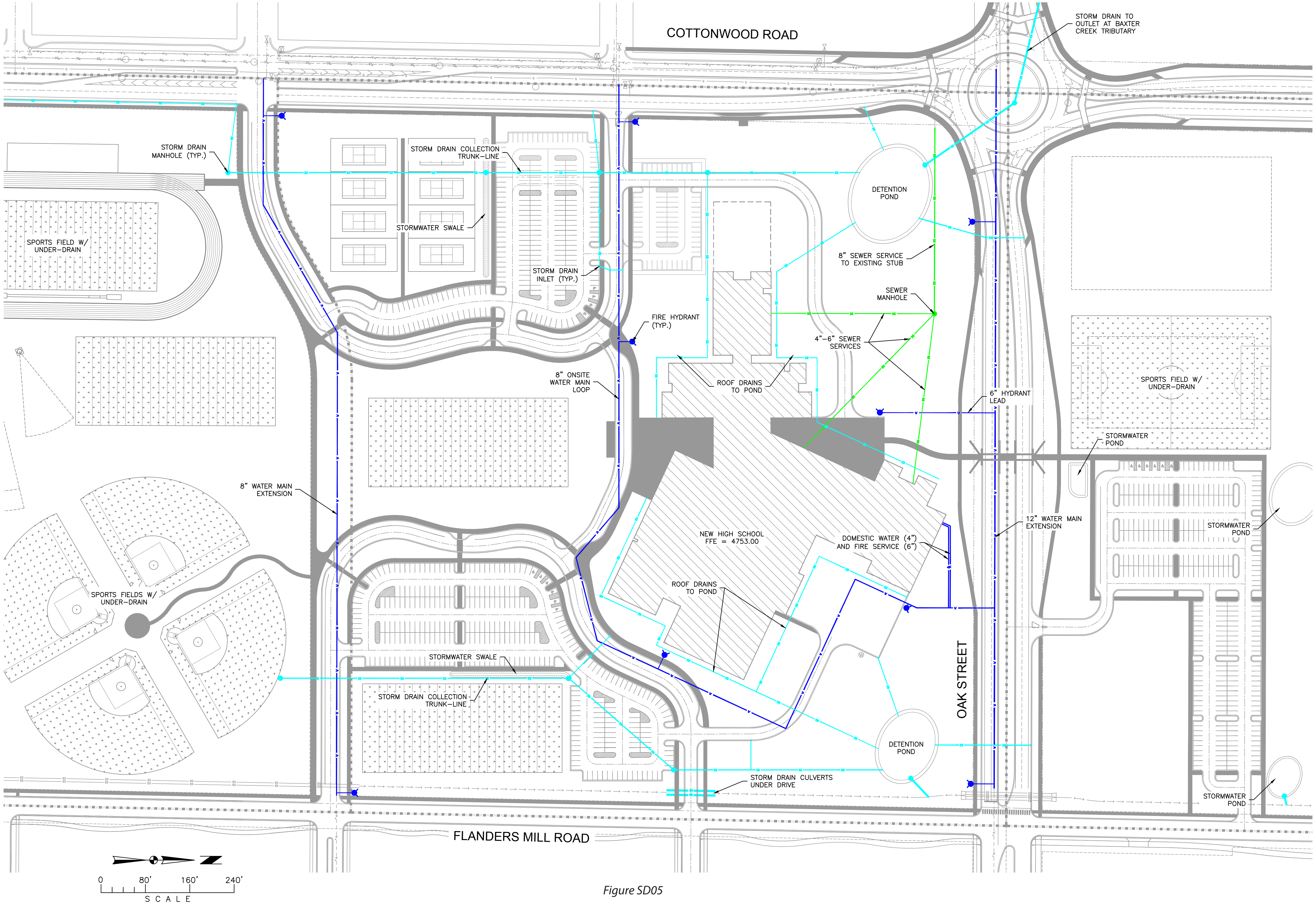

COTTONWOOD ROAD
STORM DRAIN TO OUTLET AT BAXTER CREEK TRIBUTARY
STORM DRAIN MANHOLE (TYP.)
STORM DRAIN COLLECTION TRUNK-LINE
STORMWATER SWALE
SPORTS FIELD W/ UNDER-DRAIN
STORM DRAIN INLET (TYP.)
DETENTION POND
8" SEWER SERVICE TO EXISTING STUB
SEWER MANHOLE
FIRE HYDRANT (TYP.)
4"-6" SEWER SERVICES
8" ONSITE WATER MAIN LOOP
ROOF DRAINS TO POND
6" HYDRANT LEAD
SPORTS FIELD W/ UNDER-DRAIN
STORMWATER POND
8" WATER MAIN EXTENSION
12" WATER MAIN EXTENSION
NEW HIGH SCHOOL FFE = 4753.00
DOMESTIC WATER (4") AND FIRE SERVICE (6")
STORMWATER POND
SPORTS FIELDS W/ UNDER-DRAIN
ROOF DRAINS TO POND
STORMWATER SWALE
STORM DRAIN COLLECTION TRUNK-LINE
DETENTION POND
OAK STREET
STORM DRAIN CULVERTS UNDER DRIVE
STORMWATER POND
FLANDERS MILL ROAD
0 80' 160' 240'
SCALE

Figure SD05

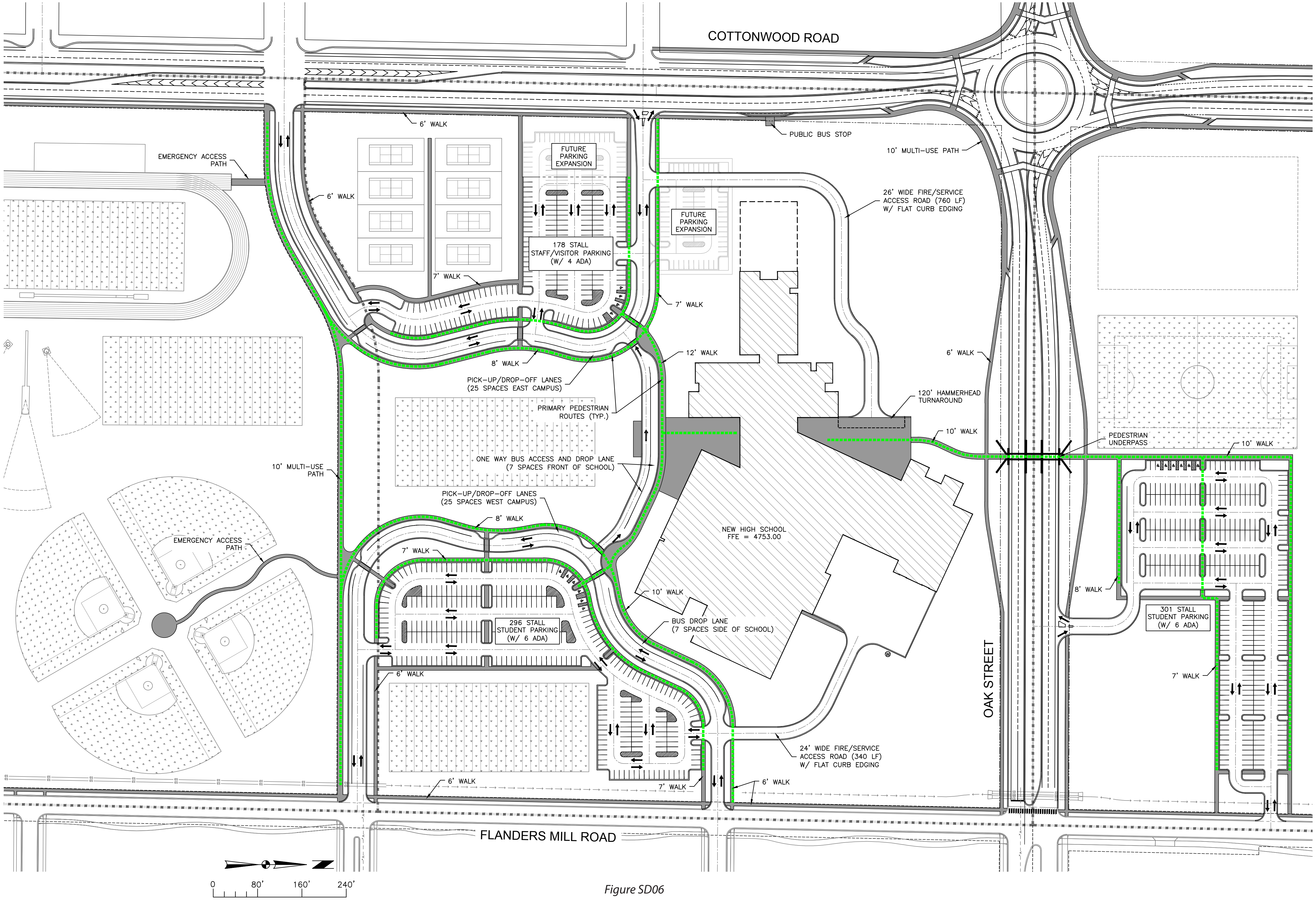

COTTONWOOD ROAD
FLANDERS MILL ROAD
OAK STREET
PUBLIC BUS STOP
10' MULTI-USE PATH
26' WIDE FIRE/SERVICE ACCESS ROAD (760 LF) W/ FLAT CURB EDGING
FUTURE PARKING EXPANSION
178 STALL STAFF/VISITOR PARKING (W/ 4 ADA)
EMERGENCY ACCESS PATH
6' WALK
7' WALK
8' WALK
12' WALK
PICK-UP/DROP-OFF LANES (25 SPACES EAST CAMPUS)
PRIMARY PEDESTRIAN ROUTES (TYP.)
120' HAMMERHEAD TURNAROUND
10' WALK
PEDESTRIAN UNDERPASS
ONE WAY BUS ACCESS AND DROP LANE (7 SPACES FRONT OF SCHOOL)
10' MULTI-USE PATH
PICK-UP/DROP-OFF LANES (25 SPACES WEST CAMPUS)
NEW HIGH SCHOOL FFE = 4753.00
296 STALL STUDENT PARKING (W/ 6 ADA)
BUS DROP LANE (7 SPACES SIDE OF SCHOOL)
301 STALL STUDENT PARKING (W/ 6 ADA)
24' WIDE FIRE/SERVICE ACCESS ROAD (340 LF) W/ FLAT CURB EDGING
0 80' 160' 240'
SCALE

Figure SD06

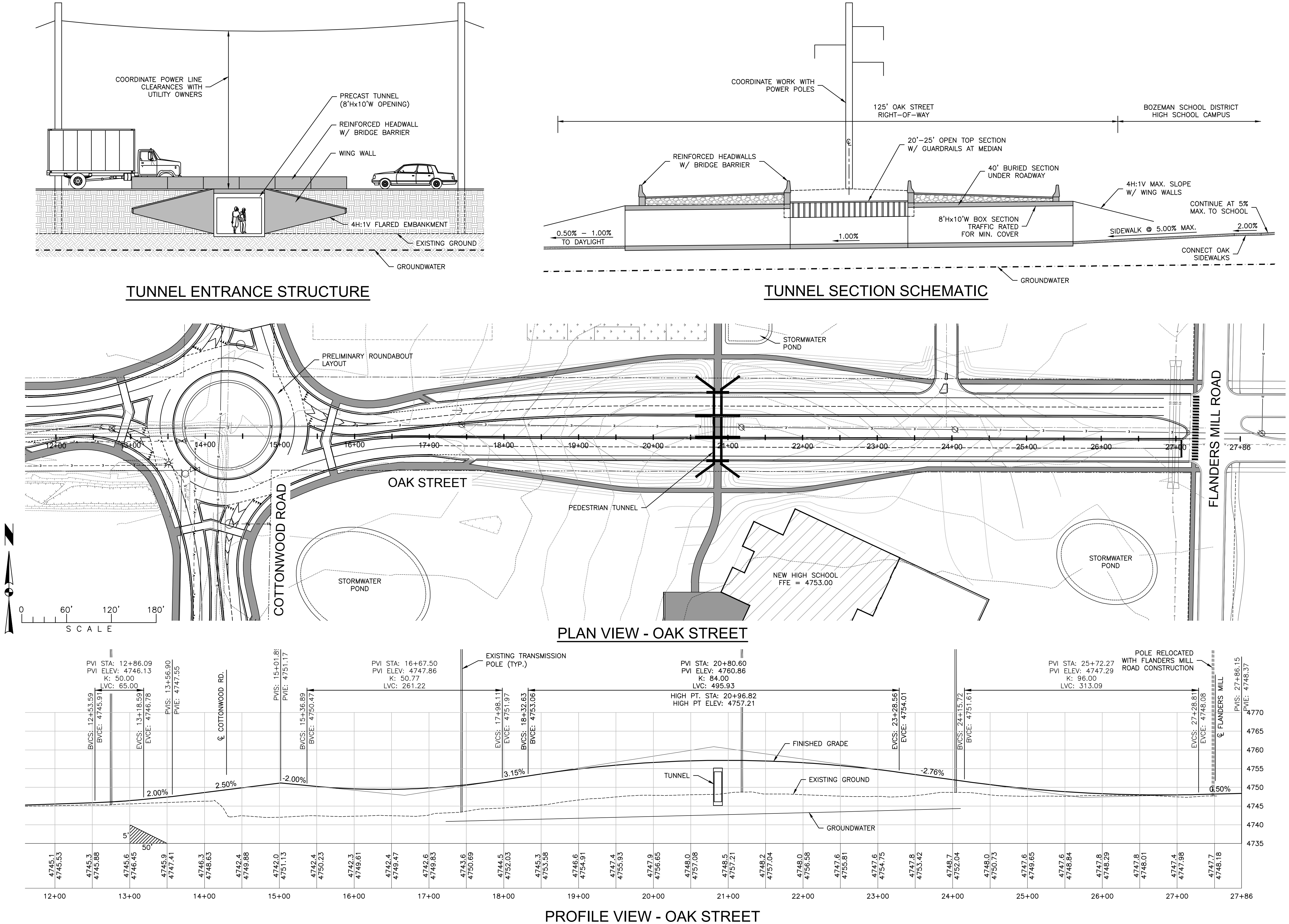
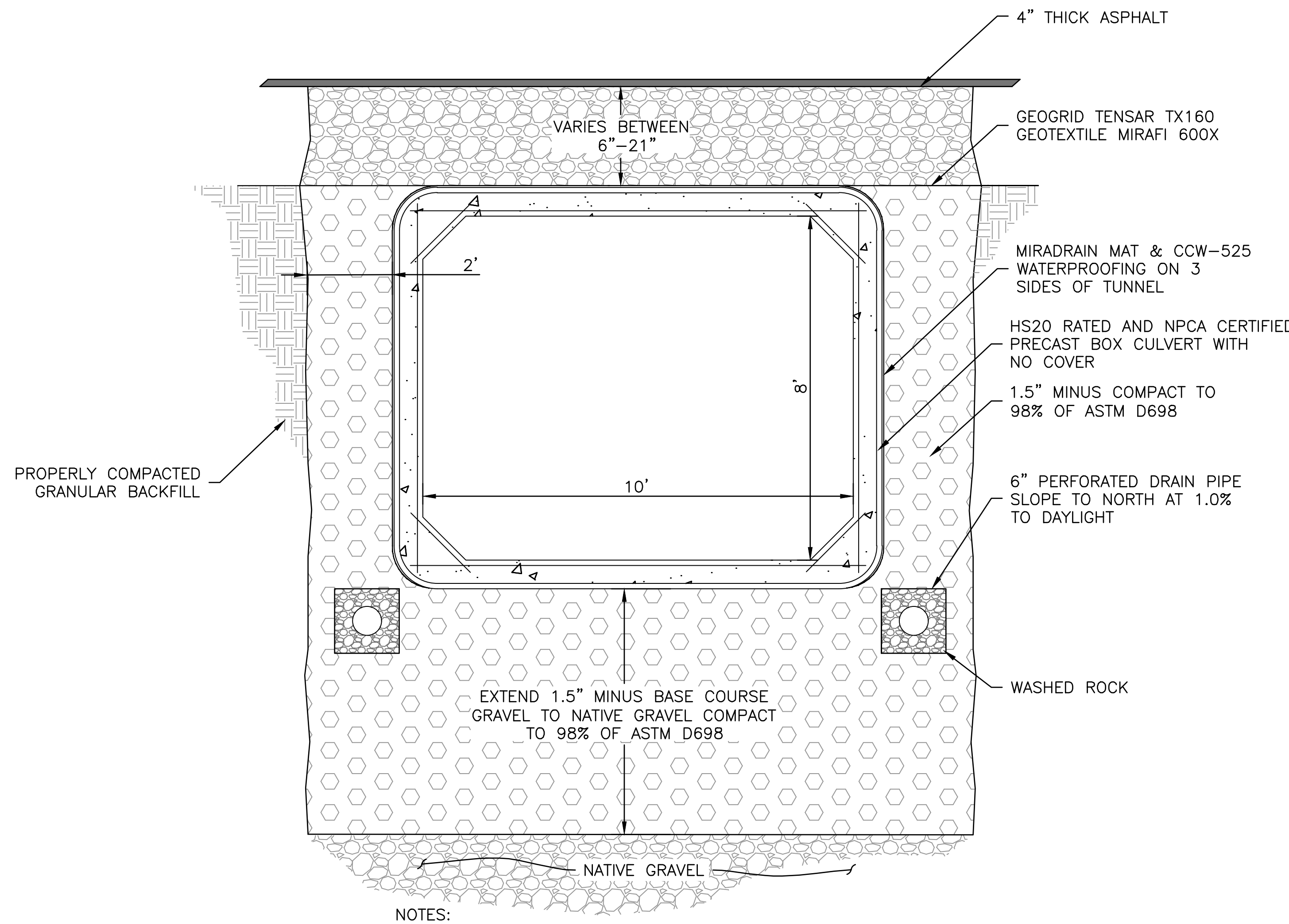

COORDINATE POWER LINE CLEARANCES WITH UTILITY OWNERS
PRECAST TUNNEL (8'Hx10'W OPENING)
REINFORCED HEADWALL W/ BRIDGE BARRIER
WING WALL
4H:1V FLARED EMBANKMENT
EXISTING GROUND
GROUNDWATER
TUNNEL ENTRANCE STRUCTURE
COORDINATE WORK WITH POWER POLES
125' OAK STREET RIGHT-OF-WAY
BOZEMAN SCHOOL DISTRICT HIGH SCHOOL CAMPUS
20'-25' OPEN TOP SECTION W/ GUARDRAILS AT MEDIAN
REINFORCED HEADWALLS W/ BRIDGE BARRIER
40' BURIED SECTION UNDER ROADWAY
4H:1V MAX. SLOPE W/ WING WALLS
CONTINUE AT 5% MAX. TO SCHOOL
8'Hx10'W BOX SECTION TRAFFIC RATED FOR MIN. COVER
0.50% - 1.00% TO DAYLIGHT
1.00%
SIDEWALK @ 5.00% MAX.
2.00%
CONNECT OAK SIDEWALKS
GROUNDWATER
TUNNEL SECTION SCHEMATIC
PRELIMINARY ROUNDABOUT LAYOUT
STORMWATER POND
OAK STREET
COTTONWOOD ROAD
FLANDERS MILL ROAD
PEDESTRIAN TUNNEL
NEW HIGH SCHOOL FFE = 4753.00
STORMWATER POND
STORMWATER POND
0 60' 120' 180'
SCALE
PLAN VIEW - OAK STREET
PVI STA: 12+86.09 PVI ELEV: 4746.13 K: 50.00 LVC: 65.00
PVI STA: 16+67.50 PVI ELEV: 4747.86 K: 50.77 LVC: 261.22
EXISTING TRANSMISSION POLE (TYP.)
PVI STA: 20+80.60 PVI ELEV: 4760.86 K: 84.00 LVC: 495.93
HIGH PT. STA: 20+96.82 HIGH PT ELEV: 4757.21
PVI STA: 25+72.27 PVI ELEV: 4747.29 K: 96.00 LVC: 313.09
POLE RELOCATED WITH FLANDERS MILL ROAD CONSTRUCTION
FINISHED GRADE
TUNNEL
EXISTING GROUND
GROUNDWATER
2.00%
2.50%
-2.00%
3.15%
-2.76%
0.50%
PROFILE VIEW - OAK STREET

Figure SD07



NOTES:

1. WRAP TUNNEL SECTION JOINTS WITH 12" WIDE EXTERIOR JOINT WRAP MATERIAL: CONSEAL CS–212 OR APPROVED EQUAL.

2. DRAIN PIPE SHALL CONSIST OF A MINIMUM 6–INCH DIAMETER, GEOTEXTILE– WRAPPED, FLEXIBLE, SLOTTED PIPE, ADVANCED DRAINAGE SYSTEMS (ADS) WITH DRAIN GUARD OR APPROVED EQUIVALENT.

3. GEOTEXTILE ENVELOPE SHALL INCLUDE A FULL WIDTH OVERLAY AT THE TOP. GEOTEXTILE SHALL BE CONTECH C–35NW, MIRAFI 140NC, ADS 4000, OR APPROVED EQUIVALENT.

4. FOOTING DRAINS SHALL HAVE A MINIMUM SLOPE OF 1.0 PERCENT TOWARDS PUMP OR DAYLIGHT.

5. DRAINAGE AGGREGATE SHALL BE WASHED OR SCREENED GRAVEL CONFORMING TO THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
1 1/2–INCH	100
3/4–INCH	75 – 95
3/8–INCH	10 – 20
NO. 4	0 – 5

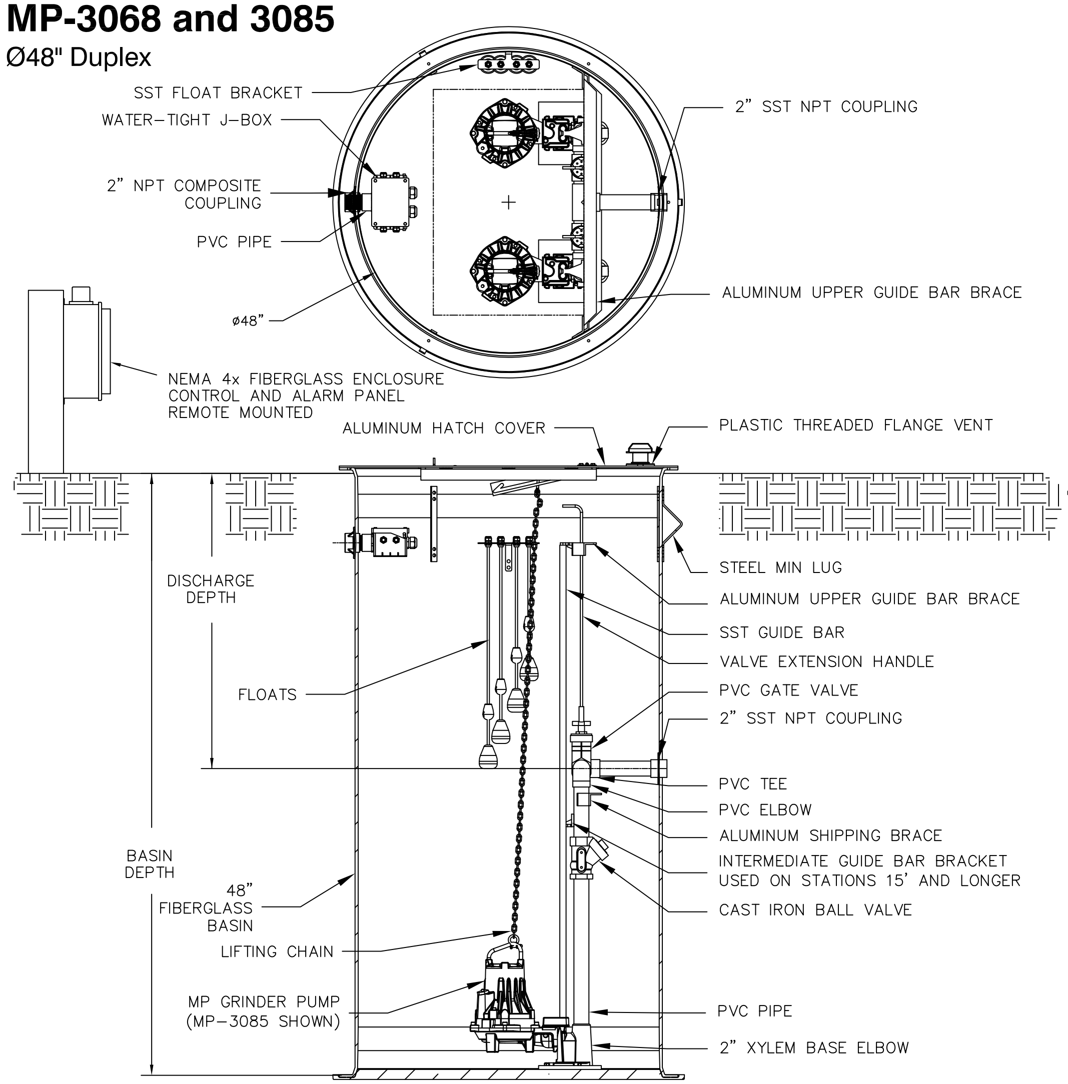
Figure SD08

FLYGT a xylem brand

Issued: 11/14 Supersedes: 4/12

MP-3068 and 3085

Ø48" Duplex



BASIN	BASIN DEPTH	DISCHARGE DEPTH	WEIGHT (LESS PUMP)
14–480742	6'	3'	645 lbs
14–480743	7'	4'	684 lbs
14–480744	8'	4'	722 lbs
14–480745	9'	4'	791 lbs
14–480746	10'	4'	830 lbs
14–480747	11'	4'	868 lbs
14–480748	12'	4'	917 lbs
14–480749	13'	4'	956 lbs
14–480750	14'	4'	1009 lbs
14–480751	15'	4'	1048 lbs
14–480752	16'	4'	1126 lbs

CONTACT FLYGT REP FOR MORE OPTIONS

FLYGT a xylem brand

Issued: 4/12 Supersedes:

FGC Control Panel
for Low Pressure Sewer System (LPSS)

Product Description

In addition to the basic LPSS control line, Flygt also offers an automatic control that utilizes Flygt's FGC211 controller which is designed for single pump installations and household usage.

Automatic Control / Alarm Panel with FGC211

Controls will be provided for LPSS pump models 3068.170, 2.3 HP and 3068.175, 1.7 HP.
These controls are designed for 230 Volts,
60 Hz, single phase and they are available in Simplex control type only.

Controls consist of:

- NEMA 4X Fiberglass Enclosure
- Red Dome Alarm Light w/ Flasher
- Audible Alarm with Push to Silence Switch
- Power Distribution Components
- Pump Motor / Control Circuit Breakers
- Level Control Input Options**
- Flygt FGC211 Simplex Pump Controller
- UL 508A Listed and Labeled

**Level control options include 1) Floats - start, stop, & high level 2) Flygt's Open Bell system with LTU301 pneumatic sensor and 3) Floats with timed pump runs. All options sold separately.

In addition, the following components are included for single phase power conversion to the pump:

- A start capacitor which provides the additional torque required to get the rotor turning.
- A run capacitor to provide running torque
- Voltage or current sensitive relay to remove the start capacitor from the circuit once the motor has started.

Flygt FGC Controller Features include:

- Easy to use
- Displays level, pump current, running hours, and number of starts
- Maintenance Run
- Alarm log

Simplex Control with FGC for LPSS pumps

Enclosure Dimensions: 14 in. x 12 in. x 6 in.
Enclosure Mounting Dimensions: 14.75 in. x 10 in.

ORDERING INFORMATION

Part number:

14-530235

Simplex Control w/ FGC for
3068.170, 2.3 HP
3068.175, 1.7 HP

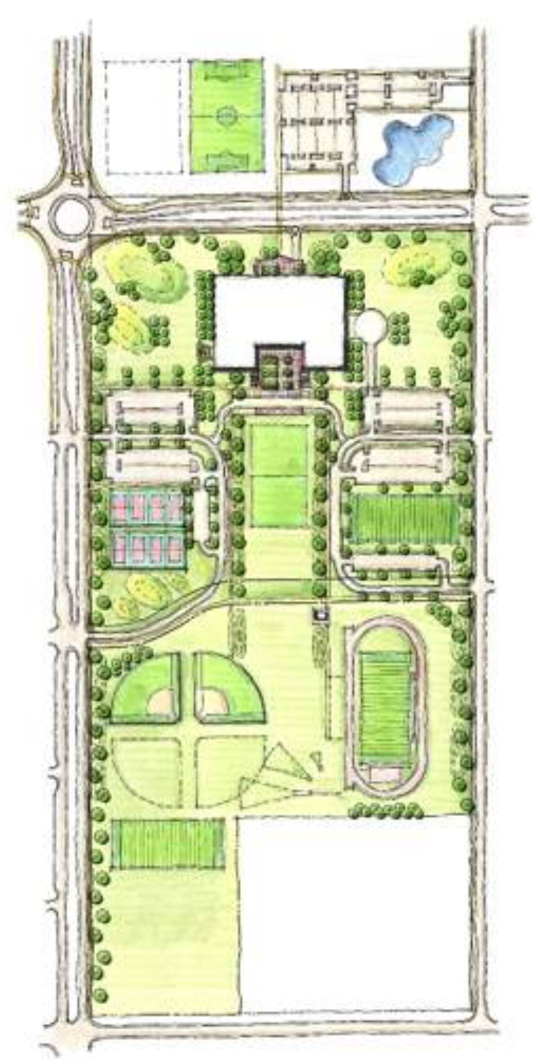
Landscape / Site Design

Site Design

The site design process began with the organization of desired program elements. These elements included parking areas, circulation routes, and recreation opportunities based upon the selected location of the school building. Based upon the learning street theme of the architecture, similar opportunities in the site were explored. See examples below.

Landscape / Site Design

Initially, three concepts, based upon the site program elements and building layouts, were presented to the Building Committee. These concepts are highlighted below.



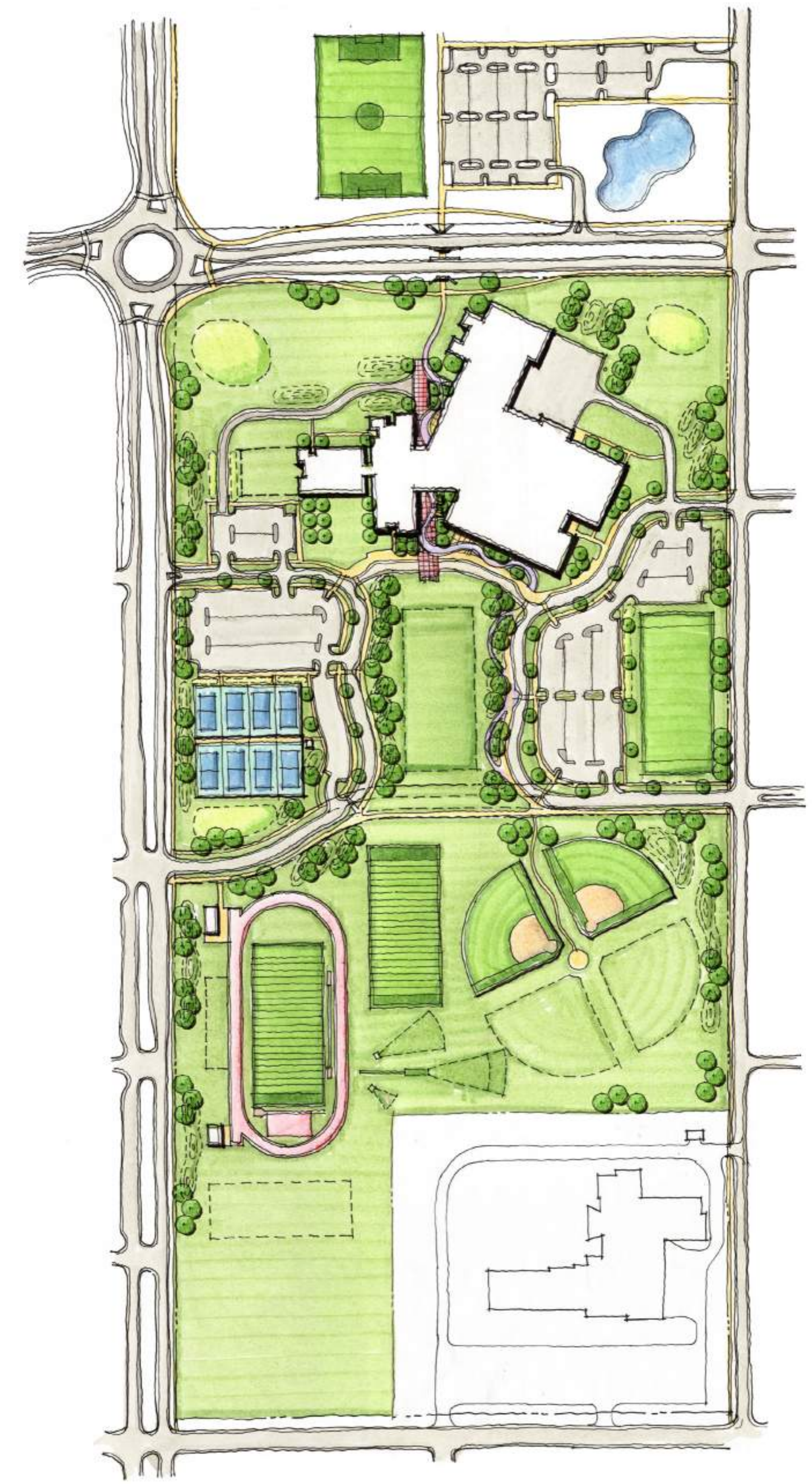
Core Concept

Array Concept

Radial Concept

Landscape / Site Design

The Radial Concept was selected by the committee and revised to the following plan (as presented to the committee in August, 2017).
See revised Radial Concept.



Revised Radial Concept

Landscape / Site Design

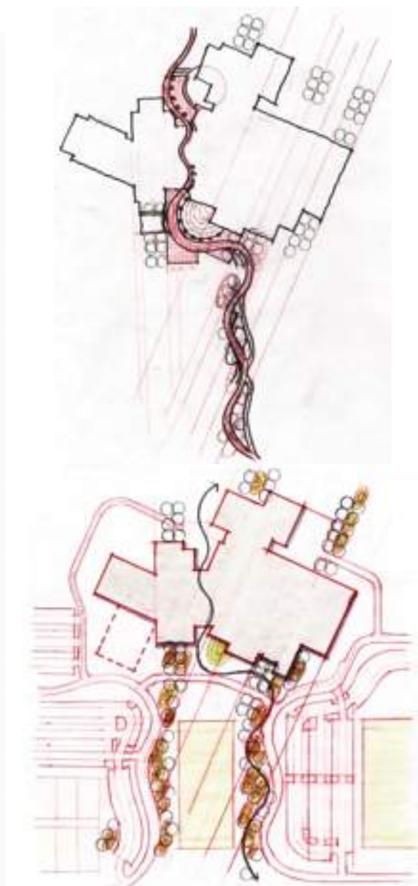
Landscaping

Site landscaping includes lawn areas near the school, surrounding parking areas, in the central green space, and in areas outside of designated playfields. Landscaping will also include enhanced plantings in and near main school entry plazas. All planted areas will be irrigated. In an effort to reduce water demand for the site, some turf areas may be planted with a native, low-water seed mix. The low-water native grass would be used in peripheral areas such as detention ponds, areas outside of fire/service lanes at school, and areas not suitable for recreation purposes. Landscaping highlights include:

- Enhanced areas at main entry(s) and potential learning street area to planting beds with a mix of native and adapted plant material.
- Bio-swales and detention ponds along with other areas (not yet determined) that cannot be used for meaningful recreation areas – seeded grassland mix, 15-30% of open space areas.
- Berms will be used at the central green space, as a screen for service areas, and as buffer from exterior roadways. Native fill from excavation of building and parking lots to be considered for berm structure. Top native fill with 12" of onsite topsoil.
- Approximately 200 trees: 85% 1.5" caliper deciduous, 15% 4'-6' height coniferous.

Pedestrian Plazas

Pedestrian plazas are primarily focused on three areas. See sketches below.



Learning street concept sketches

- **Site Learning Street** – a path of outdoor gathering and learning spaces that link site elements, such as parking/drop-off areas and athletic fields, to the building.
- **Entry Plaza** – the entry plaza will contain a colored/ textured concrete surface to visually enhance the space and reduce solar glare. Site furnishings will include waste receptacles, three flag poles, and outdoor seating. Enhanced landscaping will be incorporated.
- **North Plaza** – the north plaza is adjacent to the art department and the library, connecting the Oak Street crossing to the north building entry. This plaza will contain colored concrete surface to visually enhance the space and reduce solar glare. Site furnishings will include waste receptacles, seating, enhanced landscape plantings, outdoor art, and lighting.

Landscape / Site Design

Bicycle Parking
At the entry to the school, bicycle parking for 80 bikes will be incorporated. The basis of design is the Expo Series by Cora, surface mounted to concrete.

Pedestrian Walks
In addition to the plazas located at main building entries, a 6' wide concrete walk will be added to connect points of the building egress to the ROW. As the building plan progresses these egress walks will be incorporated.

Irrigation
The intent of the irrigation system is to provide permanent underground irrigation to the entire site during the watering period of May 1st to September 30th. The site contains sports fields, enhanced plantings at the building entries, lawn areas, and 200 deciduous and coniferous trees. The sports fields are expected to use additional irrigation to maintain a safe playing surface.

The basis of design for the irrigation system is to manage the entire system with automatic control valves that are operated by 2-3 decoder satellite controllers. This type of irrigation system will reduce the installation cost and will allow the school district to add and remove zones easily in the future without excessive trenching. The main controller will also utilize an on-site weather station to adjust irrigation based on site evapotranspiration rates.

Water will be delivered using gear driven rotors in large turf areas and fields, and Matched Precipitation Rotors will be used on turf areas under 30' in width.

Planting areas will be watered via drip irrigation

Irrigation Water Use:

Turf and planting areas:	1,352,774 SF	water use per week (gal): 1,738,557
Sports fields:	394,169 SF	water use per week (gal): 581,077

Water use per month: 9.2 million gallons
Annual water use (5 months): 46.3 million gallons

The source of irrigation water is to be primarily taken from (2) 35 GPM (10 acre feet) wells capable of producing 6,446,880 gallons per year, the maximum allowed by the Department of Natural Resources and Conservation (DNRC). However, preliminary calculations show that water from the irrigation wells will only provide 14% of the total water needed for maintaining the site. Additional sources for irrigation are being considered. See Civil/Site Narrative for additional information on potential water sources.

Rainwater Harvesting:
Rainwater harvesting was explored to supplement the irrigation wells and to offset the cost of domestic water use. However, the water source is unreliable and the system will not produce enough water to meet the sites need for irrigation. Based on these findings, the design team will not further pursue rainwater harvesting for irrigation.

Building roof area:	180,000 SF
Average precept (June-Sept) :	7.66 in.
Approximate rainwater harvesting vol. annually (gal)	839,160 Gal (1.8% of water needed)

The cost of rainwater harvesting systems vary depending on the type of storage. Surface storage in the form of a pond, is the least expensive option, but it requires land area, additional site maintenance to keep water clean, and some water is lost to evaporation.

Underground cisterns are the most expensive option, but cisterns store water safely and with the least amount of maintenance. A drawback of cisterns is the added cost for installation, nearly $2 per gallon.

Landscape / Site Design

Domestic Water Use
Domestic water use is not the preferred source for irrigation water because of its high cost for service installation and the high re-occurring cost of water. There is also a risk of the water cost increasing over time and a risk of water restrictions in times of drought.

According to water rates for 2017, Government entities pay $1.74 per 100 CF (HCF). At this rate the High School will pay $18,600 per month for domestic water to supplement the irrigation wells, and service fees for the irrigation connections will be approx. $11,000 annually. See Civil/Site Design Narrative for additional information on the cost of domestic water and domestic water rights.

Water conservation measures
To reduce the demand for purchasing domestic water, the design team is looking at reducing the amount of Kentucky Bluegrass sod and replace it with a low water use native grass that is irrigated less frequently. The grass will be allowed to go semi-dormant during the heat of the summer and watered in the fall to reduce fire risk and increase the visual appeal of the school during the school year.

The illustration on the right highlights 360,000 SF of turf that could be converted to low water native grass areas. With these areas as low water native grass, the demand for irrigation water for the season would be decreased by 9.2 million gallons, or 20% of the total irrigation water.

Landscape / Site Design

Athletic Fields

There are a total of 3 practice football fields, 2 softball fields, 1 soccer field and 1 football field planned for the site in the initial construction phase. See sketch above. Basis of design for the fields are as follows:

- Practice football fields will be Kentucky Bluegrass seed on 6-8" of amended native top soil screened to remove larger stones. The practice fields will contain head to head irrigation coverage and will be crowned for adequate drainage. Subsurface drainage is possible but is not currently being considered for the practice fields due to the additional cost.

- Soccer field will be Kentucky Bluegrass sod on a 6" sand base consisting of 70% course sand, 20% native soil, and 10% amendments. This will be placed on 6" screened native top soil with compost. The soccer field will be competition size according to MHSA standards. The field will contain head to head irrigation coverage and will be crowned for adequate drainage. Subsurface drainage system comprised of a geo-composite, prefabricated, water collection system and the associated water transport system will be incorporated in the base of the field.

- Football field will be Kentucky Bluegrass sod on a 6" sand base consisting of 70% course sand, 20% native soil, and 10% amendments. This will be placed on 6" screened native top soil with compost. The football field will be competition size according to MHSA standards. The field will contain head to head irrigation coverage and will be crowned for adequate drainage. Subsurface drainage system comprised of a geo-composite, prefabricated, water collection system and the associated water transport system will be incorporated in the base of the field.

New goal posts standards per the MHSA will be incorporated into the field.

Lighting for the track and football field is being considered and is the highest priority for athletic lighting.

Landscape / Site Design

- The competition softball fields will be Kentucky Bluegrass sod on a 6" sand base consisting of 70% course sand, 20% native soil, and 10% amendments. This will be placed on 6" screened native top soil with compost. The other field will be placed on 6-8" of amended native top soil screened to remove larger stones. The fields will be competition size according to MHSA standards with an outfield fence at 200' from home plate. The field will contain head to head irrigation coverage and will be crowned for adequate drainage. Subsurface drainage system comprised of a geo-composite, prefabricated, water collection system (collection system) and the associated water transport system (transport pipe) will be incorporated in the base of the infield of the competition field.

The softball fields will have 15' backstops and a 4' perimeter chain link fence chain with the upper rail of perimeter fence having a padded safety rail.

Basis of design for the dugouts will be masonry walls with metal roofs.

Lighting on the softball fields is the second priority for athletic field lighting.

Track and Field

The basis of design for the track is an eight lane, equal quadrant, running track with room to expand to 10 lanes. The track is to be an asphalt base with concrete curbs designed per geotechnical report recommendations. Two options are being considered for the track surfacing:

- High end option = Mondo surface.
- Mid-range = ½" rubberized surface.

Interior track areas and ends will receive the same track surfacing for high jump and pole vault areas. The track area will be surrounded with a 4' safety chain link fence. The track will have a slot and grate drainage system around entire interior of track.

Field events will include:

- Two protection cages composed of 15' tall chain link fencing and concrete throw pad for discus.
- Two shot put throwing pads with sand throwing areas edged with concrete curbs.
- Two long jump lanes composed of concrete or asphalt base with track surfacing.
- Two boards for boys and girls long jump and triple jump and a sand jump pit edged with concrete curb.
- One pole vault box will be located on the infield of the track and surrounding surface will be rubberized to match track surface.

Lighting for the track and football field is being considered and is the highest priority for athletic field lighting.

An area for grandstands is to be designated. Grandstands are not a part of the initial construction phase.

The entire athletic area south of the Annie Street is to be fenced with a 6' height chain link fence. The total fencing will be approximately 4,000 LF.

Tennis

The site will contain eight tennis courts built to MHSA standards. Multiple base and surface coatings are being considered.

- High end = post tension concrete with color coating
- Mid-range - standard concrete or asphalt with color coated surface

The tennis areas will be surrounded with 10' chain link fencing. Lighting on the tennis courts is the third priority for athletic lighting.

Landscape / Site Design

Outdoor Storage/Built Areas

Small structures on site will be required for the athletic programs. Potential site elements include:

- Storage shed near track and field to house equipment. Unconditioned metal structure, to 1,800 SF.
- Storage shed near tennis courts for equipment. Unconditioned metal structure, 150 SF.
- A CMU comfort station with ticketing/storage/concessions/restrooms adjacent to the track and football field, 2,000 SF.

Electrical

Exterior lighting will be designed with full cutoff fixtures to meet the requirements of local building codes and to minimize glare on adjacent residential areas. Lighted areas will include parking areas, vehicular circulation routes, drop zones, service yards (as needed), and main pedestrian routes.

- Lighting (Activities) – Priority is the track area (stadium style). If budget allows – one softball field and then tennis area.
- Transformer: 7'x7' concrete pad at main building. 4' clearance on sides (if not by windows/doors). 10' in front or near windows/doors.
- Transformer: 5'x5' concrete pad located near comfort station
- Transformer: 5'x5' concrete pad located near track (if located away from comfort station)
- Generator: 12'x8' concrete pad. Near main transformer.

Structural Design

Structural Systems Analysis

The New Bozeman High School building consists of three wings around a central core area. The classroom wing to the west is three stories, the north wing is two stories with some vaulted shop spaces, and the gymnasium/auditorium wing is one story with roof heights ranging from 14-ft to 40-ft. The structural system at the Schematic Design (SD) level that is being considered is as outlined below. As we move into Design Development (DD), these systems will be further refined along with the other consultant's design documents.

Building Code

- 2012 International Building Code (IBC) and Amendments
- ASCE 7-10 Minimum Design Loads for Buildings and Other Structures

Loading & Design Criteria

Roof Snow Loads

- Design Roof Snow Load = 35.4 psf (plus drift as applicable)
- Ground Snow Load = 46 psf
- Importance Factor (I) = 1.10

Design Loads

- Dead Load = weight of structure
- Roof Live Load = 20 psf (reduced as applicable)
- Floor Live Load:
  - Classrooms = 40 psf
  - First Floor Corridor = 100 psf
  - Second/Third Floor Corridor = 80 psf
  - Mechanical Mezzanine = 125 psf

Wind Criteria

- Basic Wind Speed = 120 mph
- Risk Category = III
- Exposure Category = C
- Importance Factor (I) = 1.0

Seismic Criteria

- Risk Category = III
- Importance Factor (I) = 1.25
- Design Spectral Response Accelerations:
  - Sds = 0.595
  - Sd1 = 0.281
- Site Class = D
- Design Category = D

Structural Systems

Gravity Systems

Gravity resisting systems will consist of steel and concrete decking supported by structural steel beams and columns. Roof framing will consist of light gage steel decking supported on steel open web joists and structural steel beams and columns.

Standard steel wide flange shapes will support the elevated floor decks. The majority of floor beams and girders will be reinforced with composite welded studs and cambered to reduce the tonnage of steel required, and subsequently the cost of the steel materials.

At the steel framed areas, exterior walls are anticipated to be cold formed metal studs. Where possible, exterior walls will be balloon framed with the steel structure inset from the wall framing which is typically more economical. In locations where the steel structure cannot be inset from the exterior walls will be platform framed and the structural steel beams and columns will be within the wall pack.

A steel framed mechanical mezzanine will be constructed above the third floor of the classroom wing. The extents of this area will be further investigated based on the mechanical system and layout for the building.

At the gymnasium areas, long span steel open web joists would be used for the roof framing and would be supported on concrete masonry walls or pre-cast concrete wall panels.

Structural Design

Due to unique geometry and openness of the core and covered entry areas, it is anticipated that these areas may require some larger custom steel elements to achieve the large clear spans and cantilever components in these locations.

The following can be used for estimating purposes:

- Typical bay size for steel framed floor areas of 30-ft x 40-ft. Anticipated girder size of W24x76 with W16x26 beams spaced at 8-ft on center.
- Typical roof framing to consist of 20K3 joists at 6-ft on center supported on W18x40 girders.
- Elevated floor slabs to consist of 4-in lightweight concrete topping on 2-inch Type VLI composite metal decking (6-inch total thickness).
- Roof deck to consist of 1.5-inch Type B metal roof decking.
- Typical exterior wall framing to consist of 600S162-54 metal studs at 16-inch on center spacing.
- Wall construction at gymnasiums anticipated to be 12-inch reinforced masonry walls or 10-inch pre-cast concrete wall panels. (size based on 40-ft wall height with a 4-ft parapet).
- For three-story areas, interior columns to be HSS8x8 or W10x sections and perimeter columns anticipated to be HSS6x6. For one and two-story areas, interior columns to be HSS7x7 or W8x sections and perimeter columns anticipated to be HSS5x5.
- Long span roof joists at competition gymnasium to consist of 120SLH22 steel open web joists at 6-ft on center spacing (size based on a 172-ft clear span). Larger joists may be required at intermediate locations to support scoreboard or other suspended equipment.
- Long span roof joists at practice gymnasiums to consist of 72DLH17 steel open web joists at 6-ft on center spacing (size based on a 100-ft clear span).
- Long span roof joists at auditorium to consist of 60DLH17 steel open web joists at 6-ft on center spacing (size based on a 93-ft clear span).

Lateral Framing Systems

As the building lies in a seismically active area, the Main Lateral Force Resisting System (MLFRS) will be a structural steel system detailed for the requirements of the current AISC Seismic Design Manual. We anticipate the MLFRS to be mainly comprised of Steel Special Concentrically Braced Frames with a combination of single-story 'X' and two-story 'X' configurations (braces form an inverted "V" on the first floor and a "V" on the second floor). At the gymnasium locations, concrete masonry or pre-cast concrete shear walls will be used as the lateral elements.

Braced frames will consist of wide flange beams, wide flange or HSS columns and HSS or pipe braces, which will be sized for the minimum static equivalent seismic loads so that gussets and frame bases may be detailed as economical as possible.

Wind loads will be resisted by the same MLFRS elements as seismic loads. Out of plane loads are resisted by the exterior steel stud walls, curtain window wall systems, or structural mullion systems at large curtain wall or storefront window areas.

Structural Design

Foundation Systems

A conventional shallow foundation system is anticipated for the building with continuous strip footings and foundation walls at exterior wall lines with spread footings and concrete pilasters at column locations. Bottom of all exterior footings shall be located 42 inches below grade to meet the frost protection requirements based on the Geotechnical report.

The main level of the structure is anticipated to be a conventional slab-on-grade construction with site preparation recommendations base on the Geotechnical report.

The following can be used for estimating purposes:

- f’c = 4,500-psi for footings, walls, and pilasters.
- Typical perimeter walls to be 8-in concrete foundation walls with a continuous 2-ft wide by 10-in deep strip footing. Wall thickness may increase to support veneer where applicable.
- Spread footings beneath interior columns anticipated to be 9-ft square by 14-in deep at two-story spaces and 12-ft square by 18-in deep at three-story spaces. Spread footings beneath perimeter columns anticipated to be 7-ft square by 12-in deep at two-story spaces and 8-ft square by 14-in deep. (Larger footings may be required at braced frame locations)
- Strip footings beneath gymnasium walls anticipated to be 3-ft wide by 12-in deep.
- Typical slab-on-grade thickness anticipated to be 4-in and reinforced with welded wire mesh or #4 rebar. At gymnasium and shop areas slab thickness anticipated to be 6-in to 8-in depending on the design loads.
- Interior non-bearing walls would not require a footing.

Mechanical Design

Mechanical Systems Analysis

Heating, Ventilation, and Air Conditioning

Codes & Standards

As of January 12, 2015, the City of Bozeman and the State of Montana have adopted the 2012 International Codes with the Administrative Rules of the State of Montana modifications. The most current codes, as adopted by the City of Bozeman and the State of Montana at the time of the permit submission, will be used for the Basis of Design. The following codes and standards are currently applicable to the design:

- 2012 International Building Code (IBC)
- 2012 International Mechanical Code (IMC)
- 2012 International Fuel Gas Code (IFGC)
- 2012 International Energy Conservation Code (IECC)
- 2012 Uniform Plumbing Code (UPC)

The following standards are applicable in addition to any other local requirements:

- Sheet Metal and Air Conditioning Contractors National Associations (SMACNA)
- Underwriters Laboratories (UL)
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- Occupational Safety & Health Administration (OSHA)
- The mechanical system will have System Commissioning specified and performed according to the 2012 International Energy Conservation Code

Outdoor Design Criteria

Summer:

- Elevation: 4,800'
- 95° F dry bulb
- 63° F wet bulb

Winter:

- -21° F

Indoor Design Conditions

Conditioned Areas:

- Summer: 75° F
- Winter: 70° F

Heating, Ventilation and Air Conditioning

Modern schools require mechanical systems designed to provide our children the best learning environment possible. The heating, ventilation, and air conditioning (HVAC) systems must be capable of delivering uniform temperatures, controlling humidity, and maintaining high indoor air quality with minimum background noise. All of these factors must be balanced with energy efficiency, complexity, serviceability, and first costs.

There are many types of systems capable of meeting the needs of the new Bozeman High School. The following paragraphs describe the various central plant and terminal systems currently under consideration. Final system selection will be the most cost effective system determined through life cycle cost analysis and energy modeling.

Central Plant Option 1: Open Loop Ground Source

An open loop ground source is CTA's recommended central plant for the New Bozeman High School. The open loop ground source would take advantage of the ground water underneath the high school as a source of heating and cooling energy. Ground water is extracted via production wells and then goes through an energy exchange at a heat exchanger creating heating and chilled water for the school. The system would consist of production wells from which ground water is extracted, a plate and frame heat exchanger that decouples the well water from the building heating and cooling water loop, a re-injection well that allows the water to be injected back into the aquifer, and the associated submersible pumps and piping for the system. The number and depth of the wells cannot be determined until a test well is developed and analyzed. Additionally, a sand filter may be required if the test well analysis determines it necessary.

The system flow is estimated at 2,000 gpm and is sized to cover the heating and cooling load for the areas of the school served by the terminal units. The piping to and from the wells and the building will be buried welded steel or fusion welded plastic pipe. The piping inside the building will be insulated and constructed of steel with mechanical joints or fusion welded plastic.

Mechanical Design

The plate and frame heat exchanger will be sized for the ground source flow and the energy balance of the system with a 3 degree approach and 50% additional plate capacity.

An additional design option under consideration is to use water-to-water heat pumps to provide heating and chilled water to all of the stand-alone HVAC systems in the building. These spaces will be discussed in further detail later in this narrative but they include the gymnasiums, the auditorium, the Career Technology Education spaces, and the ventilation units for the classrooms. This water-to-water heat pump strategy would utilize modular heat pumps coupled to the open loop ground source to provide 120 degree glycol heating water to hydronic coils located in the air handling units. The three (3) heat pumps would be 2,000 MBH each. The modular design would allow the heat pumps to cover the minimum heating loads of the unoccupied spaces or increase production to handle the maximum ventilation load of the classrooms or a full capacity gymnasium. All of the individual spaces in the building will be on demand control ventilation so the heat pumps would be able to react to handle the fluctuations in the connected loads. This strategy lowers cost by reducing our connected capacity significantly while operating at a high efficiency. This option is only applicable if the ground source loop is utilized.

Central Plant Option 2: Traditional Plant

Heating

The heating fuel source for the building will be natural gas supplied by the public utility company. The gas will be piped underground into the building to the mechanical room to serve high-efficiency, condensing water boilers. The boiler total capacity will be 3,700 MBH which exceeds the 400 MBH limit defined by code for a non-fire rated room. Therefore, the mechanical room will be required to have fire rated walls according to the IBC 2012. The number of boilers and operational configuration has not been determined, but redundancy in the system is required. End suction centrifugal pumps with high efficiency motors and Variable Frequency Drives will be installed for circulating heating water to the terminal units throughout the building. The pumps will be sized to provide 100 percent of the calculated building heating water flow rate and redundant backup. Hydronic system accessories will include an expansion tank, air separator, and chemical feeder.

Heating water piping will be copper with soldered fittings in sizes 2 inches and smaller. Piping 2-1/2 inches and larger will be Schedule 40 steel with grooved "Victaulic" type fittings. Formed fiberglass pipe insulation with All Service Jacketing (ASJ) will cover the entire piping system.

Cooling

A 300-ton fluid cooler will be pad mounted outside of the building. This fluid cooler will provide chilled water to the terminal units throughout the building. The chilled water loop between the fluid cooler and the central mechanical room will be 35% glycol. The chilled water loop throughout the building will not contain glycol. A plate and frame heat exchanger will separate the two chilled water loops. A single pump will serve the fluid cooler. The piping from the fluid cooler to the building will either be buried or routed above grade depending upon the final location of the fluid cooler. End suction centrifugal pumps will serve the chilled water systems in the building as well.

Typical hydronic accessories such as an expansion tank, air separator, glycol feeder, and chemical feed tank will be provided for the chilled water system. Freeze protection will be provided by using a solution of 35 percent propylene glycol and 65 percent de-ionized water.

Chilled water piping will be copper with soldered fittings or fusion welded plastic in sizes 2 inches and smaller. Piping 2-1/2 inches and larger will be Schedule 40 steel with grooved fittings or fusion welded plastic pipe. Fiberglass pipe insulation with vapor barrier and All Service Jacketing will cover the piping system.

Mechanical Design

Heating and Cooling Terminal Units

In addition to the two central plant options under consideration for the high school, three terminal unit systems are under consideration to handle the space heating and cooling in areas such as the classrooms, circulation areas, and offices. All three terminal unit options under consideration can be integrated into either plant option ultimately decided upon. CTA recommends a Water Source Variable Refrigerant Flow terminal system for the New Bozeman High School.

Terminal Unit Option 1: Water Source Variable Refrigerant Flow (WSVRF)

Individual WSVRF terminal units will serve each classroom allowing simultaneous heating and cooling of different rooms or zones. The terminal units will be 24,000 btuh, medium static, ducted, concealed ceiling style. Manufacturer's include Daikin, LG, or similar. The WSVRF terminals will be connected via insulated refrigerant pipe to a multi-port selector box that allows heat recovery and simultaneous heating and cooling for all units. The terminal units will be provided with a factory filter box and a condensate pump. The condensate piping will be PVC.

Air will be distributed through the space via insulated supply ductwork and lay-in diffusers. The return ductwork will be uninsulated.

The WSVRF outdoor units (condensing units) will be connected to the selector boxes via insulated refrigerant piping and to the plate and frame heat exchanger via fusion welded plastic pipe. If the open loop ground source central plant option is selected, the WSVRF will not require additional modification of the source water to be utilized as the energy source for the building. The connection ratio of the outdoor units will not exceed 130%. The outdoor units will be located in either small, distributed mechanical rooms throughout the building, or in a larger mechanical space in the attic space.

Terminal Unit Option 2: Active Beams

Each classroom will be conditioned with a series of active beams. The number and size of the beams is determined by the occupancy and physical footprint of the classroom. The total capacity of the beams for a typical class room will be 24,000 btuh. The beams will have four pipe connections to allow for simultaneous heating and cooling of the spaces. The active beams will have a primary air duct connection for primary ventilation air.

The primary ventilation air will be distributed via uninsulated, metal supply duct. The heating and chilled water piping will be insulated steel with mechanical joints for piping over 2-1/2" and insulated copper or insulated welded plastic pipe for piping 2" and smaller.

If the open loop ground source central plant is chosen as the basis of design, a water-to-water heat pump will be required to increase the ground water temperature to an appropriate heating water temperature of 120 degrees Fahrenheit. The water-to-water heat pump would have 3,800 MBH capacity. This same heat pump would temper the chilled water supply so that it is maintained above the space dew point at all times.

Terminal Unit Option 3: 4-Pipe Fan Coil

Each classroom will be conditioned with a fan powered 4-pipe coil. The total capacity of the fan coils for a typical class room will be 24,000 btuh. The fan coils will have four pipe connections to allow for simultaneous heating and cooling of the spaces.

The ventilation air will be distributed via uninsulated, metal supply duct. The ventilation ductwork will terminate at the return duct work for the fan coil. The heating and chilled water piping will be insulated steel with mechanical joints for piping over 2-1/2" and insulated copper or insulated welded plastic pipe for piping 2" and smaller. The 4-pipe fan coil unit will have PVC condensate piping.

If the open loop ground source central plant is chosen as the basis of design, a water-to-water heat pump will be required to increase the ground water temperature to an appropriate heating water temperature of 120 degrees Fahrenheit. The water-to-water heat pump would have 3,800 MBH capacity.

Mechanical Design

Stand Alone HVAC Systems

In a building as large as the new high school, a single HVAC system is seldom capable of handling all the spaces defined within. This requires a design that focuses on the needs and utilization of these specific areas on a case by case basis. The most efficient systems can then be selected based on that specific need. These individual areas and systems are outlined below.

Gymnasiums

The competition gymnasium and the two (2) auxiliary gymnasiums will be conditioned with separate fan systems from the rest of the building. For the competition gymnasium, two (2) new indoor split air handling units suspended from the structure with remote DX condensing units located on the roof will be provided. Each unit will be provided with a natural gas heating section, dx cooling coil, a plenum fan, and MERV 8 pleated filters. Each unit will be sized to provide 12,000 cfm of outdoor air, 1,400 MBH of heating, and 35 tons of cooling. The air conditioning is only designed to temper the ventilation air, not fully cool the space. A demand controlled ventilation sequence with carbon dioxide sensors located in the space will be implemented. In addition, several destratification fans (similar to the Airius models) will be installed near the ceiling to help with circulating air through the space during large events.

Each auxiliary gymnasium will be conditioned with its own indoor split air handling unit suspended from the structure with a remote DX condensing unit located on the roof above. Each unit will be provided with a natural gas heating section, DX cooling coil, a plenum fan, and MERV 8 pleated filters. Each unit will be sized to provide 3,500 cfm of outdoor air, 670 MBH of heating, and 10 tons of cooling. The air conditioning is only designed to temper the ventilation air, not fully cool the space. A demand controlled ventilation sequence with carbon dioxide sensors located in the space will be implemented. In addition several destratification fans (similar to the Airius models) will be installed to help with circulating air through the space during large events.

Ductwork in the gym areas shall be exposed galvanized spiral ductwork with duct mounted diffusers similar to Krueger DMDGR model. Fabric ducts similar to Ductsox may also be utilized. Return grilles shall be heavy-duty type located between 6 and 12 inches above finished floor in locations coordinated with architecture.

Auditorium

A roof mounted air handling unit located in a mechanical penthouse will serve the auditorium. The unit will have a 700 MBH indirect gas fired heating section and 40 ton direct expansion cooling coil with remote condensing unit located on the roof. The unit will be equipped with full air side economization and powered relief. There will also be a flat plate energy recovery unit on the return and outdoor air ductwork to temper the ventilation air. The exterior of the penthouse will be sheathed in Solarwall paneling, from which the ventilation air will be drawn. This will allow us to preheat the ventilation air when the conditions are favorable, or bypass the Solarwall when preheating is not necessary.

The supply air for the auditorium will be distributed via ductwork located in the architectural voids and wall cavities of the space. The air will be introduced low in the auditorium, near the floor in a displacement ventilation strategy. Air velocities will be kept low so that sound is not an issue. The return duct will be located high in the auditorium. Ventilation air will be controlled by wall mounted carbon dioxide sensors using a demand control ventilation strategy.

Commercial Kitchen

The new Bozeman High School will be fitted with a prep kitchen modeled closely after the commercial kitchen located at the existing high school. The existing high school kitchen is equipped with two (2) Type 1 kitchen hoods. The two (2) required Type 1 hoods will be equipped with integrated fire suppression systems and integrated make-up air. The hoods will also be provided with Demand Control Ventilation (DCV). The grease duct will be either double wall containment type with minimum clearance to combustibles or code constructed metal duct with fire wrap. The exhaust duct will be sloped and have access doors and cleanouts per code. The exhaust duct will terminate at roof mounted up-blast fans. The make-up air system will be interlocked with the DCV system so that when the hood is in operation the make-up air unit will run and supply make-up air to the perforated plenum at the front of the Type 1 hood.

There will be three (3) type 2 kitchen hoods located throughout the kitchen. These do not require integrated fire suppression systems or make-up air. The exhaust duct will be uninsulated, galvanized sheet metal ducts that run from the hood to roof mounted, up-blast exhaust fans.

Mechanical Design

Metal Shop
A welding fume exhaust system will be provided in the welding shop area. Make-up air will be handled by a direct fired natural gas air handling unit mounted high in the space that is interlocked with the welding fume exhaust system.

General welding shop exhaust and ventilation air will be provided by an air handling unit hung high in the space with a cross plate heat exchanger to utilize heat recovery. The unit will also have a direct fired gas heating coil to bring the discharge temperature up to room neutral conditions. The unit will supply approximately 2,000 CFM of ventilation air while exhausting a slightly higher amount. This will both reduce the amount of gas heat required and keep the space negatively pressurized so that odors and contaminants do not leak out into adjacent spaces.

Heating for the space will be provided by two (2) gas fired direct vented radiant tube heaters in the 50,000 BTU/H range hung overhead.

Auto Shop
An overhead vehicle exhaust system will be provided. Make-up air for vehicle exhaust will be from a direct fired natural gas air handling unit mounted high in the space.

General auto shop exhaust and ventilation air will be provided by an air handling unit hung high in the space with a cross plate heat exchanger to utilize heat recovery. The unit will also have a direct fired gas heating coil to bring the discharge temperature up to room neutral conditions. The unit will supply approximately 2,000 CFM of ventilation air while exhausting a slightly higher amount. This will both reduce the amount of gas heat required and keep the space negatively pressurized so that odors and contaminants do not leak out into adjacent spaces.

Heating for the space will be provided by two (2) gas fired direct vented radiant tube heaters in the 50,000 BTU/H range.

Wood Shop
A dust collection exhaust system will be provided to remove wood and dust particles from the space. Exhaust from a standalone paint booth system will be routed to an exhaust fan located on the roof. Make-up air for both will be handled by a direct fired natural gas air handling unit mounted high in the space.

General shop exhaust and ventilation air will be provided by an air handling unit hung high in the space with a cross plate heat exchanger to utilize heat recovery. The unit will also have a direct fired gas heating coil to bring the discharge temperature up to room neutral conditions. The unit will supply approximately 2,000 CFM of ventilation air while exhausting a slightly higher amount. This will both reduce the amount of gas heat required and keep the space negatively pressurized so that odors and contaminants do not leak out into adjacent spaces.

Heating for the space will be provided by two (2) gas fired direct vented unit heaters in the 50,000 BTU/H range hung overhead.

Ventilation System
Ventilation air for the terminal units will be provided by two (2) air handling units located in mechanical pent houses on the roof. The two (2) 15,000 cfm ventilation units will be equipped with 1,460 MBH indirect fired natural gas heating sections and with 30 ton direct expansion cooling coils. The ventilation units will have an energy recovery wheel to pre-treat the ventilation air. Additionally, the outdoor air will be pre-treated by drawing the air through a Solarwall, so that when outdoor conditions are favorable the ventilation air will be heated. A series of ductwork and dampers will either bypass or blend the air pretreated by the Solarwall prior to it being drawn into the building. The ventilation air will be conditioned to a room neutral condition. The classroom spaces will be equipped with carbon dioxide sensors and zone dampers, so that when the classrooms are not in use the ventilation units can modulate down reducing utility usage. Bathroom exhaust and the building relief air will be ducted back to the ventilation units and then exhausted out of the building. With this strategy, spaces requiring exhaust such as bathrooms and janitor's closets will not require additional exhaust fans.

Mechanical Design

Temperature Controls

The temperature controls contractor will provide digital controls (DDC) for the terminal units, ventilation units, stand-alone units, Energy Recovery Units, and all associated pumps and accessories. The system network and control shall be arranged to support all new HVAC equipment.

Plumbing Design

Plumbing Systems Analysis

Codes & Standards

All design and construction work shall comply with all applicable building codes, standards, and ordinances adopted by Government, State and local jurisdictions in effect at the commencement of construction activities. The current codes applicable to the plumbing systems are:

- 2012 Uniform Plumbing Code as amended by the State of Montana
- 2012 International Fuel Gas Code as amended by the State of Montana

Domestic Water Service

The domestic water service will be provided by the City of Bozeman. Preliminary calculations estimate a 4" service will be required. A separate domestic service will run in parallel with the fire service and enter a shared entrance room. The water entrance will have a meter and reduced pressure principle backflow preventer.

Sanitary Sewer System

The building is large enough that there will likely be two or three outlets from the various areas of the building. The sanitary sewers will gravity flow below the main floor slab towards the north, where they will collect and connect to a new sewer tap that is part of the site utilities and is connected to the City of Bozeman municipal sanitary sewer system. (See the site utility narrative for additional information.)

Grease Waste Sewer System

The kitchen will utilize commercial cooking appliances and equipment and will very likely produce grease so a grease waste system will be installed to serve the kitchen. A separate grease waste sewer line from the kitchen will exit the building and run to an exterior grease interceptor.

Acid Waste System

An acid waste and vent system will be installed to serve the sinks in the chemistry rooms. The waste piping will collect and discharge into an acid neutralization tank which will be located in a storage room. The outlet of the neutralization tank will then connect to the sanitary sewer system. The acid vent system will be routed separately to the roof.

Roof Drain/Storm Sewer System

Cast iron body roof drains with aluminum strainers will be used for the primary and overflow roof drains. The rainwater leaders and overflow leaders will be installed in tandem and will collect several drains in various areas of the building. Rainwater leaders will collect and drop as risers in several areas around the perimeter of the building and then will run below grade to connect to the perimeter storm drainage system installed by the site utilities. This perimeter storm drainage system will discharge to the storm water retainage areas on the north side of the school. (See the Civil/Site Design Narrative for additional information.) The overflow leaders will collect and drop as risers in several areas around the perimeter of the building and then will discharge above grade with downspout nozzles.

Natural Gas System

The natural gas service will be obtained from NorthWestern Energy. A new gas meter will be installed outside the building in a location to be determined during design development. The estimated gas load is difficult to determine at this time because a final decision on the HVAC system has not been made. The load could range from a low of approximately 5 MMBtu/hr to a high of 20 MMBtu/hr. If boilers are not needed for the HVAC system, the connected gas load will be on the lower end. Natural gas will likely be used for the domestic water heaters; gas fired kitchen appliances and equipment; commercial clothes dryer(s), lab gas outlets in the science rooms; the art lab kilns; and the emergency generator.

Domestic Hot Water

Domestic hot water will be generated from high efficiency, gas fired, water heaters. During the design development phase two options for domestic hot water production will be reviewed in more detail: (1) a central domestic hot water plant with two primary water heaters and a storage tank with hot water branches and recirculation piping installed throughout the entire building; and (2) a decentralized system with domestic water heaters strategically located in 4 to 5 locations throughout the building serving smaller areas. Also during the design development phase, further analysis will be performed to determine if possibilities exist to utilize waste heat from the HVAC system to preheat domestic hot water, or if sharing a boiler with the HVAC system is viable if it increases the overall building efficiencies.

Plumbing Design

The domestic hot water will be stored at 140°F for health purposes and a master mixing valve will be used to produce 115°F for the majority of plumbing fixtures. The kitchen, the laundry, and select mop sinks will be piped with 140°F water. Domestic hot water circulation pumps utilizing high efficient EC motors will be used to circulate the domestic hot water to minimize the amount of time it takes hot water to reach the fixtures.

Plumbing Fixtures

Toilet Rooms

Water closets and urinals will be wall mounted, vitreous china fixtures. The lavatories will be vitreous china, either wall hung if stand alone or under-mount if in a countertop. Prefabricated solid surface wash fountains and lavatories will also be considered in the large toilet rooms. Fixtures will be equipped with battery powered infrared sensor operated flush valves and faucets. The restrooms will be ADA accessible.

Chemistry Classrooms

The chemistry rooms will have sinks formed into the resin laboratory countertops. These sinks will connect to the acid waste and vent system and have typical lab style laminar flow faucets. Lab gas outlets will also be located in the room. An emergency shower/eyewash will be located in each chemistry classroom.

Science Classrooms

Each science classroom will have a single bowl, stainless steel sink with a gooseneck faucet.

Teacher Planning Rooms

Each teacher planning room will have a single bowl, stainless steel sink with a gooseneck faucet

Art Labs

The art labs will have thermoplastic resin sinks with gooseneck faucets and plaster traps. Floor drains with integral plaster traps will also be used.

Photo/Graphics Lab

The photo/graphics lab will have stainless steel sinks with gooseneck faucets. The dark room will use stainless steel sinks designed for photo developing.

FCS Prostart Lab

The FCS prostart lab will have multiple double bowl, stainless steel sinks with gooseneck faucets. A washer box will also be provided to connect to a clothes washing machine.

Main Kitchen

The main kitchen will be designed by the kitchen food service consultant. Domestic hot and cold branches will be extended all kitchen fixtures and equipment as required. Floor sinks and floor drains will be provided per direction from the consultant. A washer box will also be provided to connect to a clothes washing machine.

CTE Shops

Prefabricated solid surface wash fountains will be used in the auto shop and metal shop. An emergency shower/eyewash will be located in the auto shop, metals shop, and wood shop. The auto shop will also have trench drains connected to a sand/oil interceptor. A central air compressor will be installed and compressed air will be piped to the auto shop, the metals shop, the wood shop, and to the architecture/engineering lab. The architecture/engineering lab will also have a single bowl, stainless steel sink, with gooseneck faucet with an emergency eyewash.

Music Area

The music plaza area will have a drinking fountain with bottle filler, and a deep, single bowl, stainless steel sink with gooseneck faucet for instrument cleaning.

Plumbing Design

Gymnasium Area

Group shower rooms in the locker rooms will use stainless steel column showers or stainless steel wall mounted shower units. Individual shower rooms will use single piece fiberglass showers. All shower heads will use low flow heads at 1.5 gpm.

The training room will be designed to accommodate therapy tubs and an ice maker.

The laundry room will be designed to serve a commercial clothes washing machine and will have a trench drain for the washing machine to drain into.

Special Education

The special education areas will have ADA compliant combination toilet and shower rooms. The life skills area will have a washer box for a residential style clothes washing machine and a double bowl, stainless steel sink with gooseneck faucet.

Other Fixtures and Equipment

Dual height, ADA compliant drinking fountains will be installed near the main toilet groups and will incorporate a bottle filler.

A floor mounted mop sink will be located in all janitor closets.

Exterior wall hydrants will be located in strategic spots around the building.

A sump pump operated by a remote switch will be installed in the elevator pit to meet the elevator code.

Plumbing Piping Materials

Drain-Waste-Vent (D-W-V) Piping:

Waste and vent piping below ground will be schedule 40 PVC. Waste and vent piping above ground in occupied areas and/or in ceiling return air plenums will be no-hub cast iron. Waste and vent piping above ground in mechanical and storage areas will be either no-hub cast iron or PVC.

Rainwater Piping:

Rainwater leader and overflow piping above ground in occupied areas and/or in ceiling return air plenums will be no-hub cast iron. Waste and vent piping above ground in mechanical and storage areas will be either no-hub cast iron or PVC. Rainwater leader piping below ground will be schedule 40 PVC.

Grease Waste Piping:

Grease waste piping below ground will be schedule 40 PVC. The branch and main serving the commercial dishwasher will be schedule 40 CPVC or no-hub cast iron.

Acid Waste and Vent Piping:

Acid waste and vent piping will be Polypropylene, PVDF, or CPVC rated for acid waste service.

Domestic Water Piping:

Domestic water piping will be type "L" copper tubing or PEX-a tubing.

Natural Gas Piping:

Gas piping will be schedule 40 black steel pipe. Gas piping larger than 2" or concealed in a wall or above the ceiling will be welded; 2" pipe and smaller will be threaded.

Compressed Air Piping:

Compressed air piping will be schedule 40 black steel pipe.

Plumbing Design

Pipe Insulation
All domestic cold water, hot water, and hot water return piping throughout the building will be insulated with 1" thick fiberglass or flexible elastomeric insulation. Rain water and overflow leaders will also be insulated with 1" fiberglass insulation or flexible elastomeric to dampen sound and minimize condensation potential.

Special Systems and Equipment
A water softener is not anticipated to be used. No other special systems such as medical gas or RO water are anticipated.

Sustainable Design Features
Low flow flush valves, faucet aerators, and shower heads will be utilized to minimize water use and maximize water efficiency. A high efficiency, gas fired water heater will be used for domestic hot water

Fire Protection Design

Fire Protection Systems Analysis

Codes and Standards

The New Bozeman High School shall be fully sprinklered according to the 2012 International Building Code (IBC), 2012 International Fire Code (IFC), and installed per National Fire Protection Association (NFPA) 13 (2013) & NFPA 14 (2013). The sprinkler system will consist of a wet system throughout all conditioned spaces. A dry system will be provided within any attic and any exterior overhangs. Quick response (QR) sprinklers shall be utilized. All piping will be concealed where possible and sloped to drain back to the riser. Additional auxiliary drains may be required to completely gravity drain the system. A Class I standpipe will be proved for fire department use.

Water Supply

The sprinkler system will be supplied by a new 6" ductile iron or C900 fire water service line fed from a new looped water distribution main around the building. The building square footage is large enough, with five fire areas anticipated, resulting in a minimum of 6 fire sprinkler zones anticipated. The fire water flow data was obtained from fire hydrant #2501 in October of 2016. The flow and test hydrants are located near Meadowlark School. The static pressure of the hydrant was observed to be 78 PSI with a residual pressure of 73 PSI flowing 1240 GPM. This results in an IFC available fire-flow of 4,658 GPM at 20 PSI residual pressure. The required fire-flow for a type II-B building of 305,000 square feet is 2,000 gpm minimum. The available fire-flow is 4658 gpm. Preliminary calculations indicate that a 4" zone feed mains will provide the required flow and pressure to the most remote sprinkler design area. A fire pump is not intended and preliminary calculations indicate one will not be required.

Fire Hazard Occupancy

The following areas will be classified as light hazard in accordance with NFPA 13 and designed to a uniform density of 0.1 gpm/square foot: restrooms, classroom, work/office areas, common areas, attic, hallways, and vestibule. The gym, mechanical, electrical and elevator equipment rooms will be designed to a uniform density of 0.15 gpm/square foot as required by an Ordinary Hazard (Group 1) occupancy classification. The shop and woodworking spaces, storage rooms, and janitors closet will be designed to a uniform density of 0.2 gpm/square foot as required by and Ordinary Hazard (Group 2) occupancy classification. The minimum allowed design area shall be 1,500 square feet.

Special Situations Sprinkler System

Any unconditioned attic space and will require a dry system. A 30% increase in hydraulic design area is required for the sloped ceilings and addition 30% increase for the dry system required. The overall wet and dry systems will be based on the most hydraulically demanding remote areas of the sprinkler system. The sprinkler systems will be hydraulically calculated using the density/area method as outlined above.

Overhangs and entry canopies will require sprinklers, depending on the width of the overhang, if they are constructed of combustible materials per NFPA 13. A dry system or dry horizontal sidewall sprinklers may be needed for these areas based on the outdoor design temperatures for this location.

A Class I standpipe system will be required for buildings with floors or mezzanine elevations 30'-0' or greater above the fire department vehicle access road. A standpipe is proposed at this time with each floor being a separate fire sprinkler zone or multiple zones.

Sprinkler System

The fire sprinkler system shall include a fire service isolation valve, double check backflow device, forward flow test assembly, riser manifold, flow switches, sprinkler heads, and supervised isolation valves. The double check backflow device, forward flow test assembly, flow switches, and supervised isolation valves will be located no more than 72" above finished floor. The fire sprinkler flow switches and tamper switches shall be interfaced to the building fire alarm panel for notification of an alarm condition.

Individual components of the fire sprinkler system will be as follows:

- Fire Riser Manifolds: Fire risers will be comprised of valves, pressure relief valves, and flow switches that shall be monitored by the fire alarm system. Each floor will have a separate sprinkler system zone.

Fire Protection Design

- Piping and Fittings Interior: Interior piping 2" and smaller shall be schedule 40 or listed equivalent steel with cast iron threaded fittings. Piping 2-1/2" and larger shall be schedule 10 or listed equivalent steel with roll grooved fittings; cut grooved fittings will not be allowed. No mechanical tees or fittings will be allowed. Drain piping and fire department connection piping upstream of the check valve will be galvanized schedule 40 for sizes 2" and smaller with cast iron threaded fittings or schedule 40 for piping 2-1/2" and larger with cut grooved pipe and painted ductile iron fittings. Alternatively, a nitrogen generation system can be utilized allowing schedule 10 piping 2-1/2" and larger with roll grooved pipe.
- Sprinklers: Sprinklers shall be standard coverage quick response type selected for the thermal sensitivity of the appropriate application. Pendent sprinklers will be provided for all finished spaces and upright sprinklers will be provided for all unfinished or open structure areas.
- Hangers, Supports and Bracing: Hangers and supports will be spaced as required per NFPA 13. Due to the Seismic Design Category "D", based on the Site Class and Seismic Use Group of this region and facility, seismic bracing will be required per NFPA 13.
- Electrical Devices: All valves on the fire sprinkler supply lines will be electrically supervised by tamper switches and monitored by the building fire alarm panel. Each fire sprinkler zone (riser manifold) will be electrically supervised by a flow switch and zone control isolation valve and tied into the fire alarm panel. The exterior horn and strobe assembly at the front of the building near the new fire department connection will also tie into the fire alarm panel.
- Miscellaneous: Hydraulic placards will give the flow and pressure requirements of each zone and will be attached to the zone piping near the zone or riser manifolds. A spare stock of sprinklers will be provided for each type of sprinkler used in a zone. The fire department connection will be a four-way type with a rough brass wall plate and plugs. The wall plate shall indicate that the system supplied is an automatic wet sprinkler and manual wet standpipe system.

Electrical Design

Electrical Systems Analysis

Power

Primary power will enter the site at two locations, forming a 'loop' feed through the campus. The Northwestern Energy (NWE) scope of work will include (4) new services to the site, (2) for the main high school building, and (2) services at the sports field complex to serve the football field and the concessions area.

An existing culvert along Flanders Mill Road will be utilized to bring one end of the loop onto the site. New overhead power (transmission & distribution) poles along Oak Street will be utilized to provide incoming service to the other end of the loop. See Figure 1.

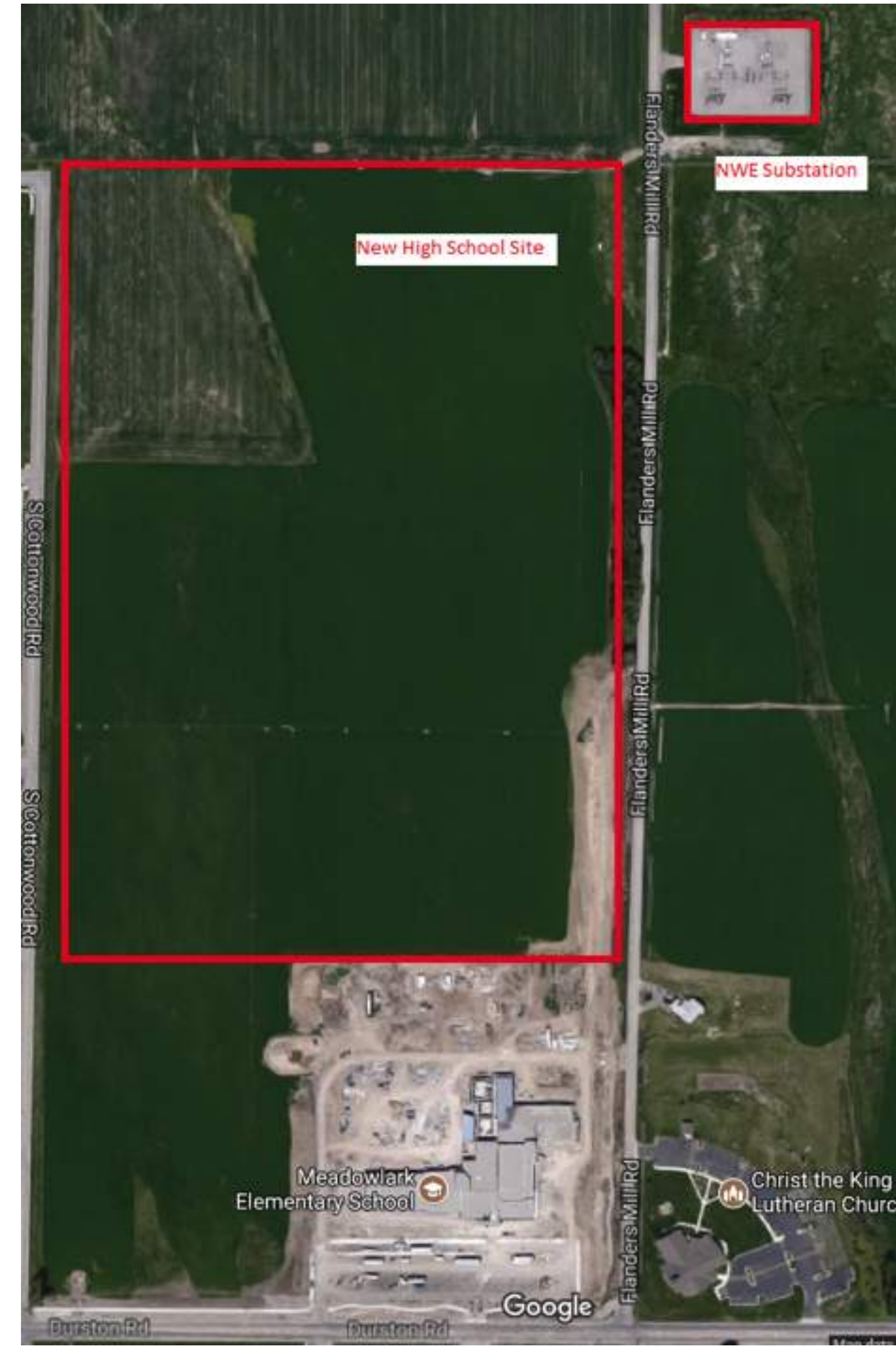


Figure 1 - Satellite Image of Nearby Power Distribution

Electrical Design

The (4) service transformers will be loop-feed type, provided and installed by NWE, estimated to be 2500kVA (main building service 'A'), 1500kVA (main building service 'B'), and 50kVA each for the softball field lighting/concessions and the football field lighting.

The estimated new demand load for the building is 4,760 kVA, based on square foot values, at this time. The secondary power will consist of a 4000A, 480Y/277V, 3P, 4W main switchboard 'A' and a 2000A, 480Y/277V, 3P, 4W main switchboard 'B'. Main switchboard 'A' will be situated near the main data frame and main mechanical room and also serve the eastern half of the building. Main switchboard 'B' will be serve the learning tower and the western half of the building, via downstream distribution. See Figure 2.

Each switchboard will also feed, via a 480:208Y/120V, dry-type transformer, a 208Y/120V, 3P, 4W switchboard. These switchboards will feed, in addition to certain mechanical loads, 84-circuit receptacle panels distributed throughout the wings.

Receptacles will be provided as required by code and equipment layouts throughout the expansion. For flexible use spaces, an array of fire-rated poke-thru devices containing both power & data will be utilized. All new power distribution will comply with the 2017 edition of NFPA 70, the National Electrical Code (NEC).

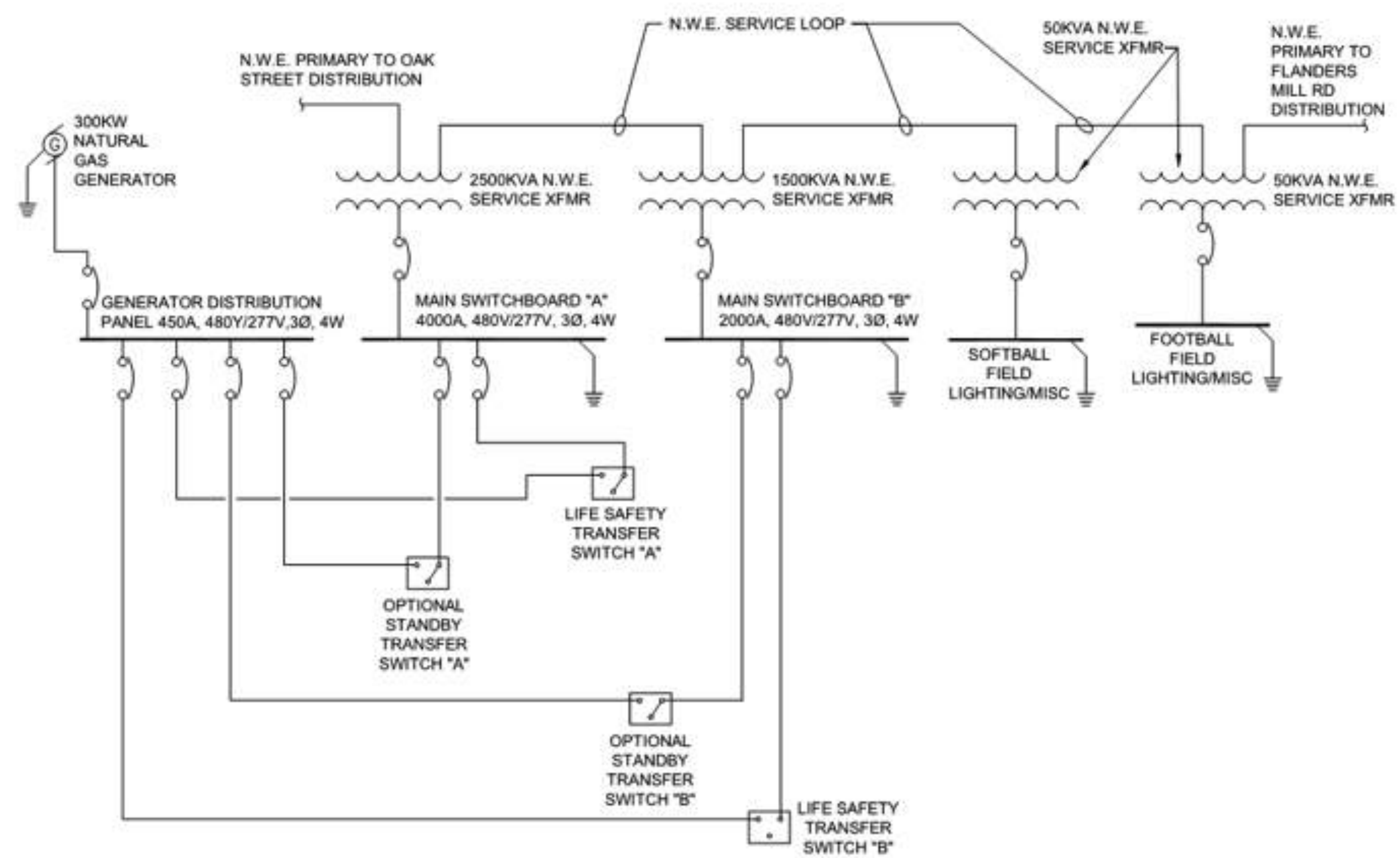


Figure 2 - Preliminary Service Equipment Schematic Diagram

Electrical Design

Emergency Power

Based on past reliability data for the natural gas utility in the area, and the Authority Having Jurisdiction (AHJ) having been accepting of natural gas generators for life safety loads in nearby installations, CTA is proceeding with discussions with the AHJ regarding the use of the exception in NEC 700.12(B)(3).

An attempt has been made to estimate the worst case load scenario, based on the mechanical system options, to allow an emergency generator to serve life safety lighting, the data center/Main Data Frame (MDF), and selected mechanical loads which would keep the building heat up to an acceptable level in an emergency.

A 300kW natural gas driven generator set, in a sound attenuated reach-in enclosure, would tie into both services (per Figure 1), in order to provide life safety and optional standby power to selected loads throughout the facility.

Data Center/MDF Uninterruptible Power Supply (UPS) Power

The entire Data Center/MDF space would be backed up by the aforementioned generator, including cooling and power to the racks/enclosures. The assumption, based on meetings with Bozeman Public Schools IT Department, is that (4) racks would operate at a maximum of 5kW, with the potential for (2) racks to operate up to 8kW. The total MDF load then becomes 36kW.

The rack/enclosure loads will be backed up by a central in-row UPS. This system will be a 40kW/50kVA Li-Ion with an external maintenance bypass. Currently, only lead acid VRLA battery options are available in this size, but Li-Ion will be the standard by summer 2018.

Symmetra PX 40

Configured-to-order distribution

40 kVA InfraStruxure PDU

The 40 kVA InfraStruxure power distribution unit (PDU) is a panelboard PDU with a twist — breakers and cord sets that match your site requirements are installed at the factory, bringing agility, availability, and speed of deployment to your data center. It is designed exclusively for use with Symmetra PX 40 kW and enhances it with these features:

- 600 V, 480 V, or 208 V input and 208 V output
- Distribution and maintenance bypass in a single rack
- High-efficiency, NEMA*-rated TP-1 isolation transformers

Configurable power accessories

Configurable power distribution accessories deliver the flexibility and management that data centers require. A comprehensive selection of single- and three-phase whips, breakers, connector sets, and current monitoring accessories provide agility, availability, and management in the data center.

Breakers

Square D* by Schneider Electric bolt-on breakers are shipped preinstalled and match your site specifications.

Options:

- 1-pole: 15 A, 20 A, 30 A
- 2-pole: 15 A, 20 A, 30 A
- 3-pole: 20 A, 30 A, 50 A, 60 A

Cord and connector sets

Connectors are shipped preinstalled.

Options:

- L21-20
- L21-30
- L15-30
- L14-20
- L14-30
- L5-15
- L5-20
- L5-30
- L6-15
- L6-20
- L6-30
- Hubbell CS8354C
- 60 A IEC 309

Figure 3- Central UPS Basis of Design

Electrical Design

Photovoltaic System

Various photovoltaic systems have been analyzed at this time, including the following:

- 50kW Exporting System, Fixed Array
- 50kW Exporting System, Dual Axis Tracking Array
- 100kW Non-Exporting System, Fixed Array

The performance data, modeled in National Renewable Energy Laboratory's (NREL) System Advisor Model (SAM) software, is currently under review by Bozeman Public Schools.

Lighting & Lighting Controls

An interior lighting design using various types of linear LED luminaires will be implemented, depending on the selection of ceiling types. The Correlated Color Temperature (CCT) of luminaires in classroom spaces will be 3500K, with a minimum CRI of 85. Some common areas and breakout spaces may utilize a warmer CCT of 2700K-3000K, with the same requirement for 85 CRI.

Emergency life safety lighting will be integral to the space lighting and fed from the generator via a UL924 transfer device for each control zone.

Exterior pedestrian area and parking lot lighting will utilize full cutoff LED luminaires, both building and pole mounted, with a CCT of 3000K. Stadium style lighting for both the football field and softball field will be an arrays of LED adjustable luminaires, mounted to masts surrounding the playing surfaces. These luminaires will be controlled in accordance with the City of Bozeman Unified Development Code (UDC) to gain the exception for non-full-cutoff lighting.

All new illumination will be in accordance with the recommendations of the Illumination Engineering Society of North America (IESNA) Handbook – 10th Edition. New emergency life safety lighting will comply with the illuminance requirements of National Fire Protection Association (NFPA) 101: Life Safety Code.

Lighting controls will comply with the requirements of the 2012 International Energy Conservation Code (IECC) for all spaces. A central, digital, lighting control panel will be designed for management of the lighting control system and future flexibility.

Low Voltage Systems

Summary

The school will require infrastructure to support both current and future requirements of network, telecommunications, security, Closed Circuit Television (CCTV), and assisted learning technologies. Current systems require copper systems of at least a Category 6 cabling plant. A fiber system based on single mode fiber to deliver all content of all building system will be capable of withstanding future transmission requirements well past the buildings life-span.

Copper systems would need to be upgraded throughout the life of the system. New copper technologies will also require a newer cabling plant. A fiber design based on passive optical network will only require electronics upgrades for future transmission speeds while the cabling infrastructure will remain intact. The fiber design also eliminates space, HVAC, and security requirements for telecommunications rooms.

Therefore, at this time, the base bid shall include a Category 6 cabling plant for the new high school, and an add alternate shall be included to utilize a Passive Optical Network (PON) throughout the high school. The contractor shall take into account the removal of Intermittent Distribution Frame (IDF) space buildouts and power/cooling to those IDFs, as part of the alternate.

Electrical Design

The following standards are applicable in addition to any other local requirements:

- ANSI/TIA 568.0-D Generic Telecommunications Cabling for Customer Premises
- ANSI/TIA 568.2-C Balanced Twisted-Pair Cabling and Components Standard
- ANSI/TIA 568.3-D Optical Fiber Cabling Components Standard
- ANSI/TIA 569-D Telecommunications Pathways and Spaces
- ANSI/TIA 598-D Optical Fiber Cable Color Coding
- ANSI/TIA 606-C Administration Standard for Telecommunications Infrastructure
- ANSI/TIA 607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
- ANSI/TIA 758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard
- ANSI/TIA 4966 Telecommunications Infrastructure Standard for Educational Facilities

Low Voltage Requirements

- The main objective to supply a working system, whether it is copper or fiber. As stated above, a minimum requirement of Category 6 will suffice for the base bid requirements.
- Phone System: an IP based phone system
- Network: Support for at least a 1Gb transmission speed to each outlet and wireless access point within the school and a 10Mb backbone.
- Clock System: Wireless with sync to satellite recommended
- Intercom System of the latest technical capabilities for announcements, two-way communications, emergency alerts, and bell schedules. The system can also be integrated with paging groups and zones, as well as door controls.
- In-Building Enhanced Cell coverage via WiFi
- Access Control: IP Based system with integration to existing Bozeman Public Schools requirements
- Audio in selected areas.
- Assisted Learning systems where needed
- IP based CCTV system where required

Low Voltage Design

The project design will be based on the selected option for cabling whether copper or fiber. The individual systems design will be based on the most capable and financially prudent with the overall performance kept in mind.

Fire Alarm

A new, fully intelligent addressable code compliant fire alarm and detection system will be provided per IBC (2012)/IFC (2012) and NFPA 72 (2010). The system will include manual pull-stations, smoke and heat detectors as required by code, and duct detectors to initiate Air Handling Unit fan shutdown.

Occupant notification shall be accomplished using an integral emergency voice/alarm communication system (EV/ACS) as required by IFC (2012). Ceiling mounted devices shall be specified for the majority of locations with a standard color white housing and red lettering.

The fire alarm system will monitor the fire sprinkler system and provide occupant notification throughout the facility upon detection of sprinkler system water flow. The fire alarm control panel will be located in the MDF Room and remote annunciator panels and remote microphones will be located at the main entry vestibule or an area approved by the Authority Having Jurisdiction (AHJ) and in the Main Office.

The fire alarm and detection system will report continuously to a central station reporting agency as required by code and directed by Bozeman Public Schools.

Appendix

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PIONEERING ENVIRONMENTS

MEETING MINUTES

PROJECT: New Bozeman High School (BZNHS)

MEETING MINUTES RECORDED BY: Bob Franzen

MEETING PURPOSE: Building Committee Meeting 1

MEETING DATE: June 6, 2017

ATTENDEES:
Kevin Conwell, BHS (KC)
Ken Gibson, Community Member (KG)
Steve Johnson, BSD7 (SJ)
Todd Swinehart, BSD7 (TS)
Wendy Tage, Trustee (WT)
Rob Watson, Superintendent (RW)
Andy Willett, Board President (AW)
Chuck Winn, CoBzn (CW)
Roger Davis, LA (RD)
Kyle Scarr, TD&H (KS)
Corey Johnson, CTA (CJ)
Jim Beal, CTA (JB)
Nathan Helfrich, CTA (NH)
Bob Franzen, CTA (BF)

Purpose: Review current project status, conduct a visioning exercise, identify site issues and review the overall schedule for the proposed new high school.

1. Project Status
   a. Pre-bond efforts have been assembled in a two volume document. These documents include all of minutes, drawings, images and reports presented throughout the pre-bond effort.
   b. CTAs design team conducted 22 programming meetings with various users and department heads to identify the space needs and requirements for the new high school.
2. Programming
   a. CTA will issue a draft programming document on June 16, 2017 for review by the committee. This document will be reviewed and finalized at the next Building Committee meeting.
   b. CTA will be reviewing opportunities for sharing space throughout the program.
   c. We will be planning on having one lunch period.
   d. The School District (SD) will review the need for block scheduling.
   e. The SD will begin to identify which programs will be offered at which high school. To date we have programmed all current classes for inclusion. The design team will need to be informed of which specific spaces will not be needed in the need building and which spaces will need a place holder for future construction. This pertains mainly to uniquely design spaces such as labs and CTE classrooms. <u>This information will be needed within the next six weeks.</u>

   f. The SD will review the potential of adult education, Gallatin College and other community groups using the new high school. Other community users may include sports camps, local athletic organizations and clubs. This will inform the design on how it may be secured for after school events.
3. Visioning
   a. The following concepts were presented, discussed and agreed upon/approved: (The slides presented follow this document.)
   b. Heritage – the following additional concepts were discussed and added by the group:
      i. How did we get to where we are now
      ii. Pre-western heritage
      iii. Agriculture
      iv. Yellowstone national Park
      v. Geography
      vi. Gallatin County High School
      vii. Honor our past and focus on the future
   c. Diversity
      i. Cave spaces/ intimate spaces combined with large group spaces
   d. Adaptability & Flexibility– the following additional concepts were discussed and added by the group:
      i. Design on a module
      ii. Furniture on wheels
      iii. Combined classrooms
      iv. Operable walls
      v. Acoustic separation / contain sound
      vi. Life cost of movable partitions
      vii. Durability Balance
      viii. Ability to store/stage equipment equipment/furniture
      ix. Management of storage
   e. Discovery and Exploration
      i. Learning on display
      ii. Transparency
   f. Community
      i. Industry Partners
      ii. Indoor-outdoor connections
      iii. Industry partners
   g. Cross pollination– the following additional concepts were discussed and added by the group:
      i. Display / Art / Information – Walls as a palette
      ii. Collaboration between departments
      iii. Creation
      iv. Innovation
   h. Learning Street– the following additional concepts were discussed and added by the group:
      i. "Want to be there"
      ii. Learning on display – can't be a distraction
      iii. Connections to natural light and views
4. Site Updates
   a. Annie Street
      i. KS developed a draft memo outlining the rational for eliminating automobile traffic on Annie Street within the high school campus. A draft copy of the memo is attached. A definition of a Bicycle Boulevard is also attached.

b. Soccer Fields
   i. SJ and TS have attend a meeting with the City of Bozeman to begin discussions in preparation for an intergovernmental agreement where the school district would construct parking and a soccer filed directly north of Oak Street on City owned property for use by both entities.
   ii. CTA and TD&H are to develop initial site concepts locating the proposed parking and soccer fields north of Oak Street for review.
c. Easements
   i. The scope of easements was briefly discussed. KS will provide exhibits to the School District for use in discussions with the land owners.

5. Schedule
   a. BF briefly presented the proposed project schedule.
   b. Regular involvement/meetings with the Design Team and Building Committee will be schedule every 3 weeks through October 2017.
   c. The dates of regular Board meetings is to be added to the schedule.
   d. A copy of the project schedule is attached.
6. Attachments
   a. Visioning session Images
   b. Draft memo regarding the intentions of Annie Street
   c. Definition of a Bicycle Boulevard
   d. Schedule

END OF MEETING MINUTES

The foregoing is the author's understanding of the content of this meeting. If the attendee's understanding differs from the above, please respond to the author within ten calendar days.

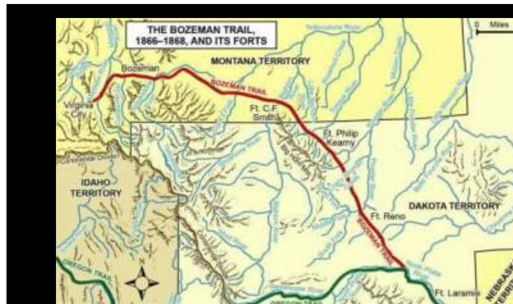
CTA ARCHITECTS ENGINEERS

cc: Attendees
Scott Wilson, CTA
Kasey Wells, CTA

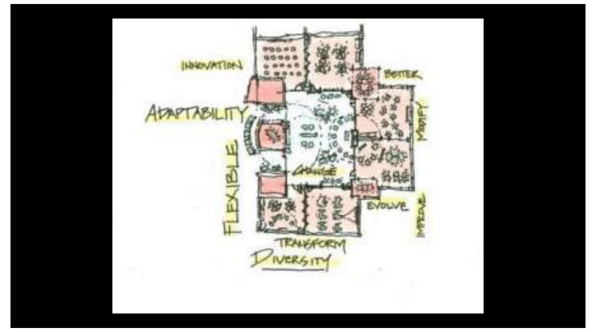
http://www.ctagroup.com E-mail: info@ctagroup.com

- HERITAGE
- DIVERSITY
- ADAPTABILITY & FLEXIBILITY
- DISCOVERY & EXPLORATION
- COMMUNITY
- CROSS POLLINATION
- LEARNING STREET

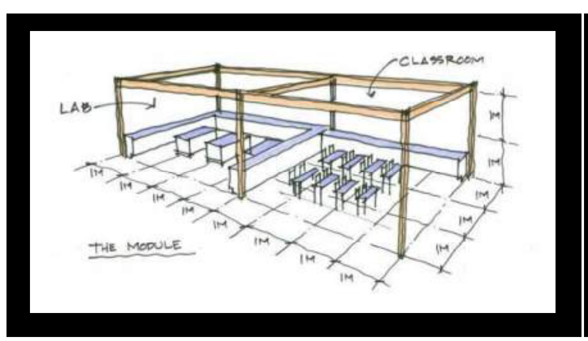
HERITAGE



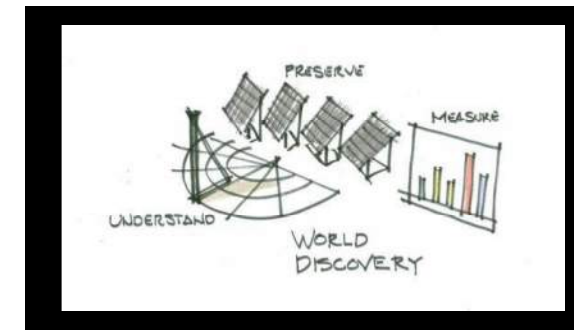
DIVERSITY

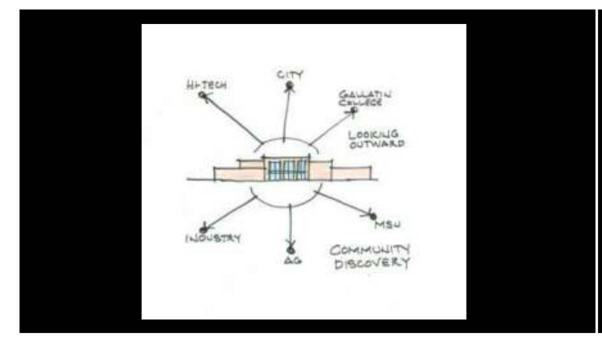


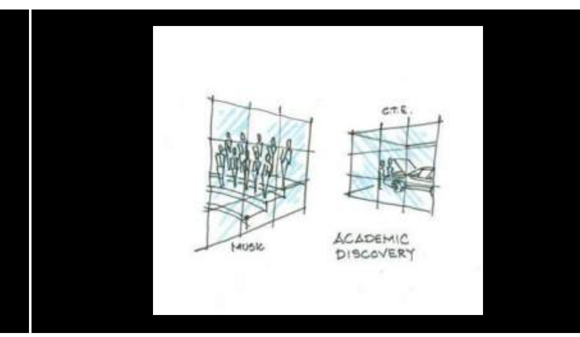
ADAPTABILITY &
FLEXIBILITY

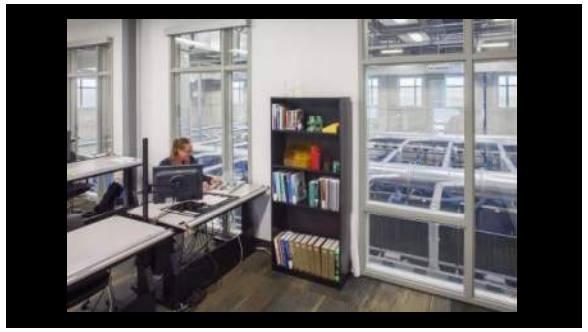


DISCOVERY &
EXPLORATION









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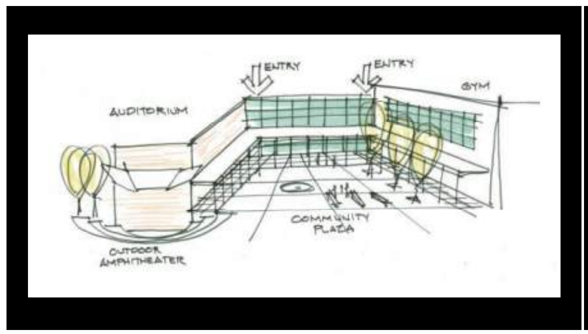
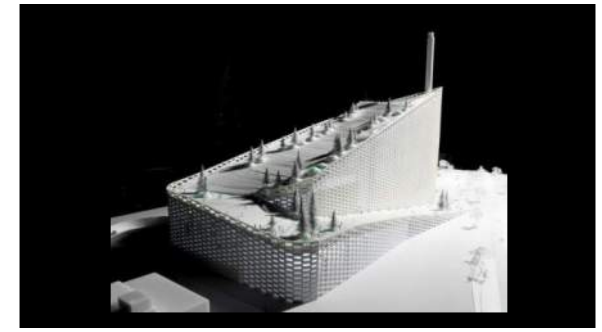
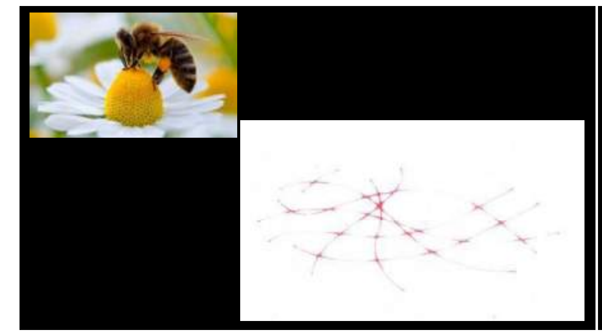
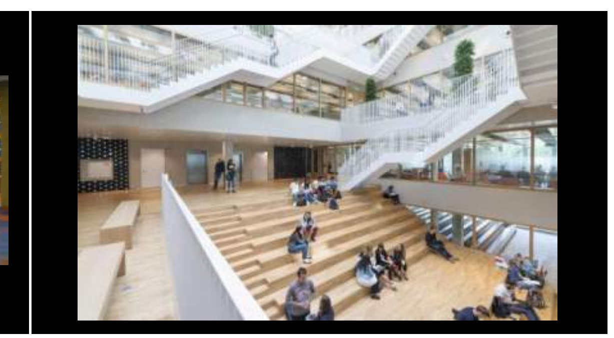


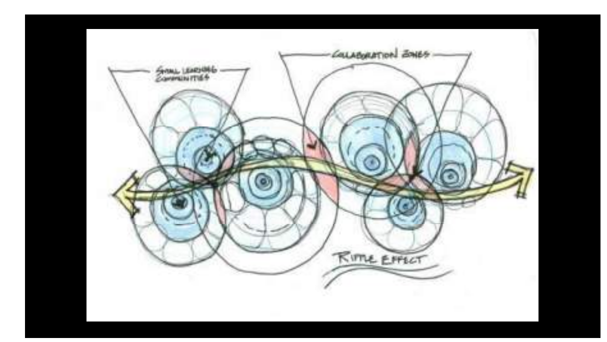


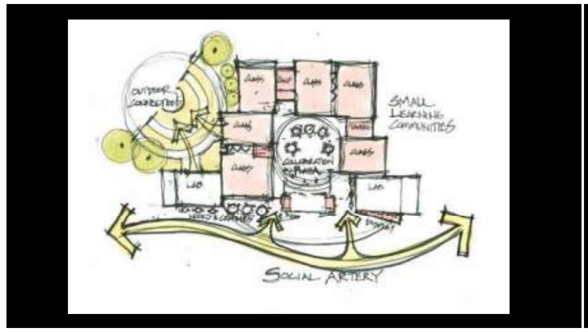
CROSS POLLINATION

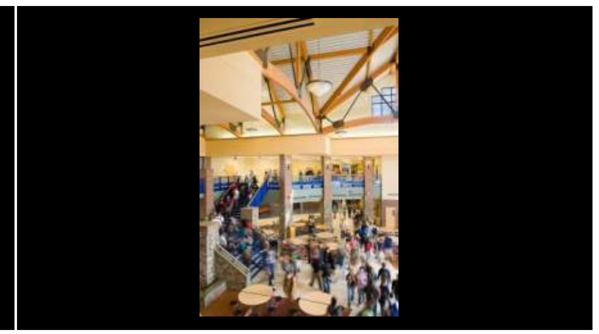


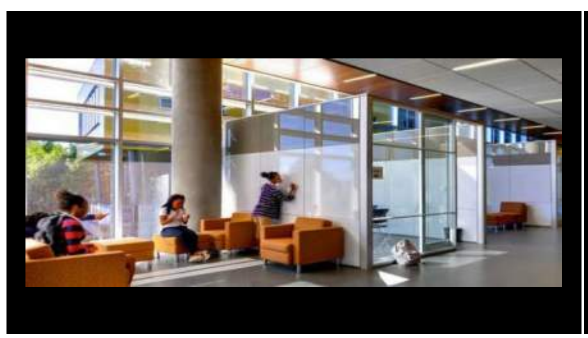


LEARNING STREET









234 East Babcock Street
Suite 3
Bozeman, MT 59715

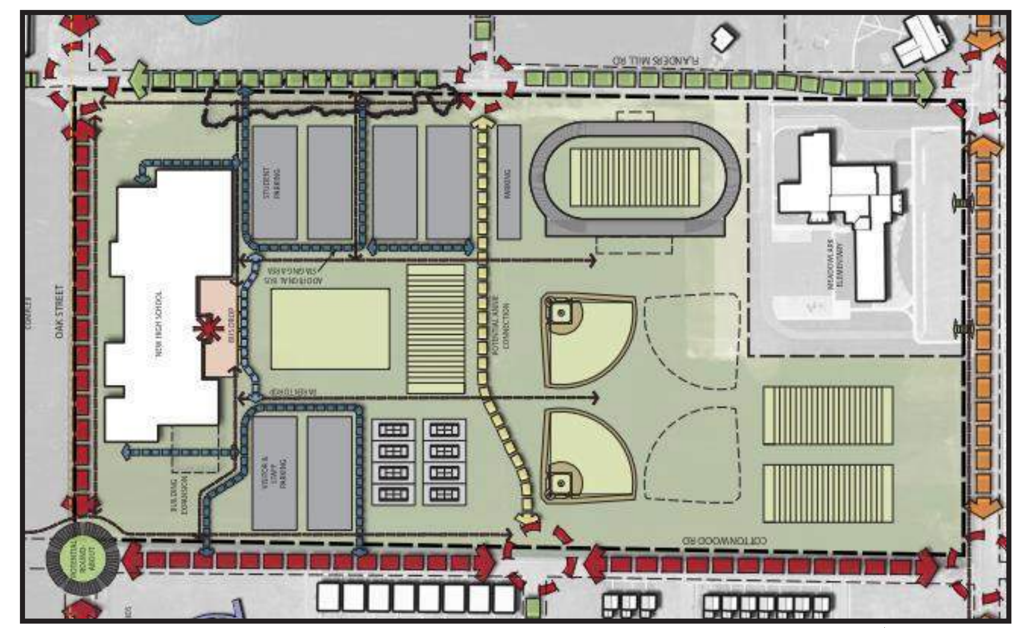
TD&H Engineering

406.586.0277
tdhengineering.com

MEMORANDUM

Date:		**TDH Job No.:**	B16-100-021
To:	City of Bozeman, Engineering Department and Commission		
From:	Kyle Scarr, P.E.		
Subject:	Annie Street Improvements		

With the passing of the Bozeman School District (District) bond this May, the detailed design and layout of the proposed new Bozeman High School campus has been initiated. The location of this campus is uniquely located between three arterial streets (Oak Street, Cottonwood Road, and Durston Road) and adjacent to the Meadowlark Elementary School. A schematic layout of the campus is shown on Figure 1.



North

Figure 1.

The overall development plan of the campus has changed since the District originally purchased the southern 43 acres and constructed Meadowlark Elementary School in 2012. The original plan was to construct Meadowlark Elementary School in its current location and a new middle school to the west. When the southern portion of the campus was purchased, it was not anticipated that the District would also purchase the northern 32 acres nor was it anticipated that a new high school would be constructed to the north. As a result of this considerable change in the proposed campus development, the District would like to forgo building Annie Street from Flanders Mill Road to Cottonwood Road, effectively bisecting the campus.

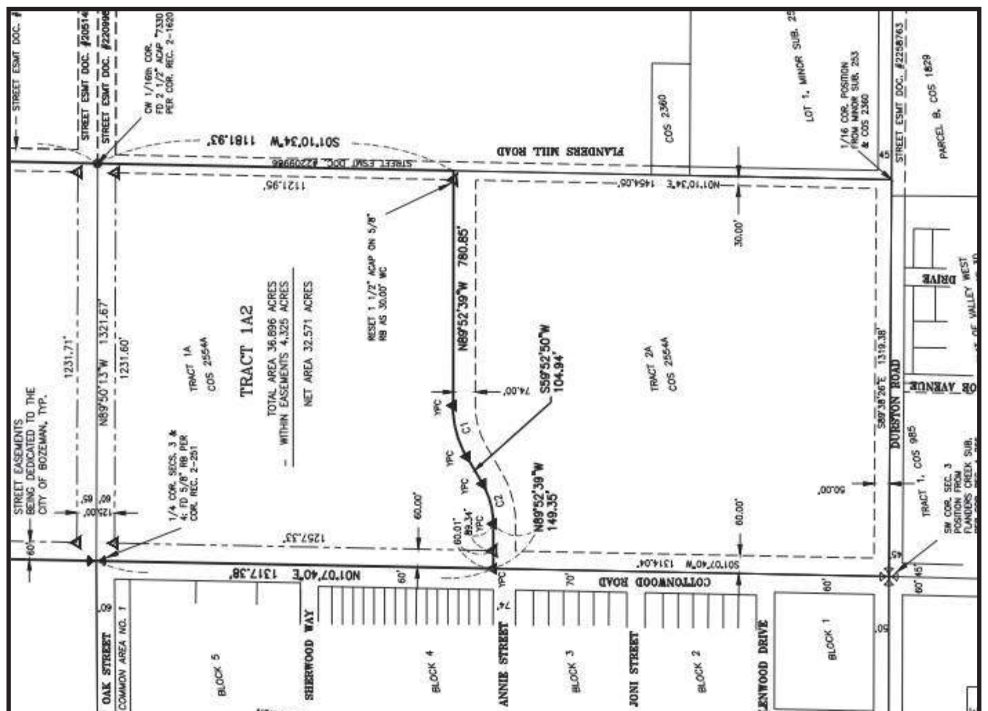


Figure 2.
COS 2554B

According to the recently adopted Bozeman Transportation Master Plan (TMP), Annie Street is planned as a local street and is further classified as a bike boulevard (See attached Figure 4.5 Bicycle Facility Recommendations and Figure 6.2 Visionary Active Transportation Network from the TMP). A bicycle boulevard is defined as "streets that are comfortable for most bicyclists to ride on due to low motorized traffic volumes and speeds." According to the TMP, these types of streets are specifically designed to reduce cut-through traffic. Additionally, local streets are meant to provide direct access to abutting lands and not cut-through traffic. It is the District's intent to keep this corridor's functionality as a bike and pedestrian travel way and meet the objectives of the TMP. Specifically, the following goals will be achieved.

1. Due to the size of the school campus, the intent of the bicycle boulevard can be reasonably met with an east/west pedestrian and bike path that connects from Cottonwood Road to Flanders Mill Road along the current Annie Street right-of-way alignment. This puts precedence on active transportation networks and non-motorized modes of transportation. The proposed pathway could be designed to accommodate emergency vehicles as well.
2. Having a break in Annie Street reinforces the bicycle boulevard concept and achieves the TMP goal of reducing cut-through traffic bicycle boulevards and local streets. Typical bicycle boulevard treatments include diverters that block through motorized vehicle traffic.
3. Direct access to abutting lands, or in this case the school campus, will be achieved through strategically placed access routes off Cottonwood Road and Flanders Mill Road that provide circulation for busses, students, teachers, and visitors. Access to the campus from Cottonwood Road and Flanders Mill Road will occur along the Annie Street right-of-way alignment, they just won't connect to each other.

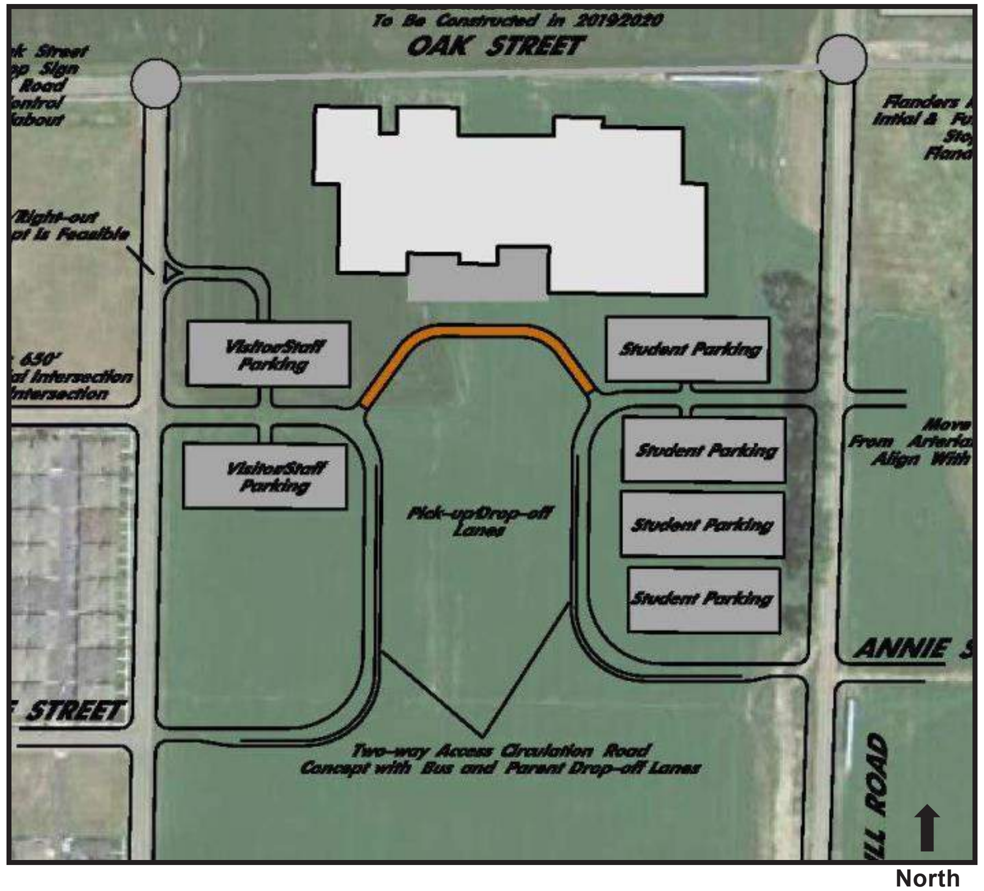


Figure 3.
TMP Objectives

If Annie Street is fully constructed between Cottonwood Road and Flanders Mill Road, the District has concerns with student safety. Several of the sports and play fields will be located south of the current Annie Street right-of-way. There will be considerable north/south pedestrian traffic across this right-of-way. The amount of pedestrian traffic will be even further intensified as a result of the proposed pedestrian tunnel connecting the campus with the Bozeman Sports Park complex north of Oak Street. Large scale events using both the Sport Park and District fields will generate additional pedestrian traffic across Annie Street. The majority of this pedestrian traffic will be elementary to high school aged students who may not be as cognizant of traffic when crossing streets or experienced in dealing with traffic, creating a potential for conflict.

While we understand the benefit of a grid transportation system, it is common for a double-A high school sized campus to interrupt local streets. We are fortunate at this site to have three arterial streets adjacent to the campus that can and should be used for through

traffic. Durston Road and Oak Street provide east/west connection while Cottonwood Road provides north/south connection. Vehicles wanting to cut through on Annie Street will be redirected south to Durston Road or north to Oak Street, which is preferred. According to the project Traffic Impact Study, which is attached, removing possible Annie Street link has minimal impact on the local transportation network (see page 29). The District feels the increase in student and pedestrian safety created by not completing a motorized vehicle link at Annie Street justifies the limited impact to the local motorized transportation network.

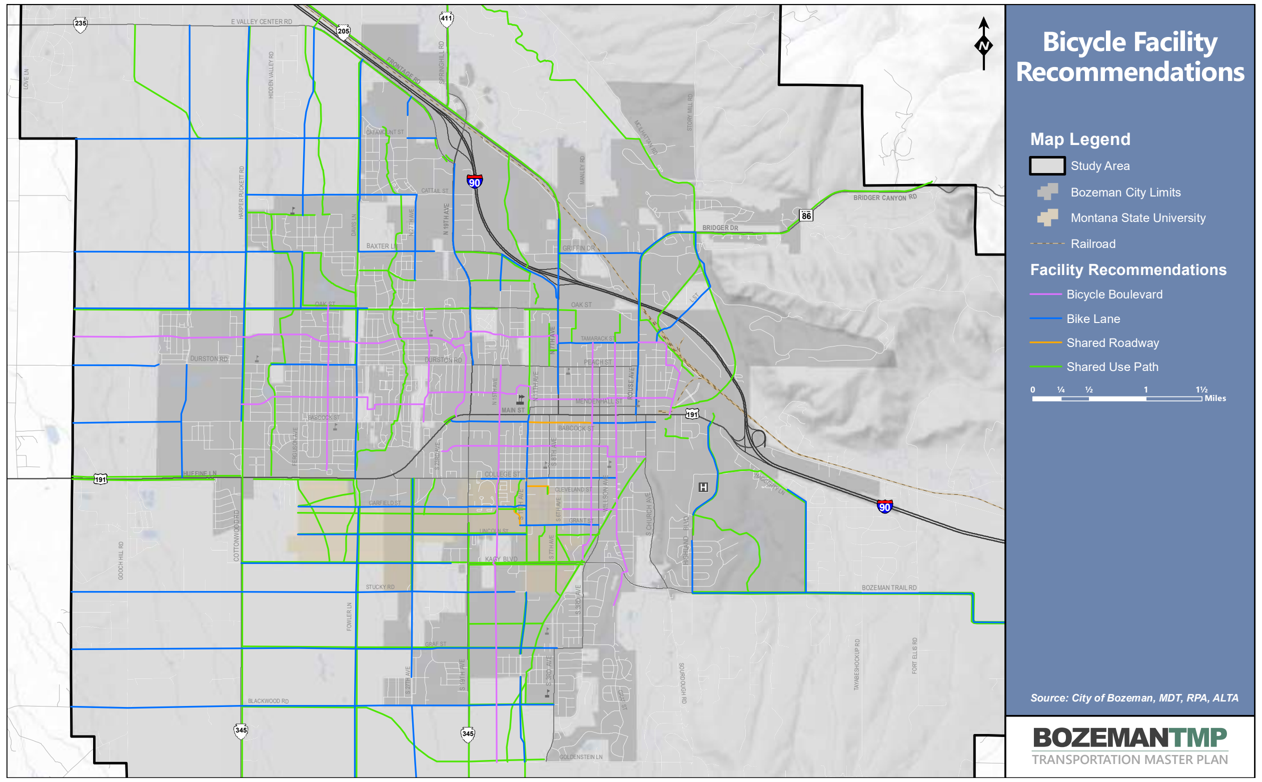


Figure 4.5: Bicycle Facility Recommendations

BOZEMAN MT
Transportation Master Plan

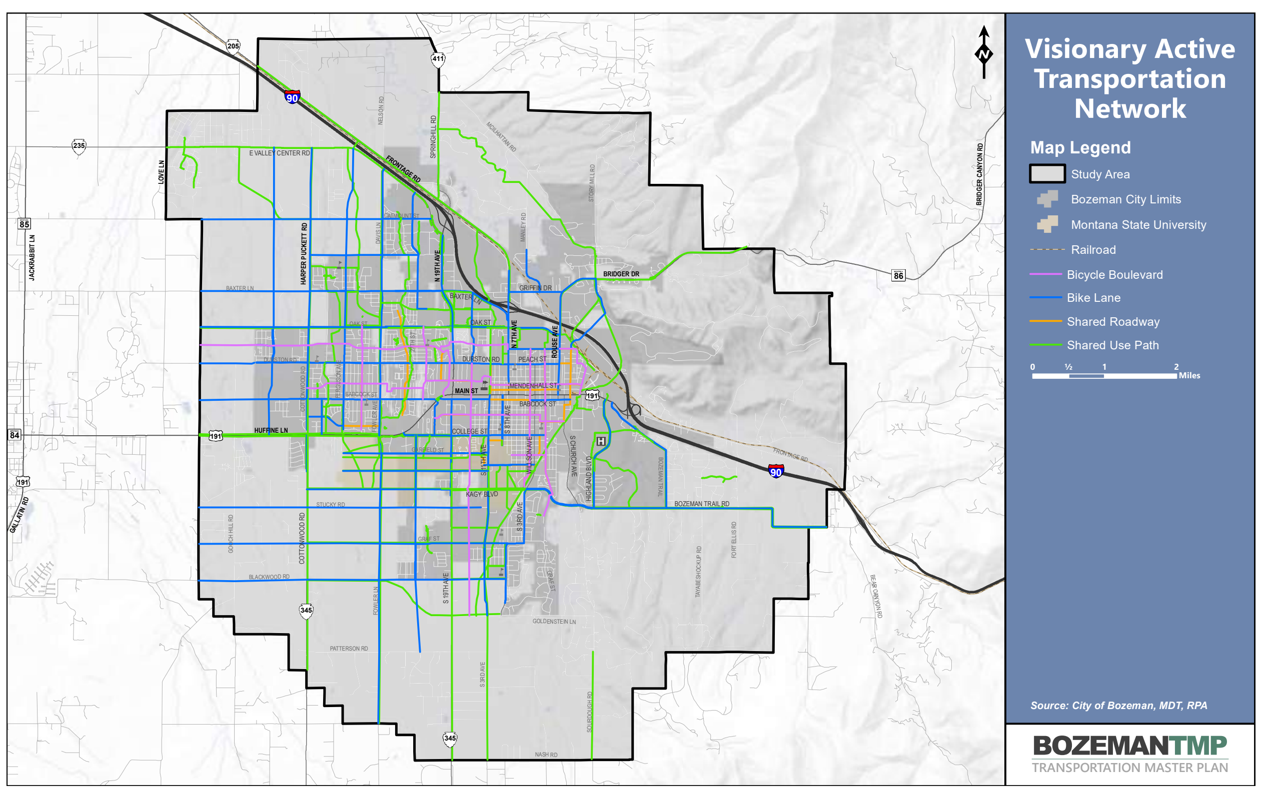


Figure 6.2: Visionary Active Transportation Network

BOZEMAN MT
Transportation Master Plan

Shared-use Paths

Shared-use paths are off-street paved trails that are designated for the use of bicyclists, pedestrians, and other non-motorized users such as skateboarders and rollerbladers. Examples include the Oak Street shared-use path and the College Street to Huffine Lane pathway. Bozeman has approximately 23 miles of shared-use paths.

Bicycle Boulevards

Bicycle boulevards are streets that are comfortable for most bicyclists to ride on due to low motorized traffic volumes and speeds. They are designed to give bicycle travel priority. Bicycle boulevards are designated with signs, pavement markings, and wayfinding elements. Additionally, they create safe, convenient bicycle crossings of busy arterial streets. If necessary, they can also employ speed or volume management techniques to keep them comfortable for bicyclists by reducing speeds and cut-through traffic. The city of Bozeman has not officially designated any streets as bicycle boulevards, however, there are many streets that currently have many of these features including pavement markings, wayfinding signage, and even a diverter, such as South 6th Avenue.

Separated Bike Lanes

While not currently found in Bozeman, separated bike lanes combine the user experience of a separate path with the on-street infrastructure of conventional bike lanes through various forms of physical separation from adjacent traffic. Two such facilities are currently in place in Missoula.

BOZEMAN MT
Transportation Master Plan

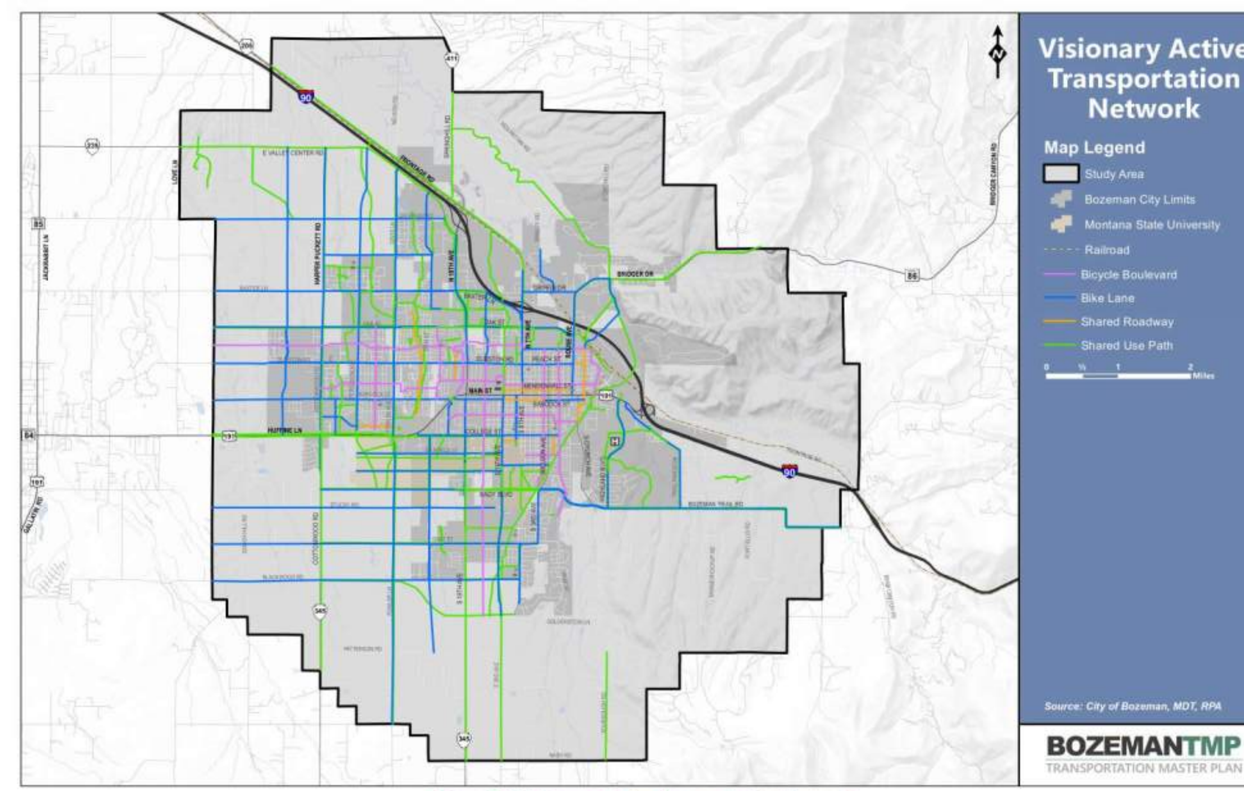


Figure 6.2: Visionary Active Transportation Network

NEW BOZEMAN HIGH SCHOOL TRAFFIC IMPACT STUDY

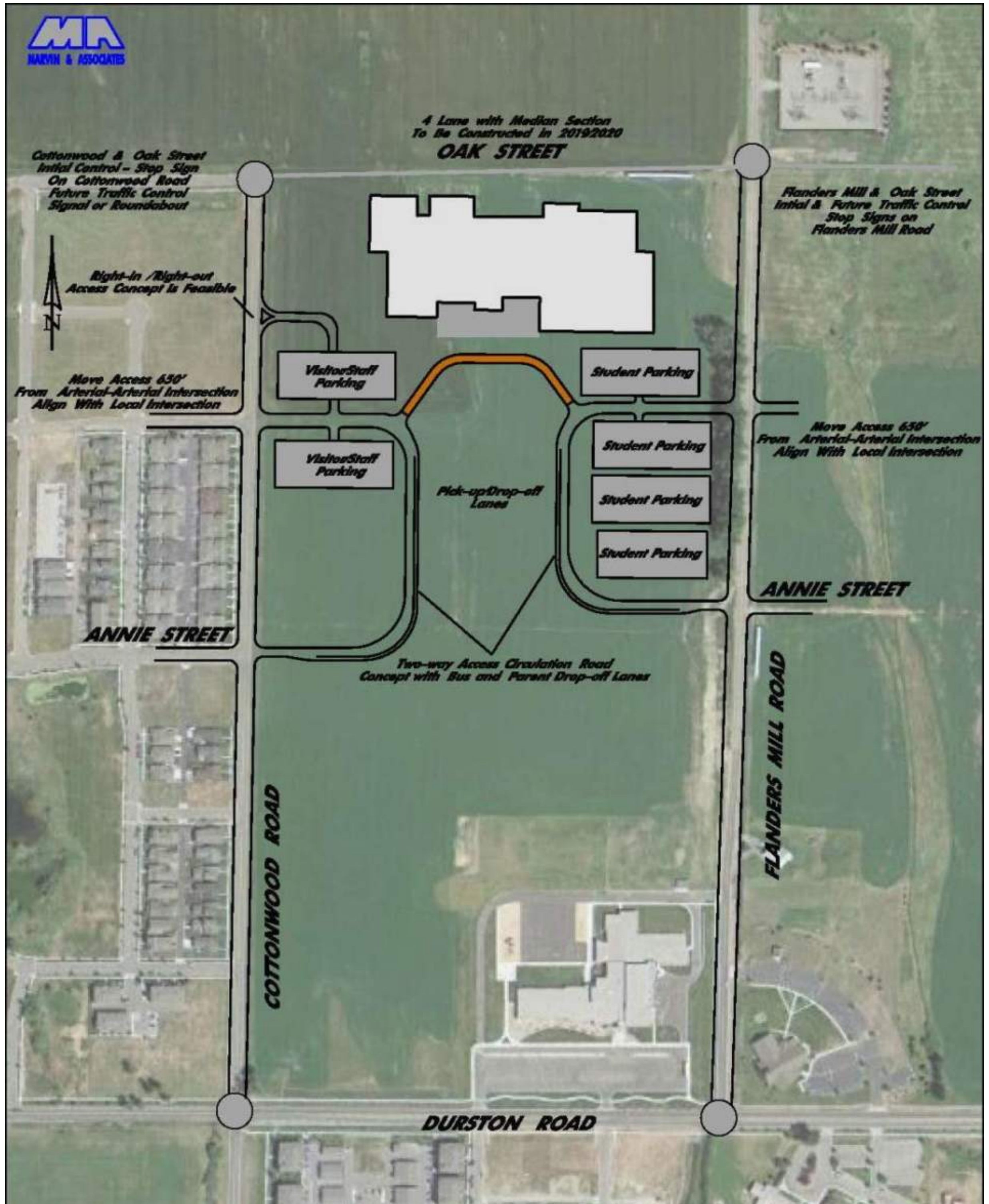
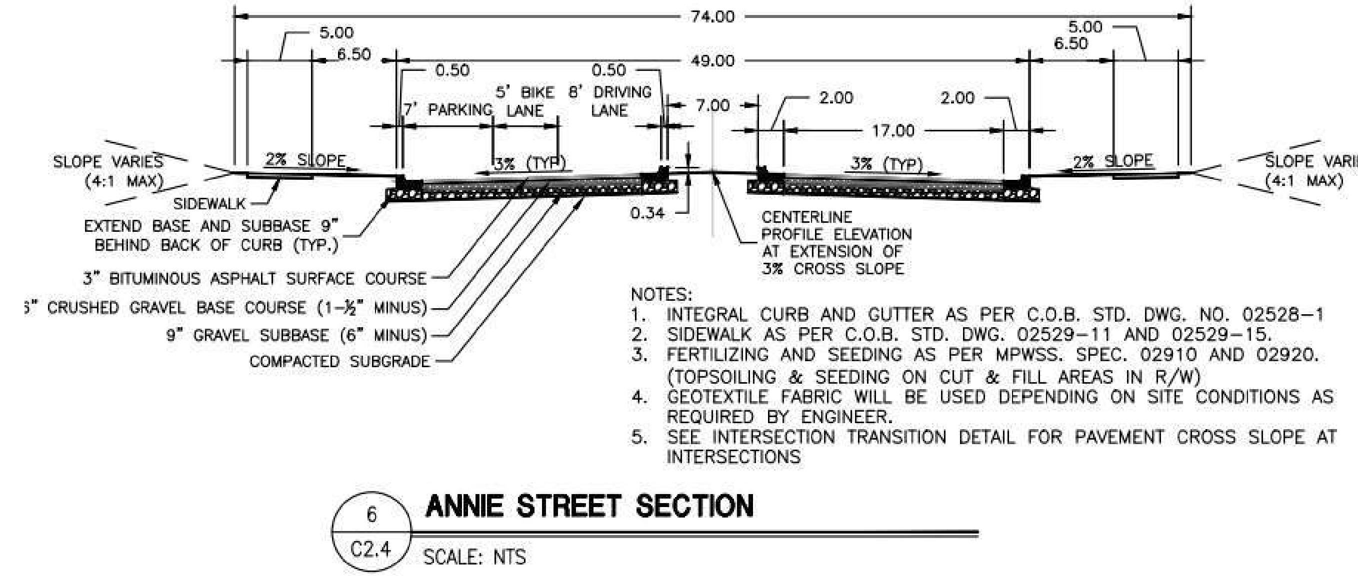
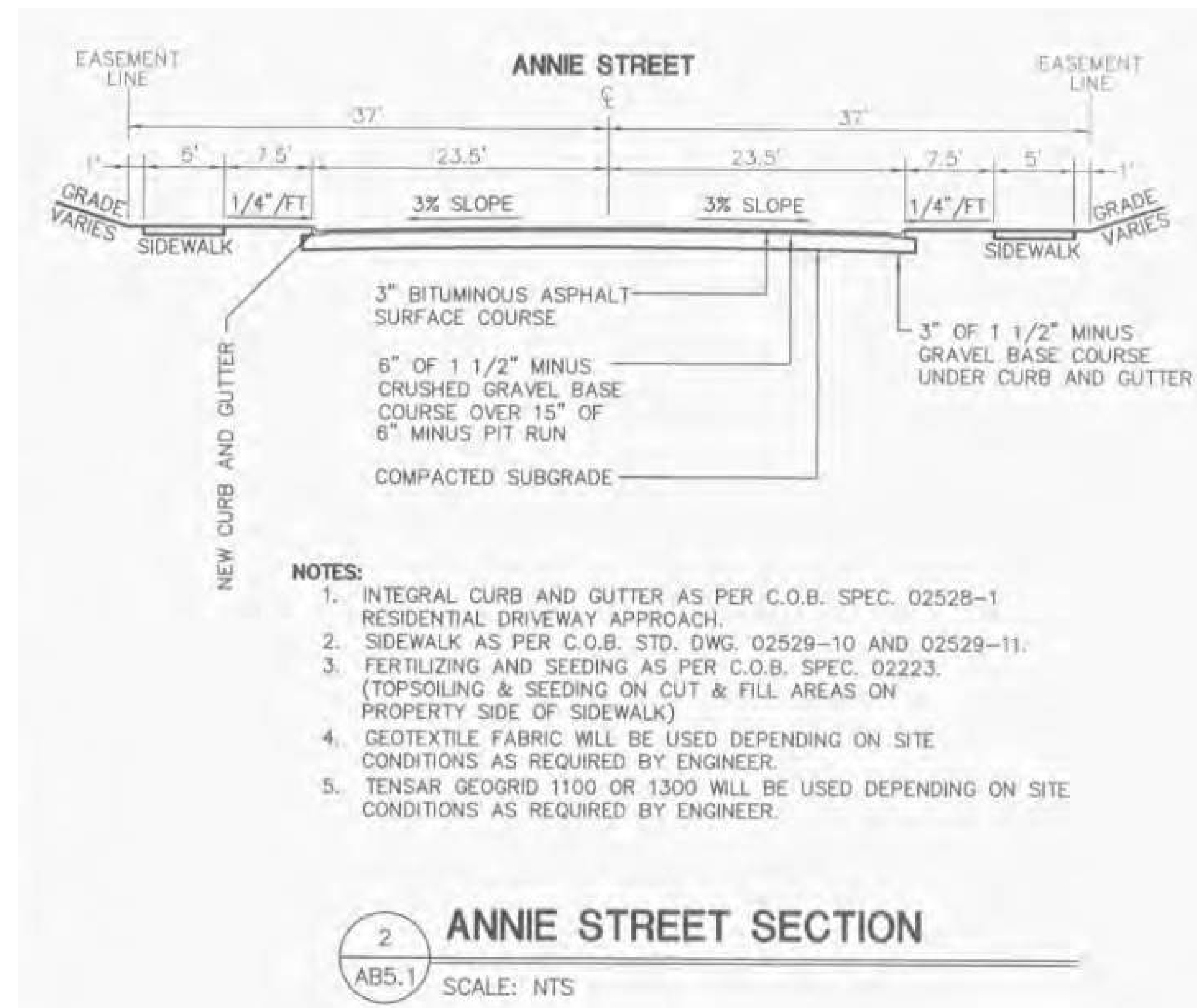
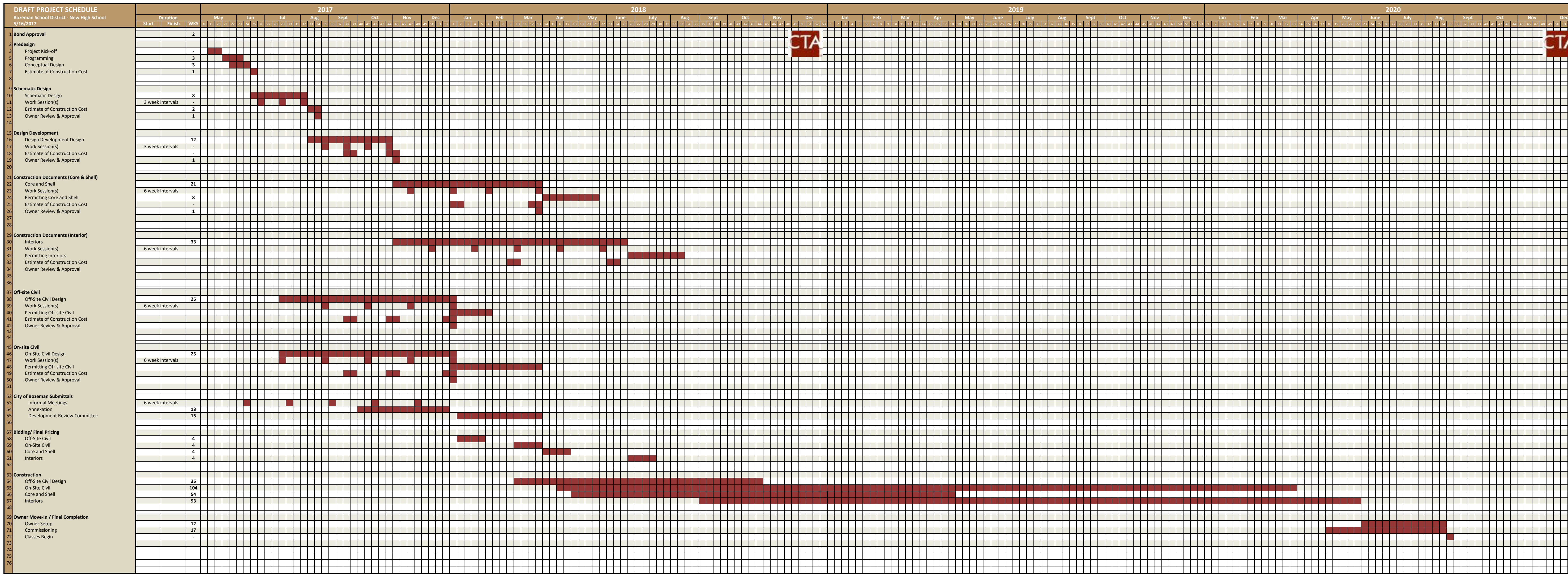


Figure 9. Recommended Improvements and Circulation Concepts

MARVIN & ASSOCIATES 1/30/2017 32






DRAFT PROJECT SCHEDULE
Bozeman School District - New High School
5/16/2017
Duration
Start
Finish
WKS
2017
2018
2019
2020
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
June
July
1 Bond Approval 2
2 Predesign
3 Project Kick-off -
5 Programming 3
6 Conceptual Design 3
7 Estimate of Construction Cost 1
8
9 Schematic Design
10 Schematic Design 8
11 Work Session(s) 3 week intervals -
12 Estimate of Construction Cost 2
13 Owner Review & Approval 1
14
15 Design Development
16 Design Development Design 12
17 Work Session(s) 3 week intervals -
18 Estimate of Construction Cost -
19 Owner Review & Approval 1
20
21 Construction Documents (Core & Shell)
22 Core and Shell 21
23 Work Session(s) 6 week intervals
24 Permitting Core and Shell 8
25 Estimate of Construction Cost -
26 Owner Review & Approval 1
27
28
29 Construction Documents (Interior)
30 Interiors 33
31 Work Session(s) 6 week intervals
32 Permitting Interiors
33 Estimate of Construction Cost
34 Owner Review & Approval
35
36
37 Off-site Civil
38 Off-Site Civil Design 25
39 Work Session(s) 6 week intervals
40 Permitting Off-site Civil
41 Estimate of Construction Cost
42 Owner Review & Approval
43
44
45 On-site Civil
46 On-Site Civil Design 25
47 Work Session(s) 6 week intervals
48 Permitting Off-site Civil
49 Estimate of Construction Cost
50 Owner Review & Approval
51
52 City of Bozeman Submittals
53 Informal Meetings 6 week intervals
54 Annexation 13
55 Development Review Committee 15
56
57 Bidding/ Final Pricing
58 Off-Site Civil 4
59 On-Site Civil 4
60 Core and Shell 4
61 Interiors 4
62
63 Construction
64 Off-Site Civil Design 35
65 On-Site Civil 104
66 Core and Shell 54
67 Interiors 93
68
69 Owner Move-In / Final Completion
70 Owner Setup 12
71 Commissioning 17
72 Classes Begin -
73
74
75
76
CTA

MEETING MINUTES

PIONEERING ENVIRONMENTS

PROJECT: New Bozeman High School (BZNHS)

MEETING MINUTES RECORDED BY: Bob Franzen

MEETING PURPOSE: Building Committee Meeting 2

MEETING DATE: June 30, 2017

ATTENDEES:
Kevin Conwell, BHS (KC)
Ken Gibson, Community Member (KG)
Todd Swinehart, BSD7 (TS)
Wendy Tage, Trustee (WT)
Rob Watson, Superintendent (RW)
Andy Willett, Board President (AW)
Chuck Winn, CoBzn (CW)
Roger Davis, LA (RD)
Bill Langlas, LA (BL)
Kyle Scarr, TD&H (KS)
Jami Lorenz, BCE (JL)
Scott Wilson, CTA (SW)
Corey Johnson, CTA (CJ)
Jim Beal, CTA (JB)
Nathan Helfrich, CTA (NH)
Wes Baumgartner, CTA (WB)
Bob Franzen, CTA (BF)

Purpose: Review current programming status, conceptual design options, site design options and Oak Street pedestrian crossing options.

1. Programming
   a. CTA issued a draft programming document on June 16, 2017 for review by the Building Committee.
   b. The school district is to identify which programs will be offered at which high school. To date we have programmed all current classes for inclusion. The design team will need to be informed of which specific spaces will not be needed in the need building and which spaces will need a place holder for future construction. This pertains mainly to uniquely design spaces such as labs and CTE classrooms. This information is to be provided on or before July 19, 2017.
   c. The school district is to review the potential of adult education, Gallatin College and other community groups using the new high school. Other community users may include sports camps, local athletic organizations and clubs. This will inform the design on how the building may be secured for after school events.
   d. In addition to the questions provided on June 16, 2017 please add the following:

   e. What type of food service distribution do we want: Servery – similar to the existing, Foodcourt - Single kitchen with 3-4 windows, or Multiple Offerings - Primary Kitchen, Soup/Sandwich Bar, Coffee Bar (Library)

2. Conceptual Design
   a. CTA developed and presented three conceptual design schemes for the new building and site. All concepts are anticipated to conform with Construction Type II A or B per the 2012 International Building Code.
   b. Radial
      i. Two-story building with a footprint of 206,511 square feet.
      ii. General Comments
         1. Liked having classrooms near CTE – provided exposure to CTE curriculum.
         2. Preferred a more direct access to the north parking and playing fields.
         3. Prefer to have the library stacked.
         4. Site plan reflected the angle of the gymnasium wing
         5. Consider a three story version of this concept
         6. Liked the single core/town center
         7. Contained public well
         8. Liked open central library
         9. Easily expanded
         10. Mid-priced to construct
         11. Consider placing spaces on the north side of the gymnasiums to break up the two story wall.
   c. Core
      i. Three-story building with a footprint of 154,259 square feet.
      ii. General comments
         1. All spaces have access to the center community space/town center.
         2. Appeared institutional
         3. Least expensive to construct
         4. Formal site design to play off of the building
         5. Liked the roof top green spaces
         6. Difficult to expand
   d. Array
      i. Two-story building with a footprint of 208,850 square feet.
      ii. General comments
         1. Liked Library as part of learning street
         2. Liked the combined service area for the kitchen and CTE
         3. Concern of congestion of students during class change
         4. Preferred to have the majority of classrooms facing south
         5. Would like to see a single commons/town center
         6. Good face to Oak Street
         7. Site plan is more park like/ informal
         8. Liked the separation of Music and auditorium from the classrooms
   e. CTA is to look at the following in the next version of the concepts:
      i. Combine the Array and Radial concepts
      ii. Two verses three story options
      iii. Consider fewer classrooms by CTE
      iv. Capitalize on southern exposures when possible
      v. Develop site plan to match new concept following the park like concept
      vi. Push the building to the north as much as reasonable
      vii. Try to leave a future site at the south end of the site off Durstin for future sale option.

MEETING MINUTES (Continued)

3. Site Design
    a. Crossing Oak Street
        i. KS presented three possibilities of crossing Oak Street
            1. Tunnel (below existing grade, partially below grade, and at grade)
            2. Grade crossing (least expensive to construct)
            3. Bridge crossing (most expensive to construct)
        ii. General Comments
            1. The below grade and partially below grade crossings would be below the water table and be less visible.
            2. The bridge would have very long ramps at each end.
            3. The at grade crossing would be considered a mid-block crossing that would require a signal. This is the leased preferred option by the traffic engineer.
        iii. CTA is to continue to develop the at grade tunnel crossing option.
    b. Annie Street
        i. TS, KS, and BF have scheduled a meeting with the City of Bozeman Planning and Engineering Departments on July 6, 2017 to discuss the need to have Annie Street bisect the high school campus. The City's current direction is to have Annie Street continue through the high school site.

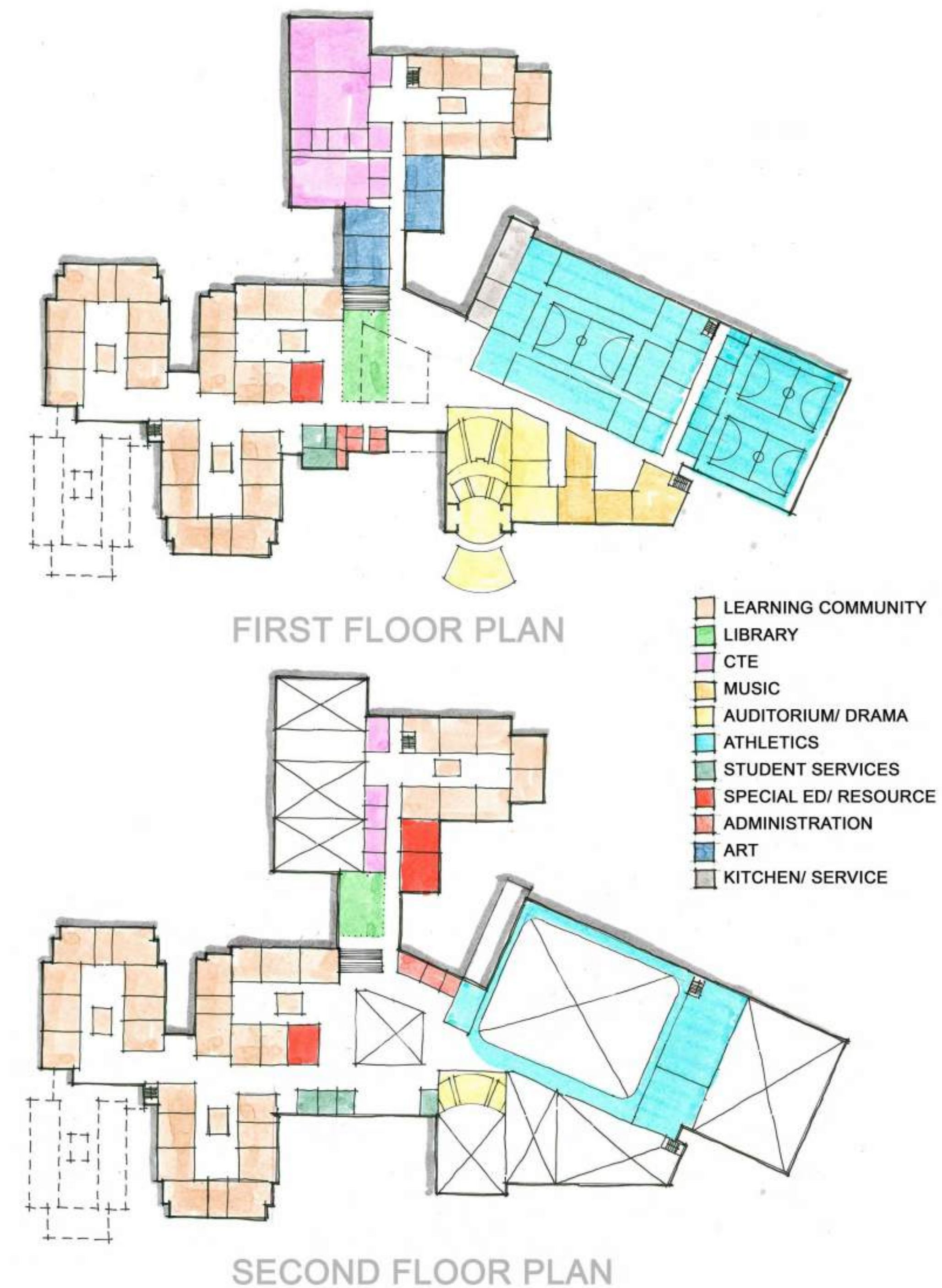
4. Attachments
    a. Radial - site plan and floor plan
    b. Core - site plan and floor plan
    c. Array - site plan and floor plan
    d. Oak Crossing options

END OF MEETING MINUTES

The foregoing is the author's understanding of the content of this meeting. If the attendee's understanding differs from the above, please respond to the author within ten calendar days.

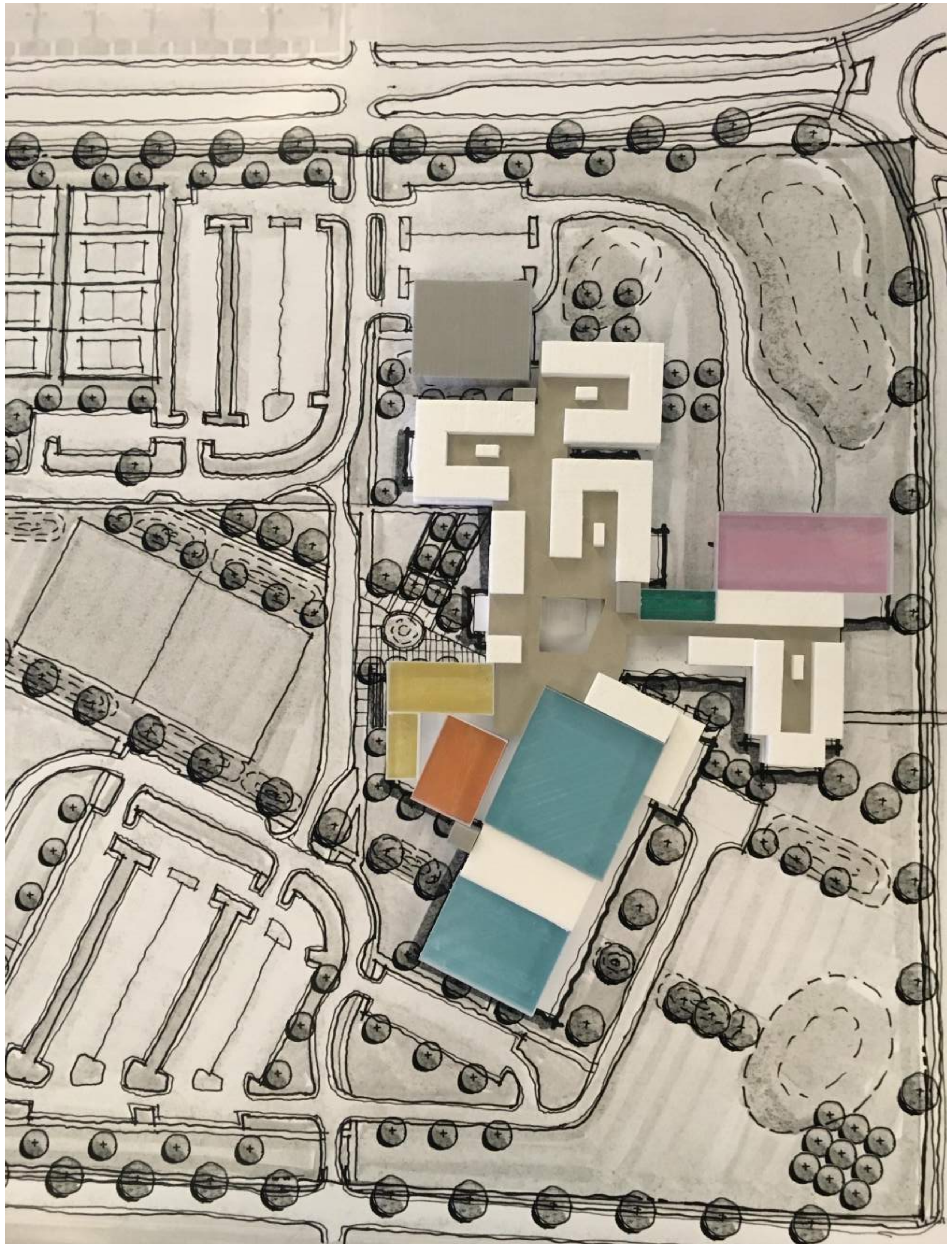
CTA ARCHITECTS ENGINEERS

cc: Attendees
Steve Johnson, BSD7
Kasey Wells, CTA



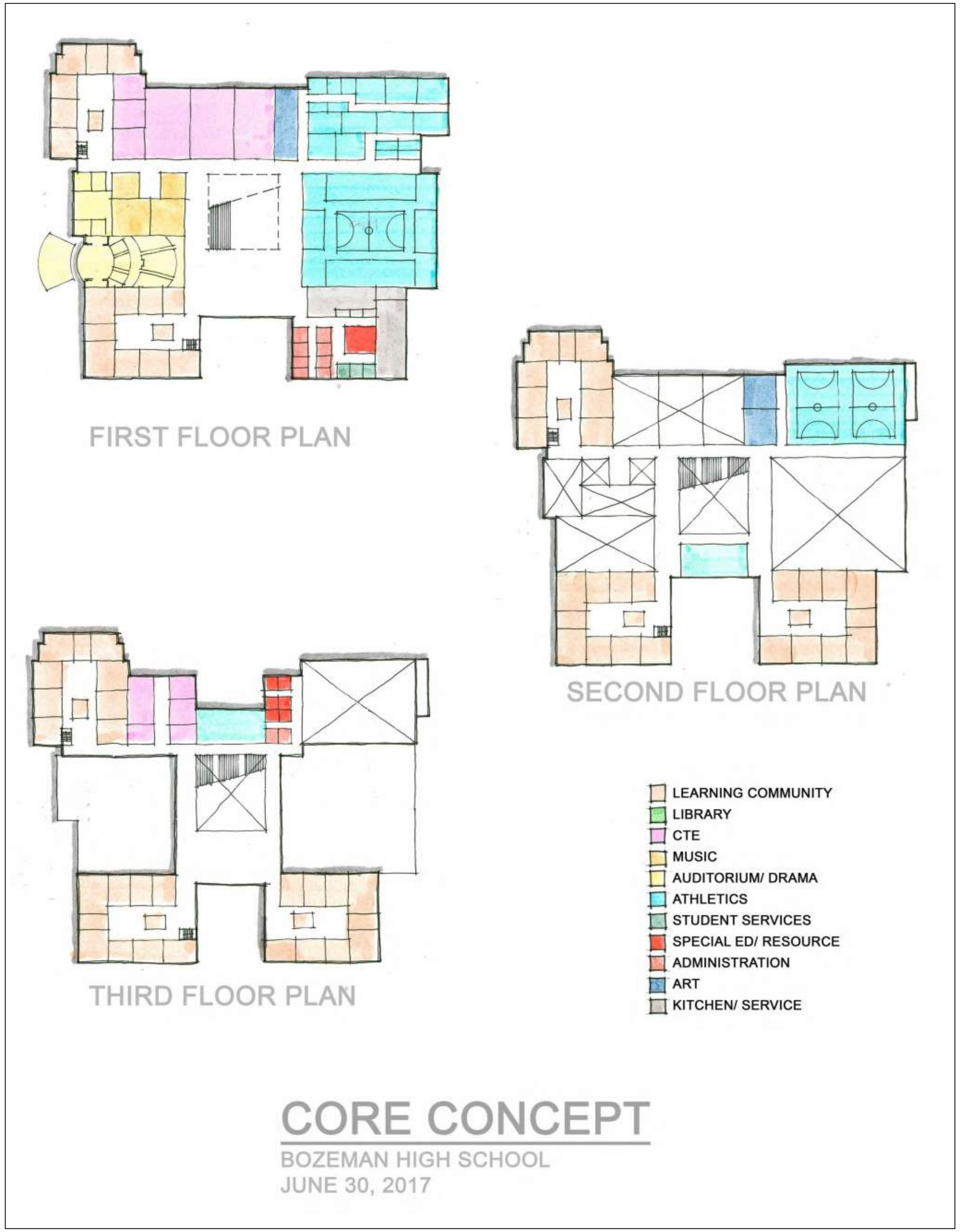
RADIAL CONCEPT

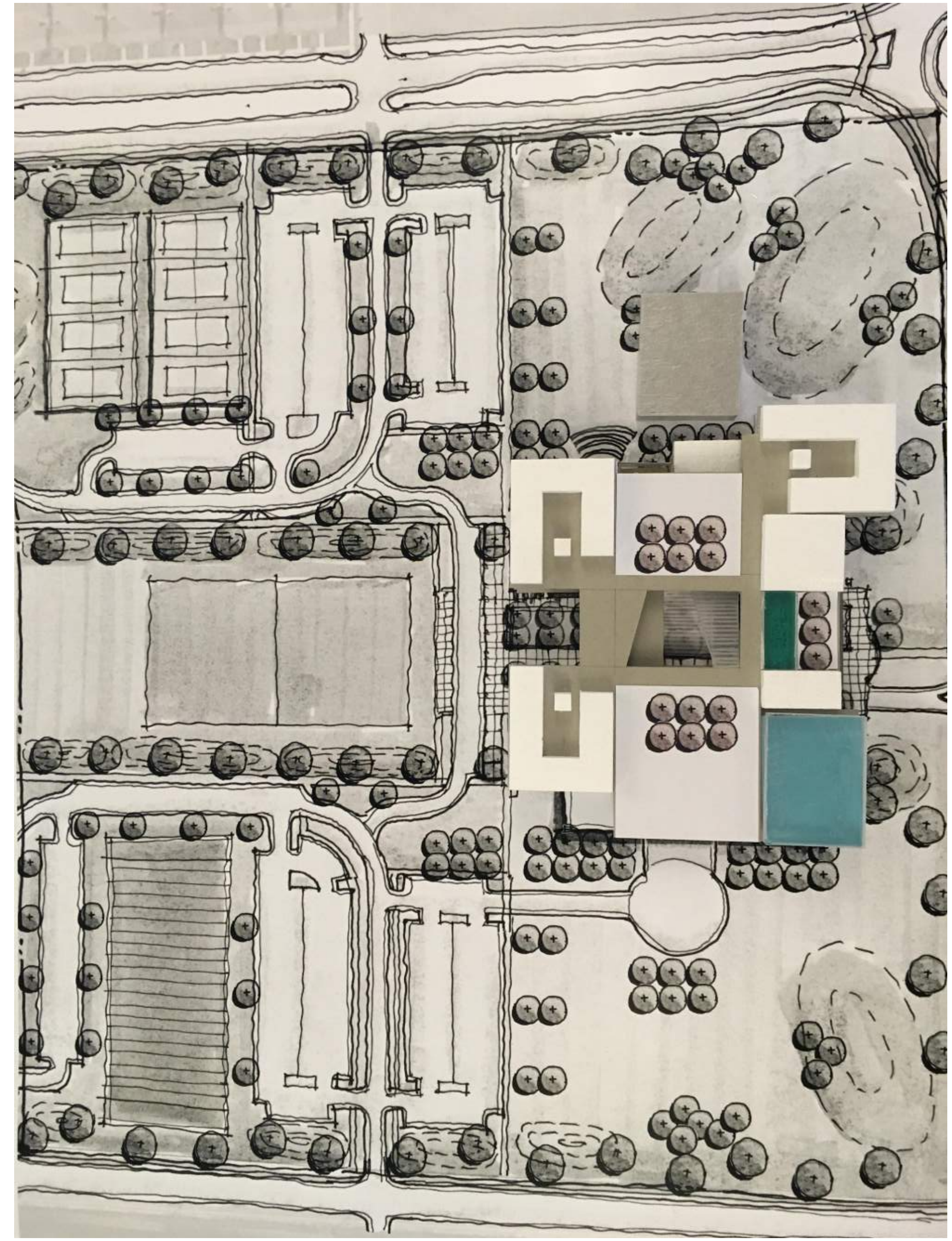
BOZEMAN HIGH SCHOOL
JUNE 30, 2017

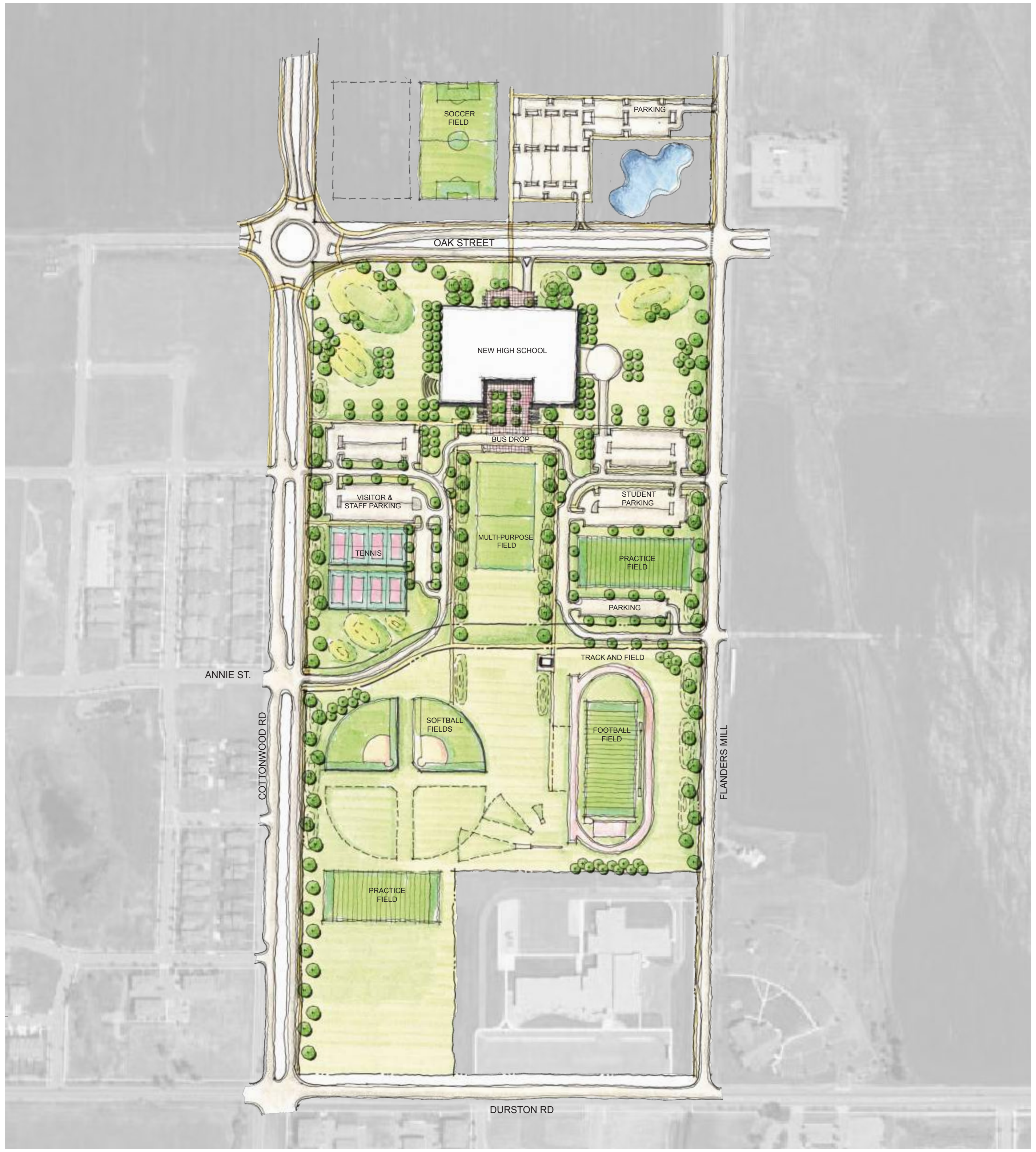


RADIAL CONCEPT

NEW BOZEMAN HIGH SCHOOL
JUNE 30, 2017


FIRST FLOOR PLAN
SECOND FLOOR PLAN
THIRD FLOOR PLAN
LEARNING COMMUNITY
LIBRARY
CTE
MUSIC
AUDITORIUM/ DRAMA
ATHLETICS
STUDENT SERVICES
SPECIAL ED/ RESOURCE
ADMINISTRATION
ART
KITCHEN/ SERVICE
CORE CONCEPT
BOZEMAN HIGH SCHOOL
JUNE 30, 2017





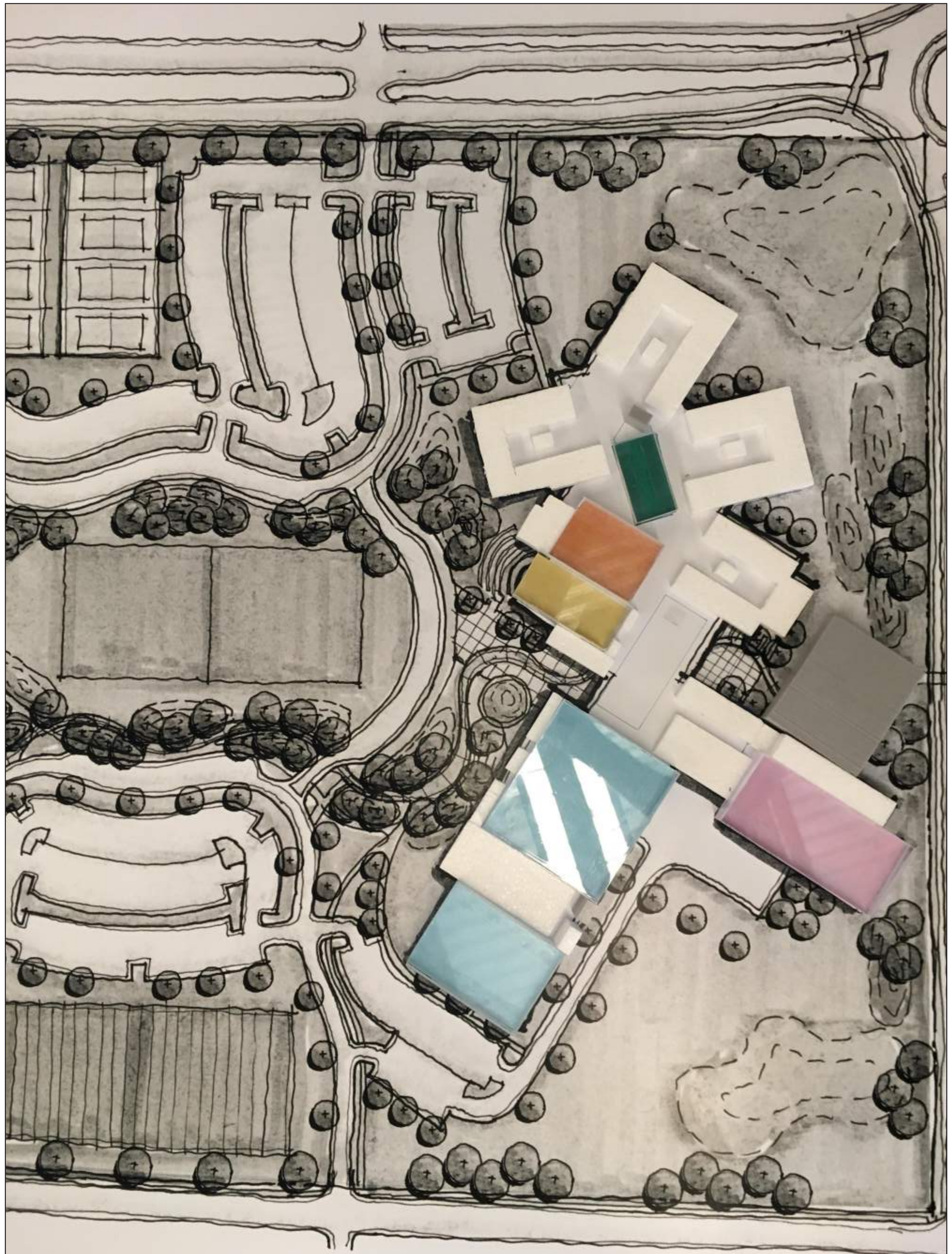
CORE CONCEPT

NEW BOZEMAN HIGH SCHOOL

ARRAY CONCEPT

NEW BOZEMAN HIGH SCHOOL

JUNE 30, 2017



ARRAY CONCEPT

NEW BOZEMAN HIGH SCHOOL
JUNE 30, 2017

MEETING MINUTES

PROJECT: New Bozeman High School (BZNHS)

MEETING MINUTES RECORDED BY: Kasey Welles/Sky Cook

MEETING PURPOSE: Building Committee Meeting 3

MEETING DATE: July 17, 2017

ATTENDEES:
Kevin Conwell, BHS (KC)
Erica Schnee, BHS (ES)
Todd Swinehart, BSD7 (TS)
Steve Johnson, BSD7 (SJ)
Wendy Tage, Trustee (WT)
Rob Watson, Superintendent (RW)
Andy Willett, Board President (AW)
Roger Davis, LA (RD)
Bill Langlas, LA (BL)
Kyle Scarr, TD&H (KS)
Jami Lorenz, BCE (JL)
Scott Wilson, CTA (SW)
Corey Johnson, CTA (CJ)
Jim Beal, CTA (JB)
Nathan Helfrich, CTA (NH)
Wes Baumgartner, CTA (WB)
Kasey Welles, CTA (KW)
Sky Cook, CTA (SC)

Purpose: Review current revised conceptual design options and site design options.

1. Conceptual Design
   a. CTA developed and presented two conceptual design schemes for the new building and site.
   b. Two Story Scheme
      i. Highlights
         1. The two story scheme has a shared service drive (CTE, Kitchen, Maintenance).
         2. The two story scheme maximizes views to Bridger Range and Spanish Peaks.
         3. CTE has a high level of connectivity with the learning communities.
         4. The library is stacked on both floors and is connected to both the learning communities and the commons.
         5. The two story scheme links outdoor space from south to north through the commons.

         6. It is possible to compartmentalize the three spokes originating at the commons for security and fire separation.
         7. The three story scheme allows the building to pull closer to Oak Street.
         8. The two story option may provide a “smaller school feel”.
         9. The future addition to the two story scheme is anticipated to be a two story structure.
      ii. General Comments
         1. This scheme provides a good connection to the North of the site and to Oak Street with the north entry plaza and with the building located further north on site.
         2. There is good connectivity between floors in this scheme.
         3. It is good to have CTE & arts connected to the commons and the service drive.
         4. KC is concerned about controlling access for events during school hours.
            a. The southeast entry could be used as an events entry during school hours while the typical events entry during off hours would be through the main entrance.
         5. SJ talked about switching the location of the competition and auxiliary gyms.
            a. This would create less connection to the commons and concessions areas.
            b. The team bus drop-off and locker room adjacency would need to be rethought to accommodate this modification.
         6. RW noted that the athletics program area will need to be reduced to match pre-bond numbers. Some potential ways of helping to reduce that number include:
            a. Decreasing the number of seats in the competition gym from 3500 to 2500.
            b. Eliminating the walking track.
            c. Incorporating the weight room and fitness center into the balcony seating.
            d. Replace currently allocated balcony seating with fitness, weight room, and wrestling practice areas and plan for potential future expansion of seating for the competition gym into the balcony if needed at a later date.
   c. Three Story Scheme
      i. Highlights
         1. The three story scheme reduces the ground floor footprint by about 20,000 sf.
         2. The smaller footprint of the three story scheme re-allocates program elements vertically throughout learning communities.
         3. This scheme provides 2 places for vertical connection:
            a. At learning communities between 2nd and 3rd floors.
            b. At commons between 1st and 2nd floors.
            c. A 3 story connection would introduce costs associated with code requirements for an atrium space if an atrium is included in the design.
         4. The added efficiencies in three story scheme include:
            a. Improved energy efficiency resulting in lower operating costs.
            b. Structural cost savings through reduced footprint.
            c. Area benefits even with increased vertical circulation
         5. The future addition to the three story scheme is anticipated to be a three story structure.
      ii. General comments
         1. The three story option makes more efficient use of the available site.
         2. RW notes that the amount of natural light at north plaza could be problematic in winter due to ice and snow.

3. WT questioned whether the added floor separations in the three story scheme create a lesser learning environment.
    a. It was discussed that there is some potential separation of functions by floor level in a three level scheme.
    b. The three level scheme does create more cross-pollination with the mix of uses in the learning communities.
4. ES noted that the three story scheme has more diversity in learning communities and is “innovative and different”.
5. KC noted that the flexibility and collaboration spaces are evident in both schemes.
6. The admin and service spaces are well distributed in 3 story option.
7. NH clarifies that the shared elevator connects all three levels in this scheme.
8. RD questions whether the amount of vertical circulation is adequate for a school this size.
    a. CJ notes that Glacier High (1300 students) has a single primary vertical circulation stair for all of its students and is functioning properly. All secondary stairs are marked “Emergency Only” and alarmed so that the main stair is utilized.
9. KC has concerns with the added circulation of the third level.
10. ES commented that the connections of programs are strong with CTE being close to other programs.
11. RD notes the cost savings for a 3 story scheme could be $2-$3/SF.
    a. SW notes that materials effect cost and structure (for example brick on the third floor would increase structural costs for supporting the weight of the material).
    b. JL notes that there is likely structural cost savings in a smaller footprint.
    c. SJ noted that there were cost savings with three stories and that the 3 story option better distributed special education throughout building.
12. NH noted that materials would need to be durable and low maintenance.
    a. NH noted that ongoing discussions with TS indicated some potential materials.
    b. Metal panels and fiber cement panels are an option that have been used in other buildings in the school district.
    c. Masonry is also an option as a material.
    d. Materials would be regionally suitable and would need to be balanced with budget.
    e. Materials would be commercial grade for an anticipated 100-year facility.
13. RW notes that a smaller footprint creates more room on the site and potential energy savings.
14. KC notes that tighter and more compact space planning is not necessarily appealing and more elbow room creates a better environment.
15. ES notes that she sees benefits to both schemes:
    a. The 2 story option is more convenient for people to circulate through.
    b. ES feels the 3 story option has more of a community feel.
    c. The 3 story option offers more cross departmental exposure.
    d. ES has concerns about staff and students being isolated on a single floor for an extended period of time.
    e. The views from the 3 story option are advantageous for occupants of the building.
    f. Additional green space on the site is beneficial for potential outdoor classroom use.

    g. ES has concerns about acoustics from floor to floor – Does it vary between 2 and 3 story option?
        i. CJ discussed how to compartmentalize areas of the building to reduce noise.
        ii. The acoustics of floors, walls, ceilings will be addressed by acoustic consultant as well.
16. KC is drawn to the small school feel of the 2 story option.

2. Site Design
    a. The site team further developed the curvilinear option to respond to changes to the architecture.
        i. A similar design concept was used for both 2 and 3 story options.
    b. A 50’ setback from Oak Street is shown on the site plan.
        i. No setback is required on Oak Street by zoning, but grading from the tunnel will potentially dictate the distance from the road to the building.
        ii. The atmosphere created with the parking and fields to north of the site may be conducive to this setback.
    c. The fire marshal will require road access and turnarounds on both sides of building.
    d. The learning street is extended through the building and into site in this iteration of the site design.
    e. The inclusion of Annie Street was discussed.
        i. A cost comparison for the full street versus a pedestrian street will be determined by RD and KS and will be delivered to RW by next week.
3. The discussion of the site and building concepts concludes with the acceptance of the 3 story scheme as the option to continue to develop.
        i. JB notes that flexibility to massage plan is needed to create best spaces for occupants, ideal diversity of spaces, and economy of construction as development continues.
4. RD discussed budget for the project.
    a. RD does not have concerns about budget at this time.
        i. RD states that estimated costs typically start over budget and work down during the design process.
    b. Constructability and cost of the architecture can be further addressed when RD better understands the materials and systems that will be used in the building.
5. Next steps for the CTA/Design Team include:
    a. 3D massing
    b. Structural grids
    c. Spatial development
    d. Building systems discussion
    e. Development of transparency vs. solid
6. Programming discussion
    a. There is a potential reduction in the number of science labs required.
    b. Science can be decentralized throughout the building rather than concentrated in one learning community.
    c. The competition gym can be 2500 seats rather than 3500 seats.
        i. It is possible to utilize the balcony for weight room and fitness center.
        ii. The school district would like the ability to expand into the balcony space in the future and relocated fitness and weight room in needed.
        iii. Health enhancement teachers are concerned about the noise level if the weight room and fitness center are on the balcony without separation from the gym.
    d. There are currently more teaching stations than were programmed for in pre-bond.
        i. The auxiliary gym can hold 200-300 spectators and has 2 full sized courts.
    e. Competition gym has 2 full sized courts if bleachers are retracted.
    f. In regards to the art department:

MEETING MINUTES (Continued)

i. Outdoor gas fired kiln was not included in pre-bond programming.
ii. Can the gas fired kiln be moved inside?
1. SC will research code requirements for a gas fired kiln indoors and CTA will send analysis to BHS.

g. RW notes that library can be reduced by approximately 4000 sf.

7. Sewer options were discussed by KS.
   a. The Baxter Meadows lift station is the current lift station for the school's sewer line.
      i. This station may be at capacity but the actual capacity and usage is currently not known by City of Bozeman. The city is looking at the remaining capacity now.
      ii. Options for the sewer if the Baxter Meadows station is at capacity include:
         1. Upgrade the lift station at Baxter Meadows.
            a. Upgrading the lift station is not preferred because it will be obsolete in the near future.
         2. Bypass the lift station to a different sewer line with an on-site pump.
         3. Build a new lift station.
   b. KS will continue to coordinate with the City of Bozeman about the sewer.
8. Attachments
   a. Two Story Scheme - site plan, floor plan, and model images
   b. Three Story Scheme - site plan, floor plan, and model images
   c. Site plan

END OF MEETING MINUTES

The foregoing is the author's understanding of the content of this meeting. If the attendee's understanding differs from the above, please respond to the author within ten calendar days.

CTA ARCHITECTS ENGINEERS

cc: Attendees
Steve Johnson, BSD7
Bob Franzen, CTA

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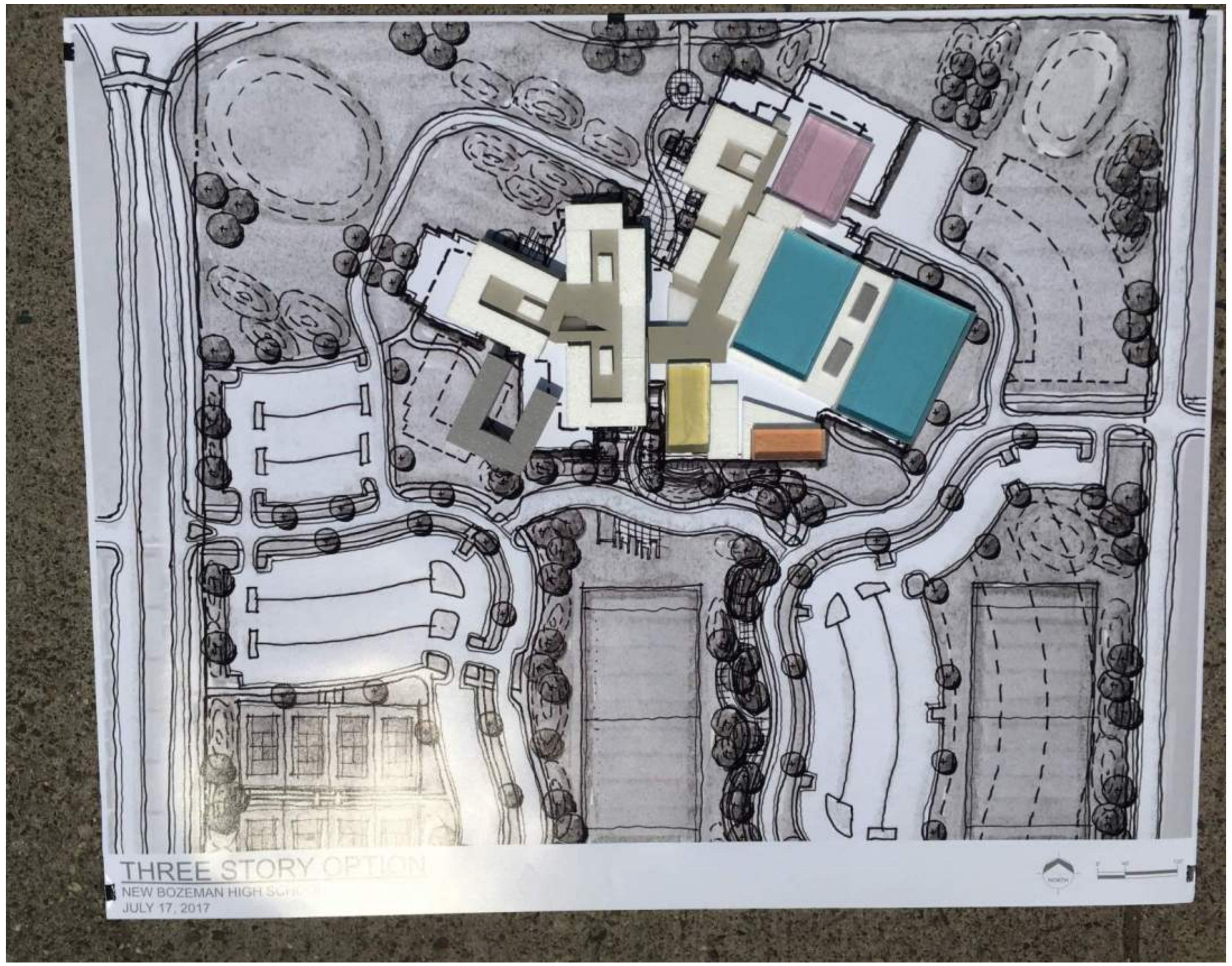
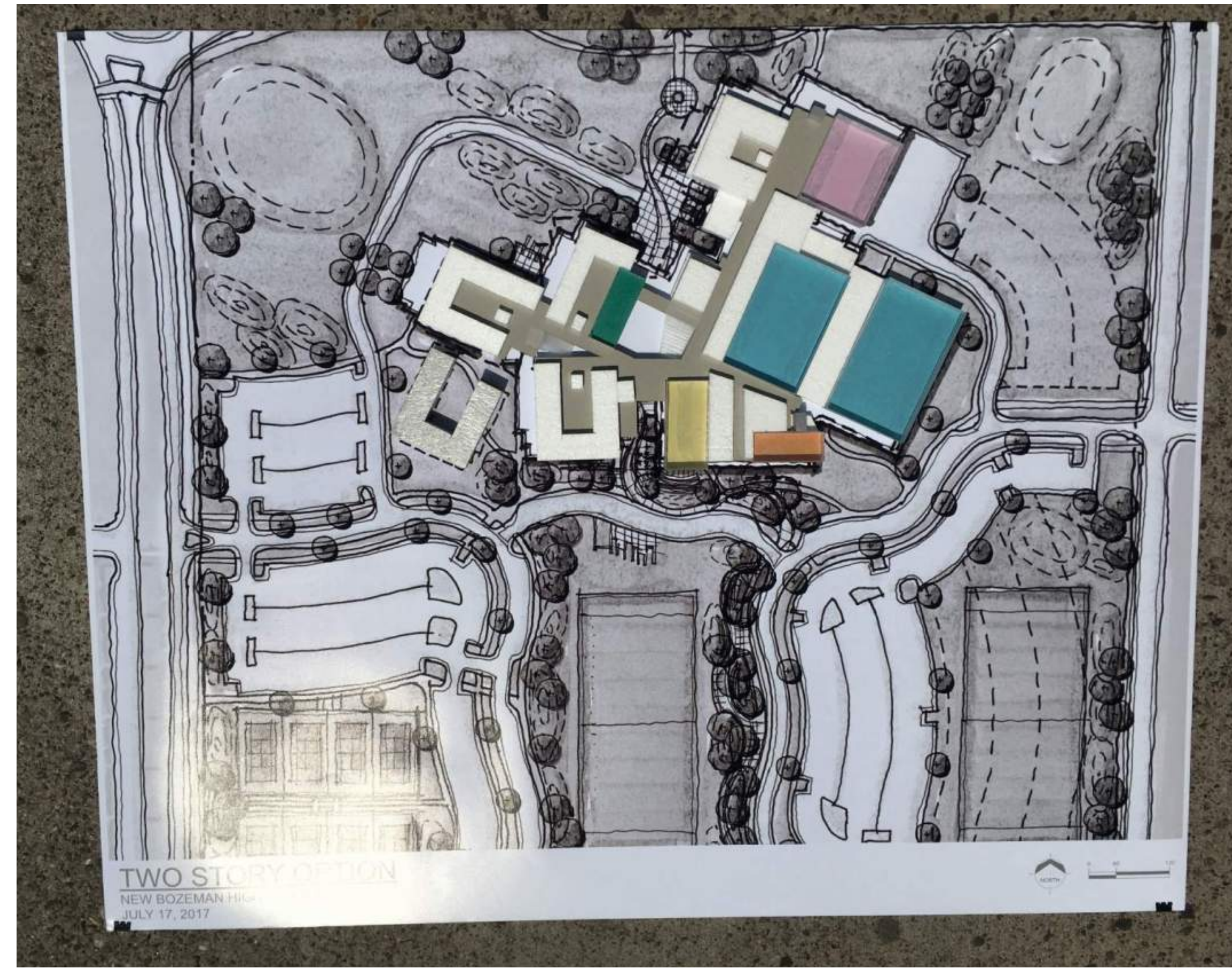
CONCEPTUAL SITE PLAN

NEW BOZEMAN HIGH SCHOOL
JULY 17, 2017


THREE STORY OPTION
NEW BOZEMAN HIGH
JULY 17, 2017


TWO STORY OPTION
NEW BOZEMAN
JULY 17, 2017

CTA PIONEERING ENVIRONMENTS

MEETING MINUTES

PROJECT: Bozeman High School (BZNHS)

MEETING MINUTES RECORDED BY: Nathan Helfrich

MEETING PURPOSE: Building Committee Meeting 4

MEETING DATE: August 9, 2017

ATTENDEES:
Kevin Conwell, BHS (KC)
Ken Gibson, Community Member (KG)
Todd Swinehart, BSD7 (TS)
Wendy Tage, Trustee (WT)
Rob Watson, Superintendent (RW)
Andy Willett, Board President (AW)
Chuck Winn, CoBzn (CW)
Roger Davis, LA (RD)
Bill Langlas, LA (BL)
Kyle Scarr, TD&H (KS)
Matt Hubbard, BCE (MH)
Scott Wilson, CTA (SCW)
Corey Johnson, CTA (CJ)
Jim Beal, CTA (JB)
Nathan Helfrich, CTA (NH)
Wes Baumgartner, CTA (WB)
Steve Johnson, BSD7 (SJ)
Sandy Wilson, Trustee (SW)
Erika Schnee, BHS (ES)

Purpose: Provide an update on building design, site design, and tunnel design options and discuss sustainability options.

1. Design of Building
   a. Commons Area
      i. SJ likes open concept of commons
   b. Materials discussed – affordable options
      i. Masonry (brick)
      ii. Metal panel systems
         1. Flat (composite aluminum)
         2. Profiled metal
      iii. CMU's
   c. Roof structure
      i. KC asked what CTA was anticipating for roof structure

         1. CJ stated that low-slope is economical for volume of this scale. With steep slope roofs, 1 ½ stories might be added to the height because of the spans.
   d. Safety
      i. CJ thinks all 3 building design options can address safety equally.
      ii. The goal is to steer people to two primary entrances (North and South).
   e. Does one allow better day lighting?
      i. RW likes the learning community angled, as shown in option 2, but anticipates a dark portion as a result. Ultimately, RW prefers the learning community in line with the rest of the learning communities.
      ii. AW likes the look of Option 2
         1. Thinks future expansion wants learning community to be straight.
         2. Thinks library in the center starts to interrupt Commons functionality-but thinks it is cool in the center.
         3. Likes 3rd story connectivity to commons.
         4. Wonders if halls are too long.
         5. Wants stairs oriented to not interrupt commons functions.
      iii. WT likes tiered commons in Option 3.
      iv. KG likes angle of stairs in Option 3 – others agreed.
      v. SW asked if the library will have natural light.
         1. The commons will provide daylight.
         2. Some schemes in extend library to the exterior, beyond the commons, so windows can be incorporated.
   f. North entry location
      i. The location is flexible
      ii. WB stated that the connection to CTE from the tunnel is harder than the connection to North Commons.
   g. WT thinks Option 1 commons is more interesting (connecting 3rd floor to Commons).
      i. AW likes the flexibility of Option 1 Commons.
   h. SW asked if there was any educational reason for splitting the commons.
      i. CJ talked about diversity of spaces.
   i. Preferences
      i. Option 1 commons
         1. RW wondering about width of stairs being too great
      ii. Library position – probably not central, push off to side
      iii. Exterior – KG, AW, SJ, WT, and RW like Option 2
      iv. Stair – like with 2 angles (2 sections)
      v. Tier the commons like Option 1
      vi. ES is concerned about the stairs facing south because of glare
      vii. RW thinks the library to the side is fine because it still opens up to the commons
      viii. RW and AW think the Option 3 performance hall, music, and drama mass is too big
      ix. CJ requested that the Board look at the Ed Specs by tomorrow (August 10th)

2. Tunnel Design Options (3 options)
   a. Grade Crossing – easiest
      i. Pros
         1. Visibility, costs least, less maintenance, Oak St. water line can remain, ADA access easier, not fighting water table, no vandalism
      ii. Cons
         1. Vehicle/Pedestrian interaction, signal (like roundabout at airport) and would have median in middle

b. Below Grade
  i. Pros
    1. Less fill
  ii. Cons
    1. Sump, sidewalk will want to float because of high water, ramps required
c. Above Grade
  i. Pros
    1. More visible, less dampness from water table, no sump - water can flow, finish floor 5 feet below road, tunnel ends up slightly shorter
d. RW wants diagrams of how opening in middle will look
  i. TD&H will produce some diagrams to better illustrate the intent.
e. Tunnel/ Grade Cost
  i. At grade - $363,000
  ii. Raised Tunnel
    1. 10' x 8' - $1,075,000
    2. 14' x 8' – add $80,000 to 10' x 8' tunnel cost
  iii. Below grade
    1. 10' x 8' - $1,100,000
    2. 14' x 8' – add $80k to 10' x 8' tunnel cost
    3. Open median – add $42,000
    4. Pricing excludes raising building – adds $800,000 to align finish floor with the high point of the road
f. AW prefers at-grade tunnel and doesn't think at-grade crossing is an option because of safety
g. The final direction is the above-grade tunnel

3. Sustainability
  a. Explore CHPS
    i. "Verified" if cost allows (approximately $100k)
    ii. "Design" if "Verified" is too expensive

4. Next meeting August 30, 2017 9:00a – 11:30a (approved to go 2.5 hours)
  a. RW wants to discuss tours – Virtual tours are probably best
  b. CTA is to deliver 6 more Ed Spec copies to RW

END OF MEETING MINUTES

The foregoing is the author's understanding of the contents of this meeting. If the attendee's understanding differs from the above, please respond to the author within ten business days.

CTA ARCHITECTS ENGINEERS

cc: Attendees

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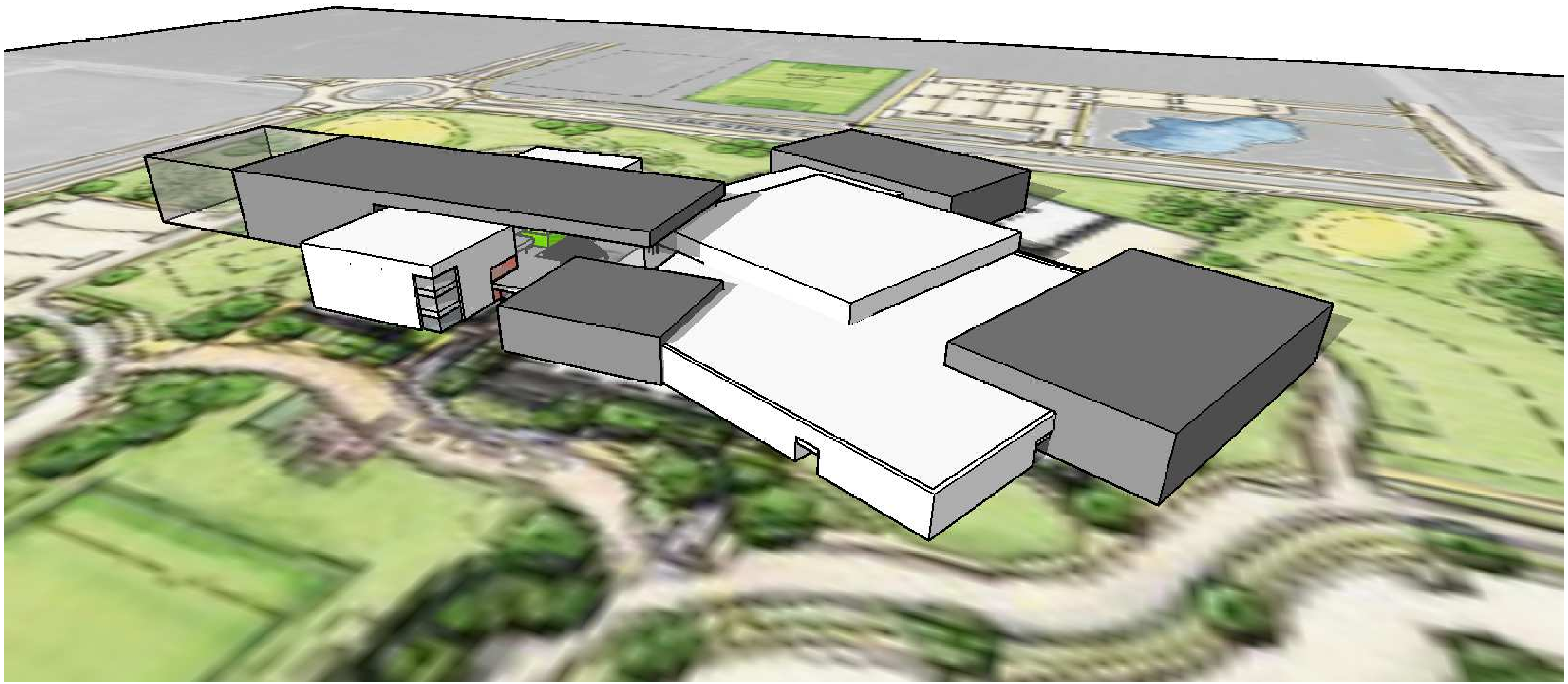
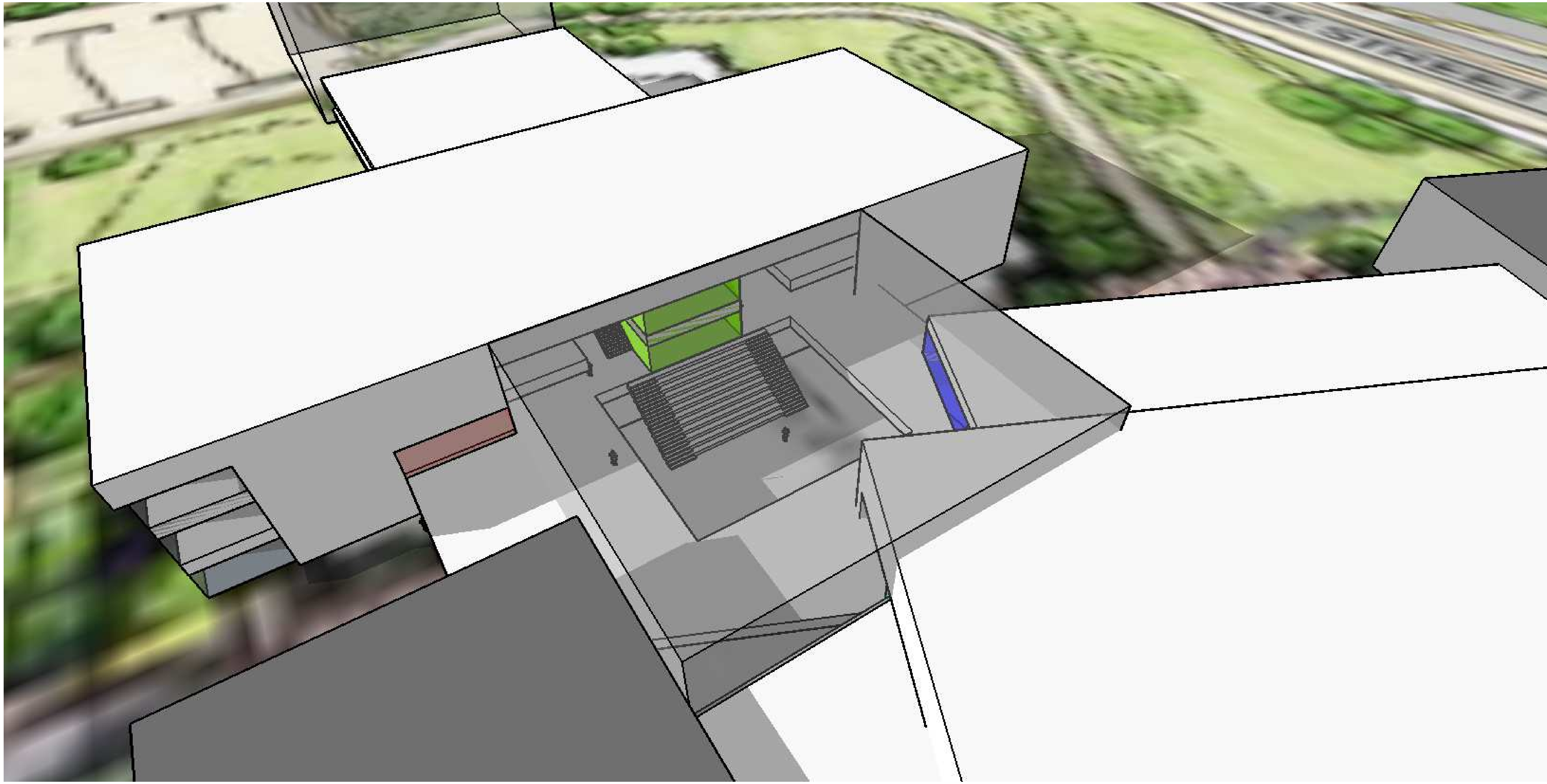
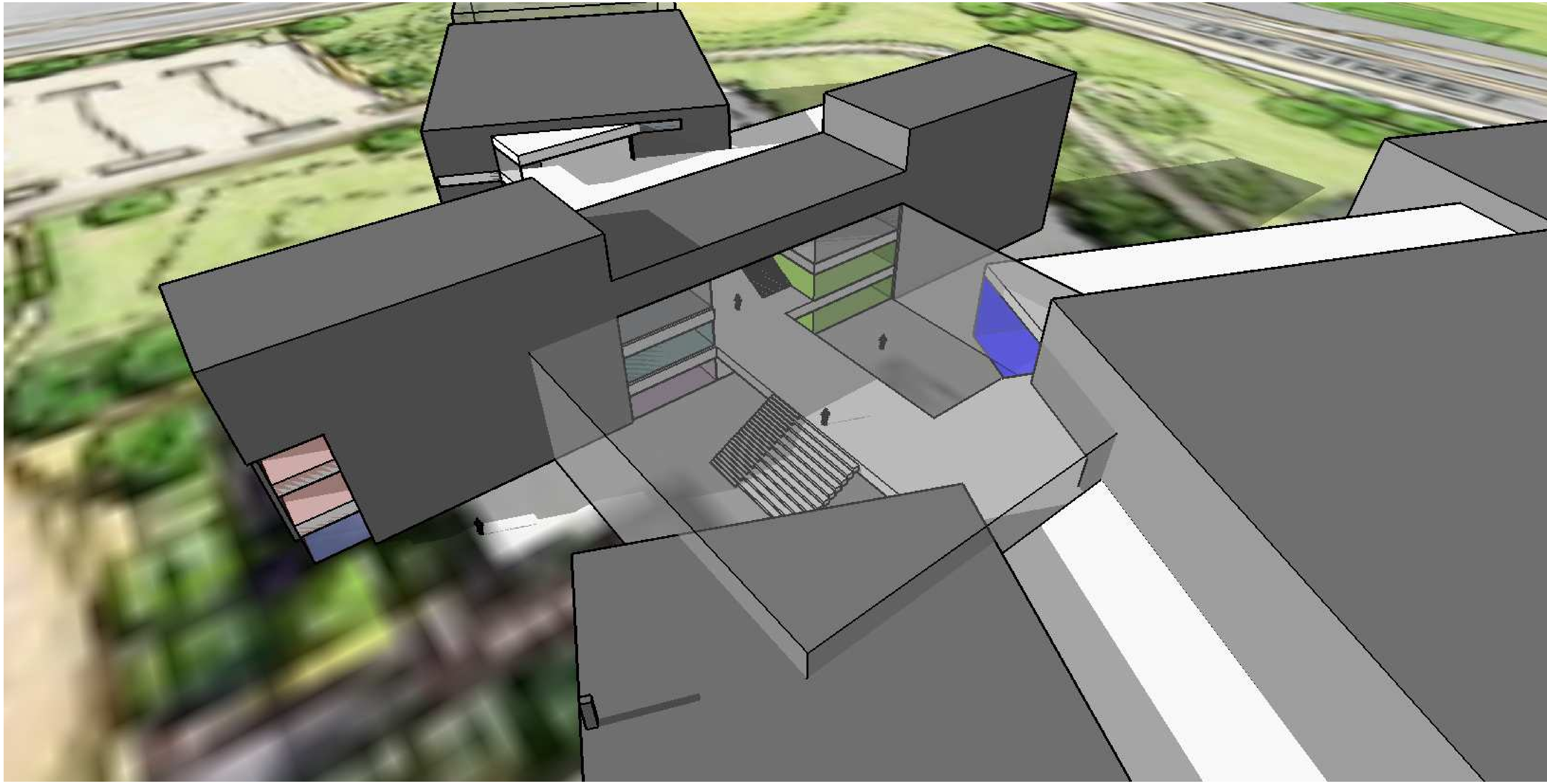
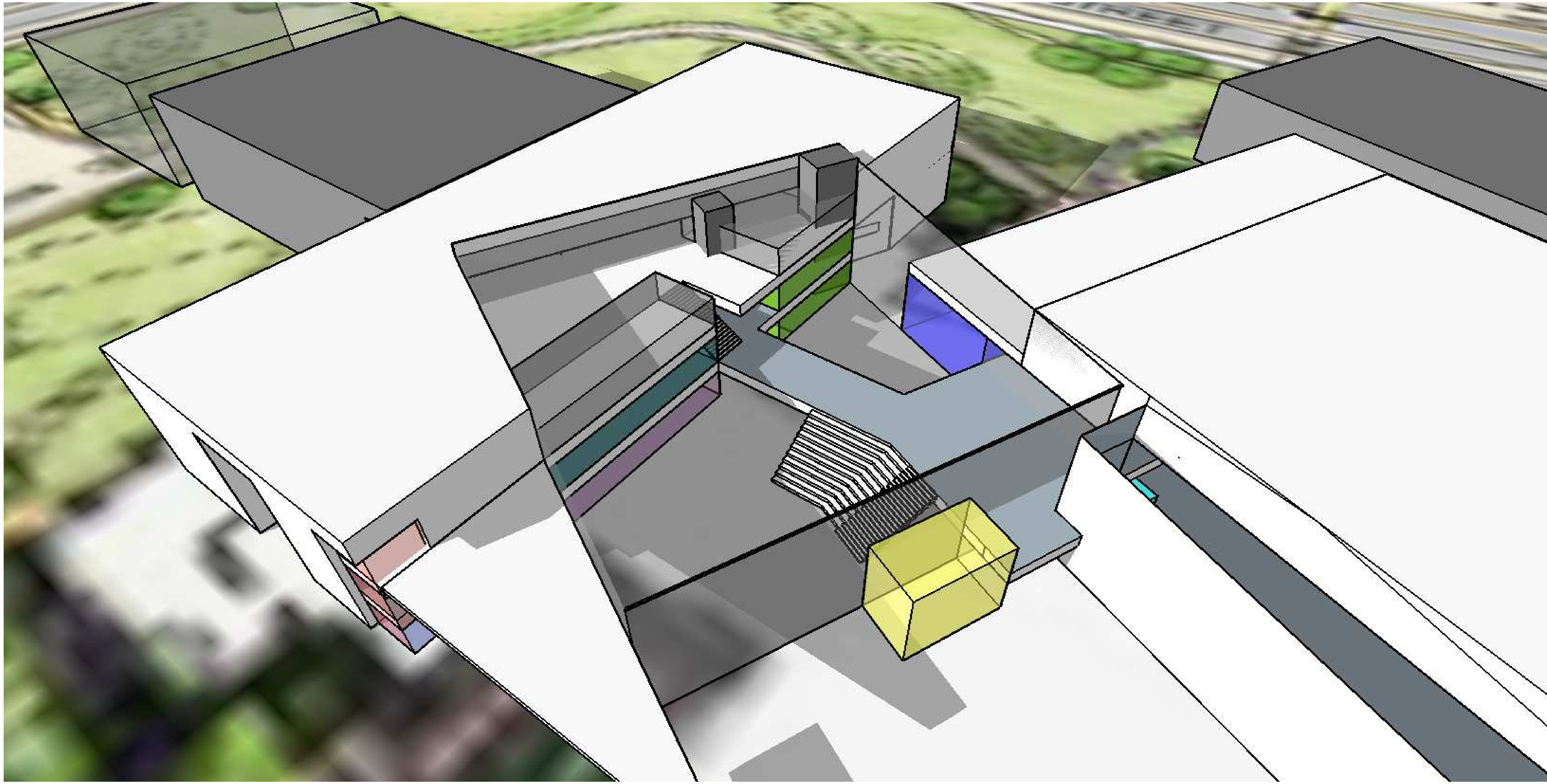







OAK STREET



CONCEPTUAL SITE PLAN

NEW BOZEMAN HIGH SCHOOL- SOUTH FIELDS CONCEPT A
AUGUST 9, 2017

CONCEPTUAL SITE PLAN

NEW BOZEMAN HIGH SCHOOL- SOUTH FIELDS CONCEPT B
AUGUST 9, 2017

CTA

PIONEERING ENVIRONMENTS

MEETING MINUTES

PROJECT: Bozeman High School (BZNHS)

MEETING MINUTES RECORDED BY: Melinda Talarico

MEETING PURPOSE: Building Committee Meeting 5

MEETING DATE: August 30, 2017

ATTENDEES:
Todd Swinehart, BSD7 (TS)
Steve Johnson, BSD7 (SJ)
Rob Watson, Superintendent (RW)
Erica Schnee, BHS (ES)
Andy Willett, Board President (AW)
Wendy Tage, Trustee (WT)
Sandy Wilson, Trustee (SW)
Ken Gibson, Community Member (KG)
Chuck Winn, CoBzn (CW)
Roger Davis, LA (RD)
Bill Langlas, LA (BL)
Kyle Scarr, TD&H (KS)
Jami Lorenz, BCE (JL)
Scott Wilson, CTA (SCW)
Bob Franzen, CTA (BF)
Corey Johnson, CTA (CJ)
Jim Beal, CTA (JB)
Nathan Helfrich, CTA (NH)
Sky Cook, CTA (SC)
Wes Baumgartner, CTA (WB)

Purpose: Provide an update on site design as well as the building design - schematic design review.

1. Site Design Update
   a. CTA presented two site design options. The major differences are as follows:
      1. Option A: Football field and track by Cottonwood Rd.
      2. Option B: Football field and track by Flanders Mill Rd.
      3. Option A was selected and approved.
   b. Parking:
      1. TS and BF met with the City of Bozeman Planning Department to discuss parking requirements for the site. Preliminary approval for 775 stall was provided.
         1. BF suggested allowing for expansion to 900 but plan for 775 for now.

         2. It was decided that the reduction of 125 stalls would be from the faculty and visitor parking.
   c. CW asked the design team to locate the detention ponds associated with the parking north of Oak Street.
   d. Bus circulation allows for 10-12 buses
      1. The site plan will identify a location for a bus stop on Cottonwood Rd near Oak Street for Streamline.
      2. Gallavan can use the bus drop off area at the south entry.
   e. A fence with a gate is required between Meadowlark and the high school site.

2. Building Design - Schematic Design Review
   a. SW informed the committee that design elements shown may change depending the outcome of the budget.
   b. JB walked the committee through how we got to where we are now.
   c. Commons:
      1. KG suggested different depth of break-out areas so space is not so geometrical.
      2. TS asked to consider the building efficiency of the glass.
      3. NH discussed security of each wing.
      4. Learning Street – met with SRO and Chief of Police – three stories means needing to protect against students jumping. The third floor has glazing to the commons area for a visual connection, but is not open and has a separate entry.
      5. The committee expressed concern of congestion at the concessions, food service, and gym entry area, specifically when tournaments and school happen at the same time. CJ talked about secondary entry into gymnasium to help with circulation. NH mentioned concession window available in gymnasium as well. The option of opening concessions to the gym and the commons was discussed to help reduce congestion at the serving area. The fact that the angle of the gym entry wall with respect to the serving wall is greater than 90 degrees was discussed, which also helps reduce congestion at the serving area.
      6. CTA is to meet with the Food Service user group for further development.
      7. The committee mentioned the need to look into the quantity of employees it would take to serve food and run the point of sales if they occur at each serving window.
      8. DECA has separate space from concessions.
      9. WT expressed concern for heat through all the glass. JB reminded group of large roof overhang as well as appropriate glass to eliminate direct sunlight penetration.
   d. Building Exterior:
      1. The following building materials are being considered: brick, concrete block (gymnasium), profiled metal panels, flat metal panels.
      2. SJ asked about incorporating school colors. SW said that school colors and mascot needs to be bumped up on the schedule.
      3. ES was concerned about heat gain in the corridor areas at the link between the west-most learning community and the central learning communities.
      4. SW clarified that glazing and roof structure need to be re-worked pending budget pricing.

a. BF stated the added cost for sloped roof is approximately $1M.
b. BF clarified glazing curtain wall (more than 12 feet) and storefront (less than 12 feet) is a $50/sf price difference. CTA will consider stacking storefront units at large glazed areas.

5. CW said 99% of the community will see the building from sides and back. The view is going to be from Oak Street and Cottonwood Rd.
6. Concern was raised about the potential for siding materials to oxidize. JB clarified that the materials that are being considered will be factory painted to resist oxidizing. It was discussed that oxidizing materials could be utilized if carefully planned for.
7. RD presented the following siding material costs:

Material Type	Cost per SF
Masonry Veneer	$18.00
Brick	$24.00
Dri Design Metal Panel (Reveals)	$36-$40
Citadel E2000 System	$28-$33
Citadel Metal Panel (Reveals)	$38-$42
10" flat metal panels	$14.00
Corten Metal Panels	$18.00

8. TS commented that brick has the most longevity compared to other building materials.

e. As a result of the general comments, CTA will be addressing the following:
   1. Review the brick portion of building to resemble Main Street Bozeman, based on the comment by RW stating that the current brick element has an old town factory feel, which we will want to avoid.
   2. Review the entrance and stairs to library.
   3. CTA will investigate exterior seating areas at the main entry.

f. Other:
   1. Interior Materials-Commons will be a durable material and classrooms will be painted gypsum board
   2. The mechanical system will be selected for the September 11 meeting pending pricing.
   3. SD Deliverable is to include neutral colors for the building exterior.

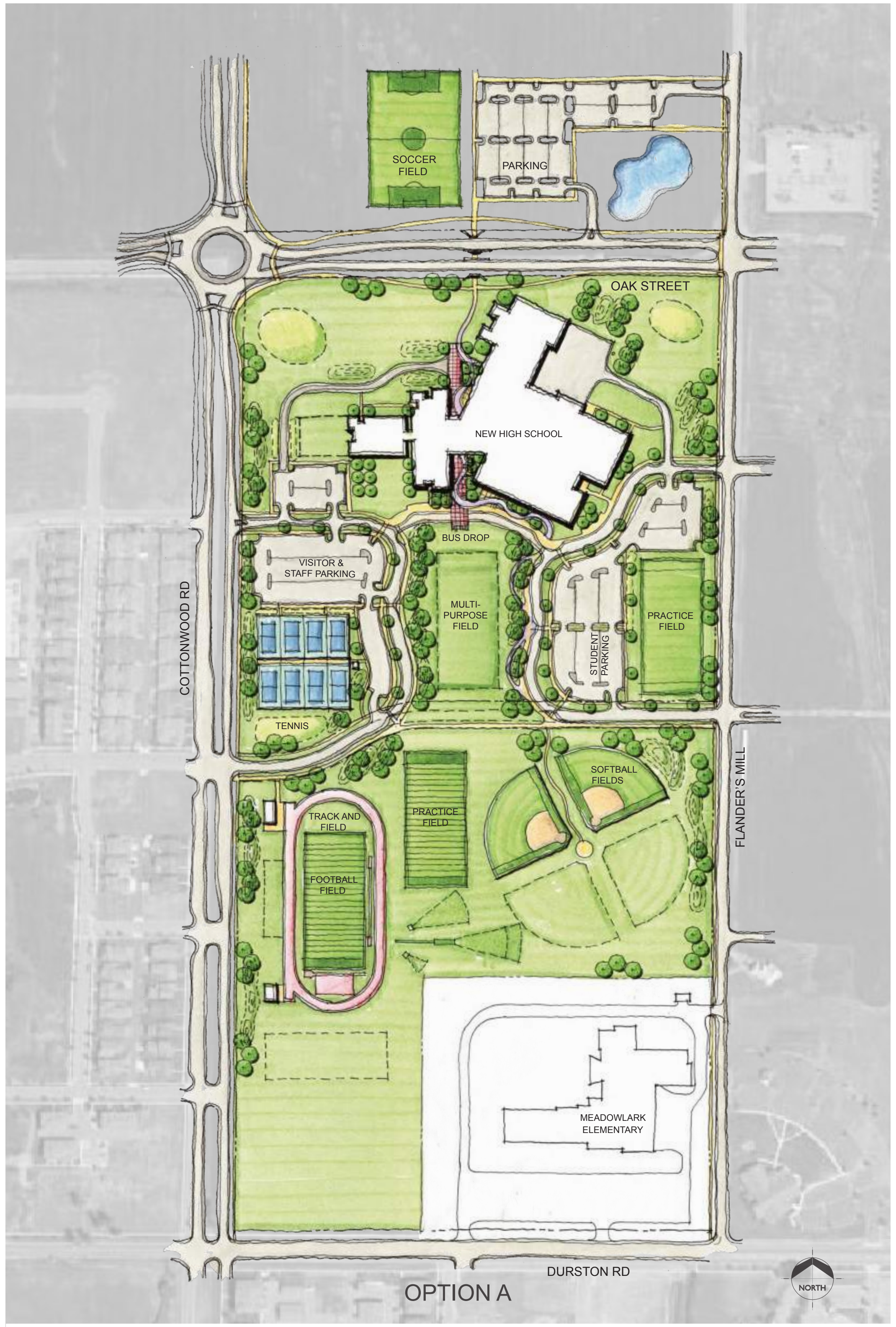
3. Scheduled Meetings:
   a. Board Meeting: September 11, 2017
      1. SD Deliverable
   b. Building Committee Meeting: September 21, 2017 9:00a – 11:00a

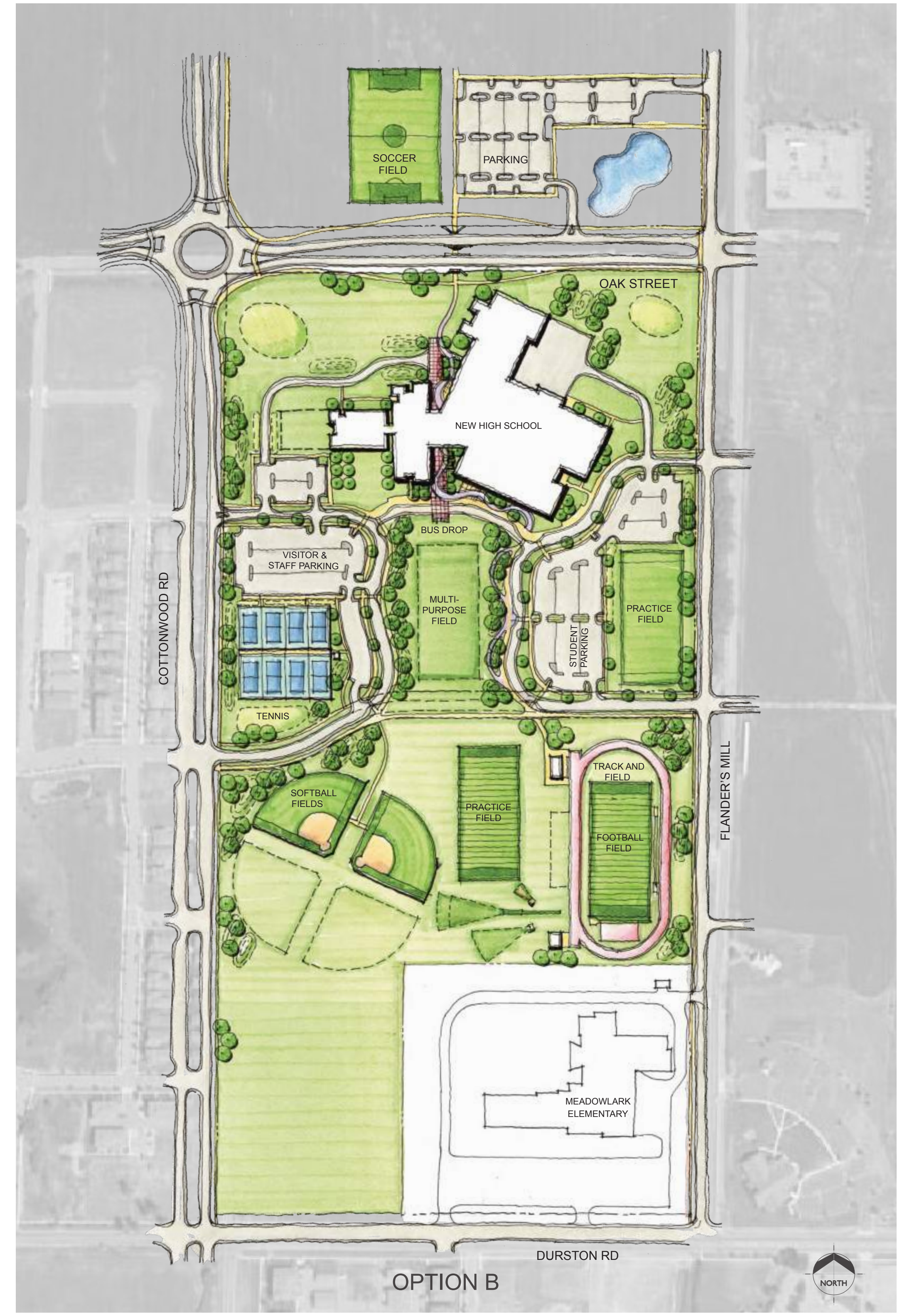
END OF MEETING MINUTES

The foregoing is the author's understanding of the contents of this meeting. If the attendee's understanding differs from the above, please respond to the author within ten business days.

CTA ARCHITECTS ENGINEERS

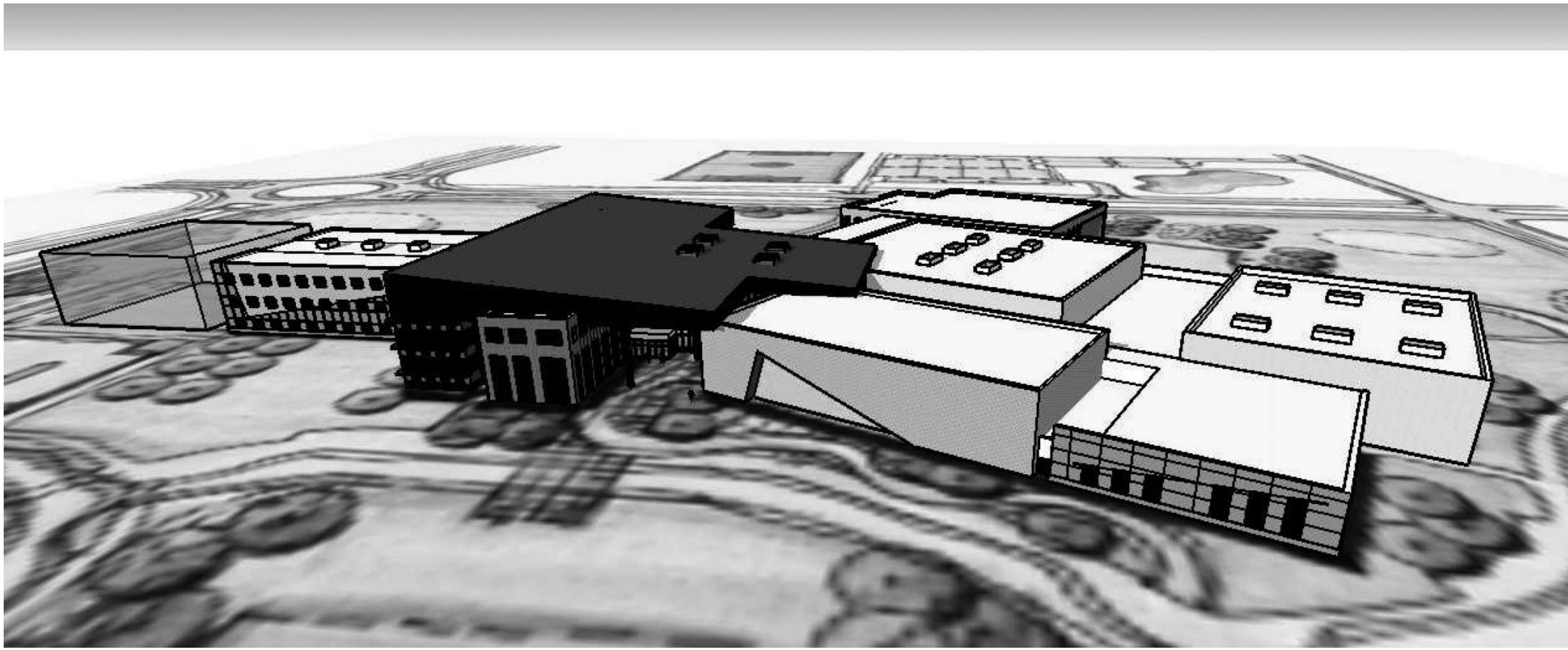
cc: Attendees
Kevin Conwell, BHS (KC)

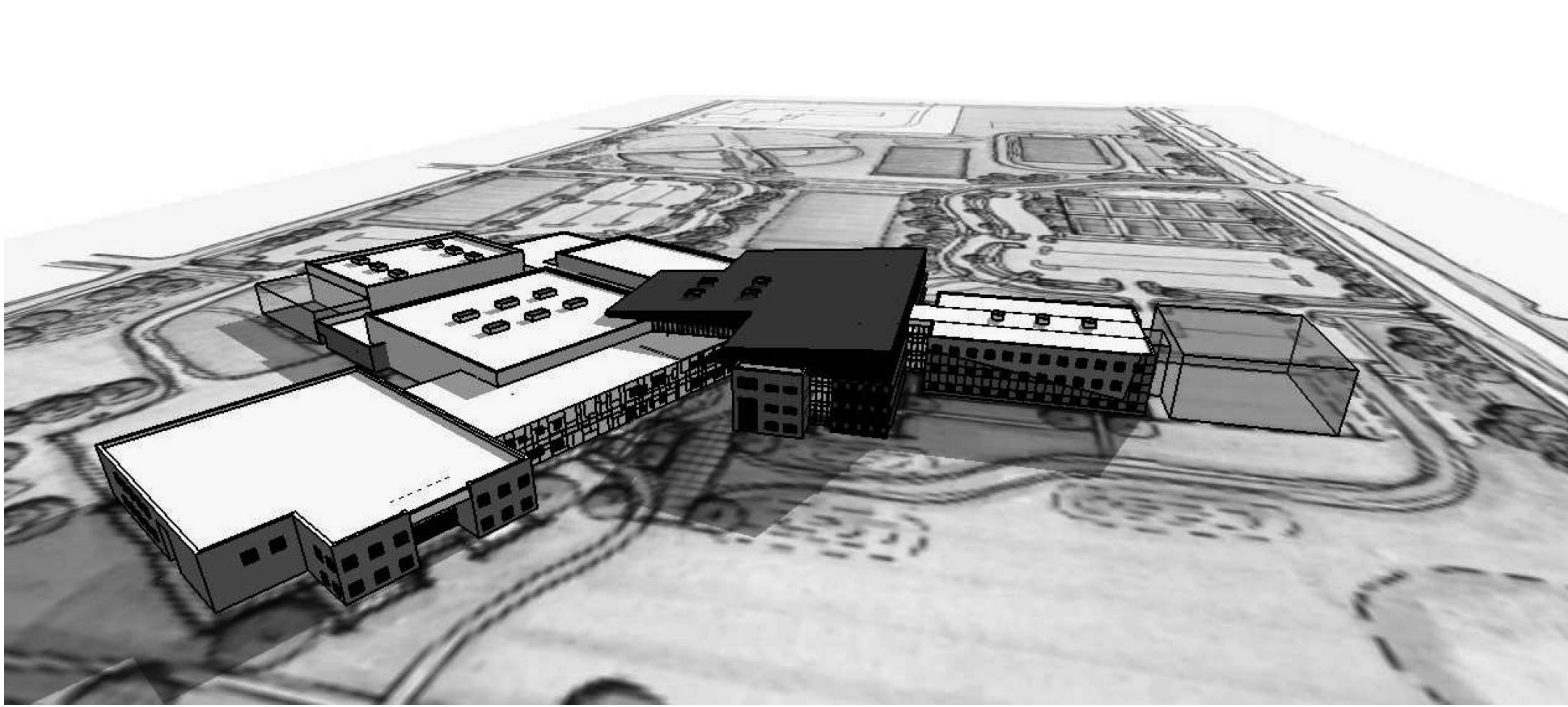


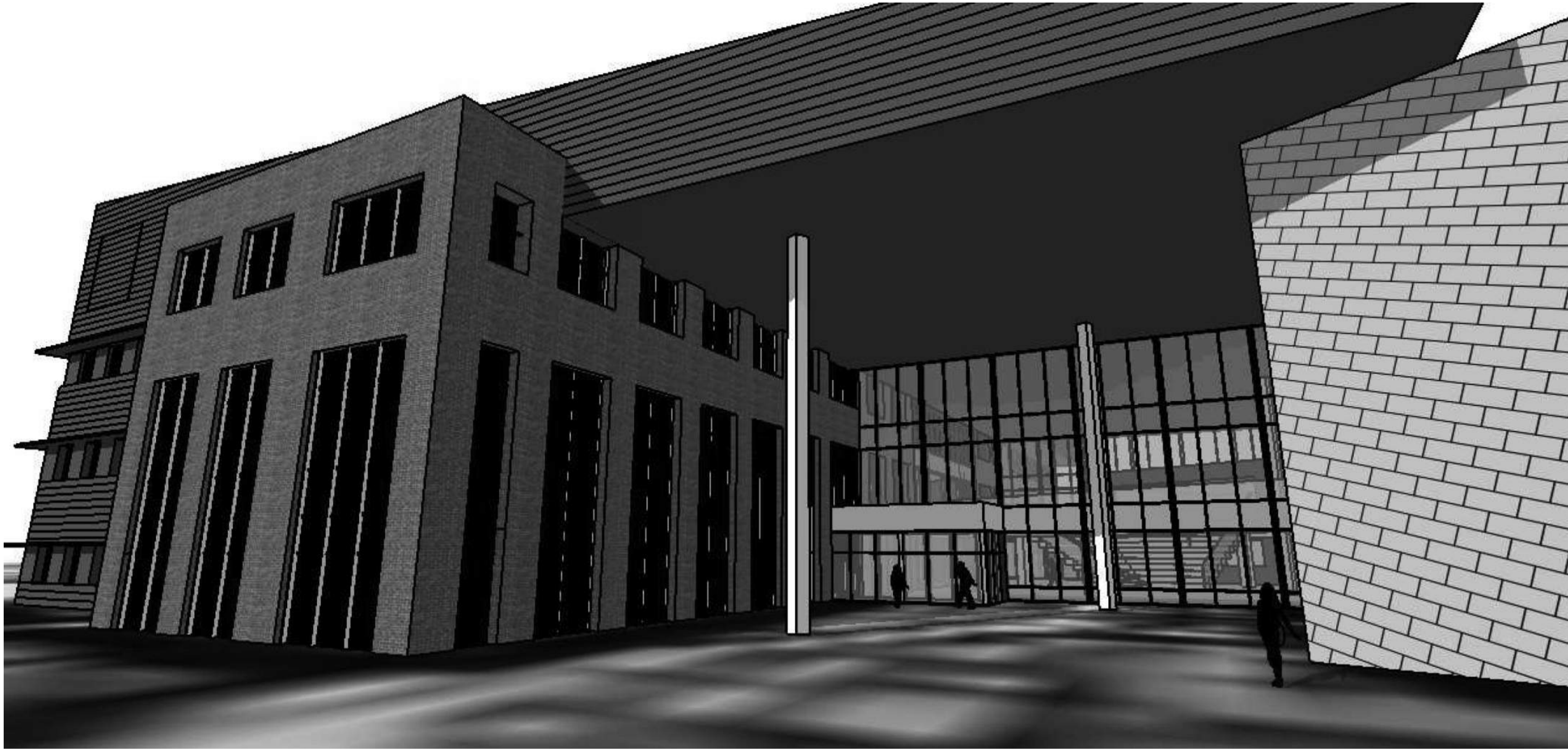


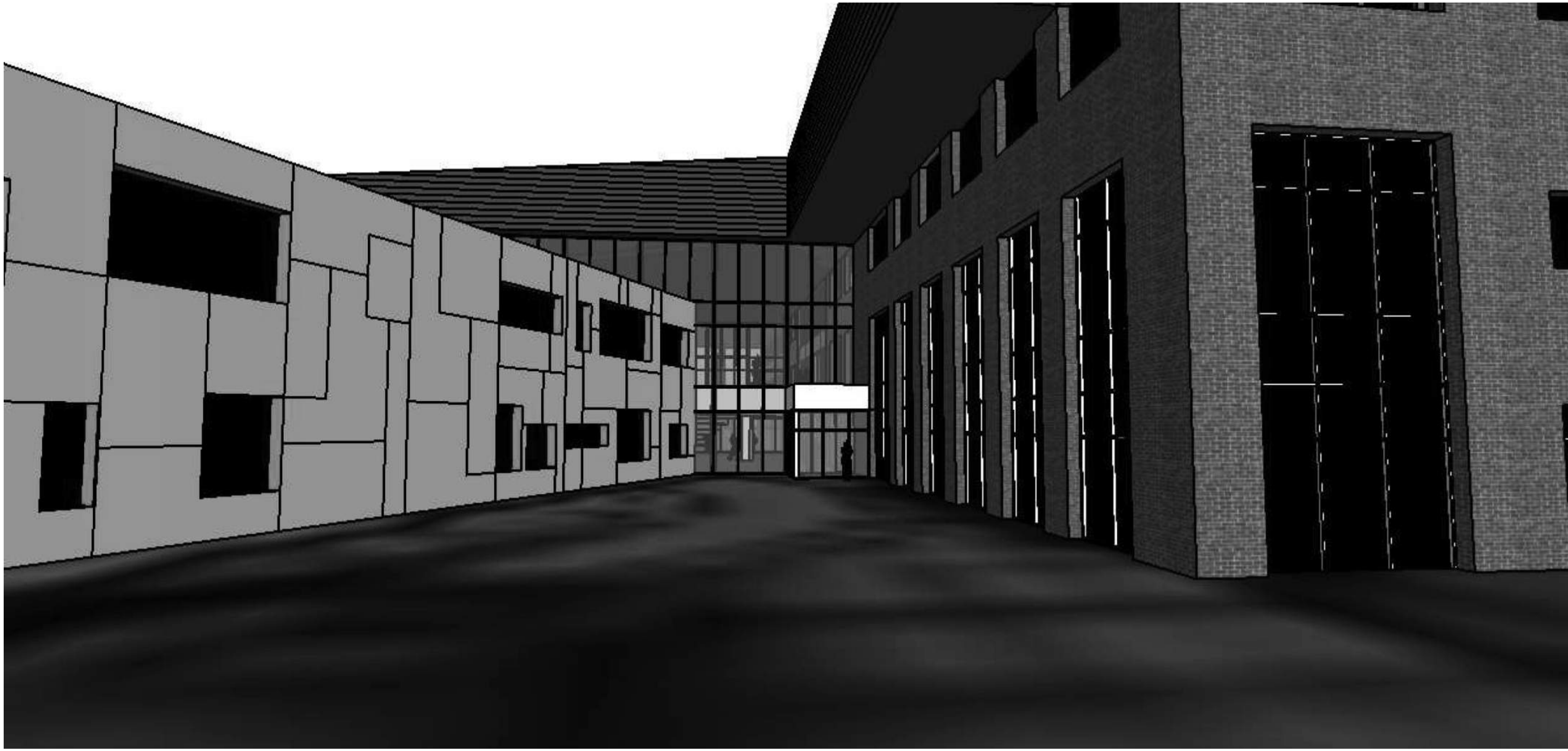
SITE PLAN OPTIONS

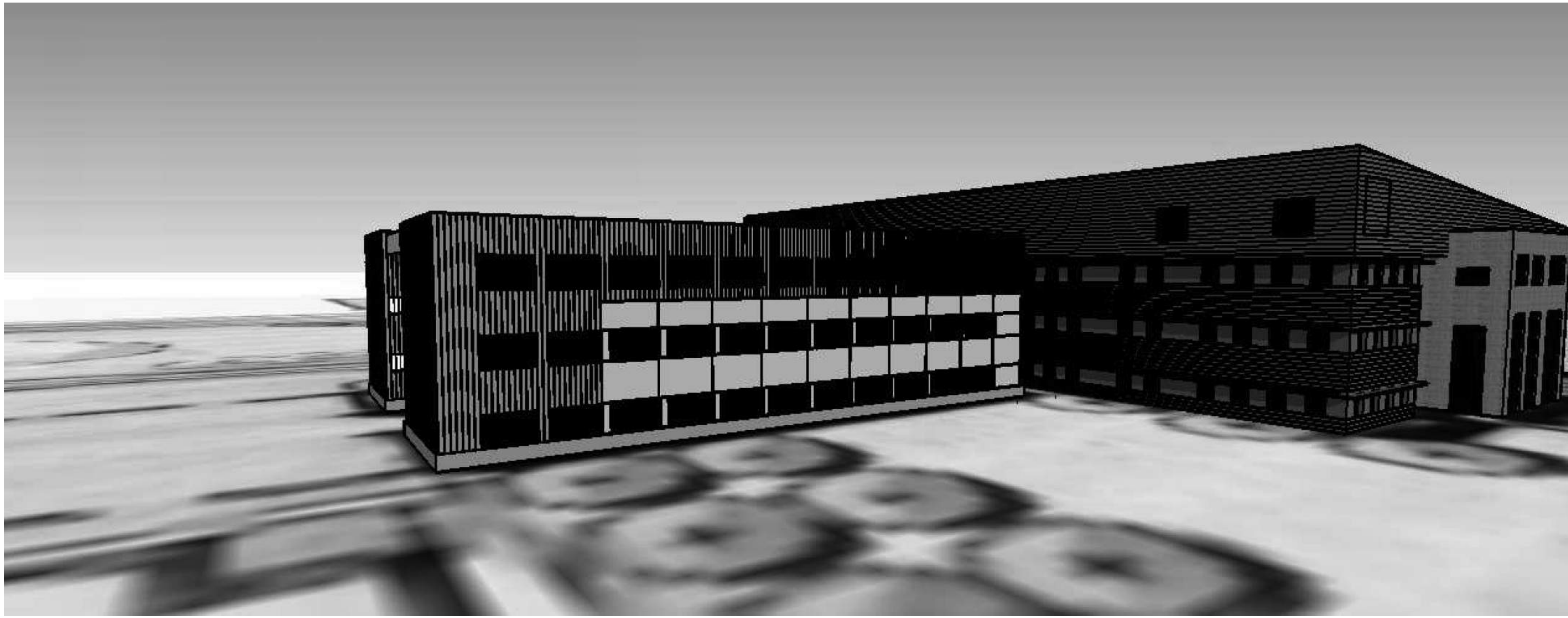
NEW BOZEMAN HIGH SCHOOL
AUGUST 30, 2017

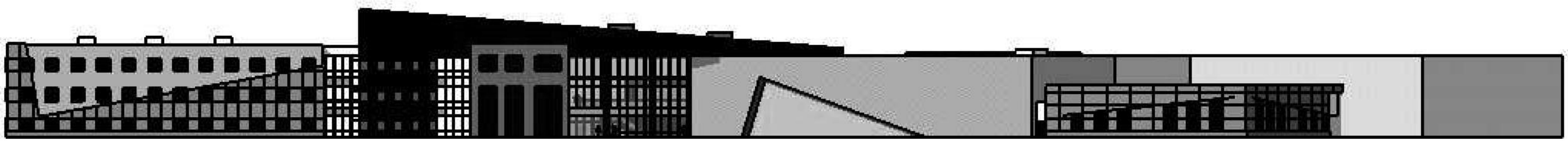


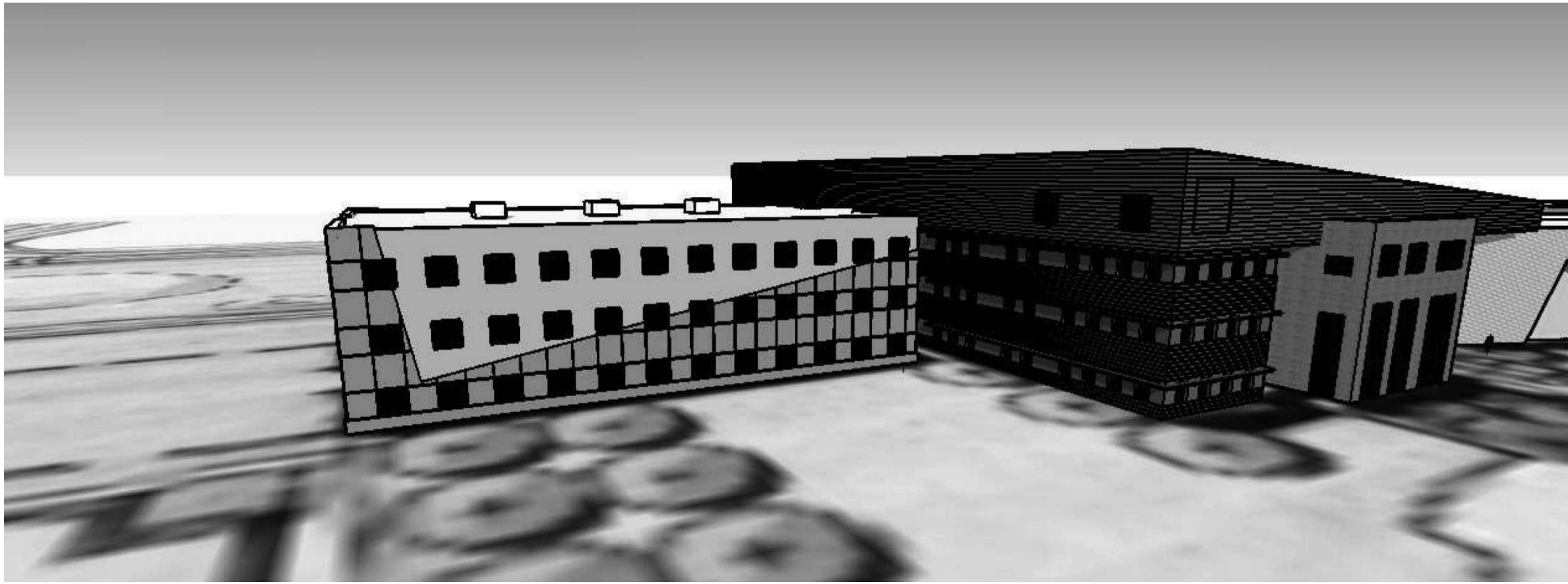


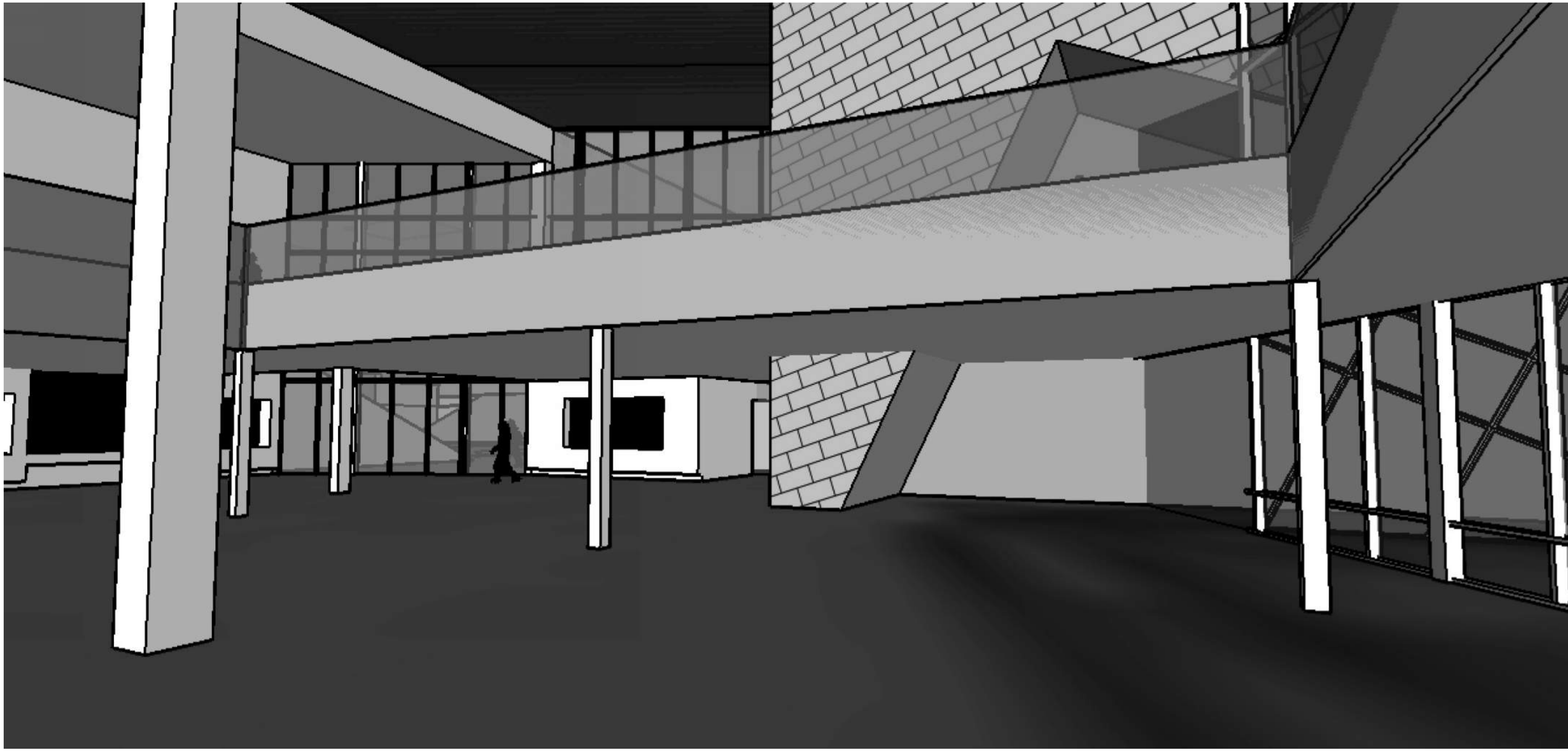








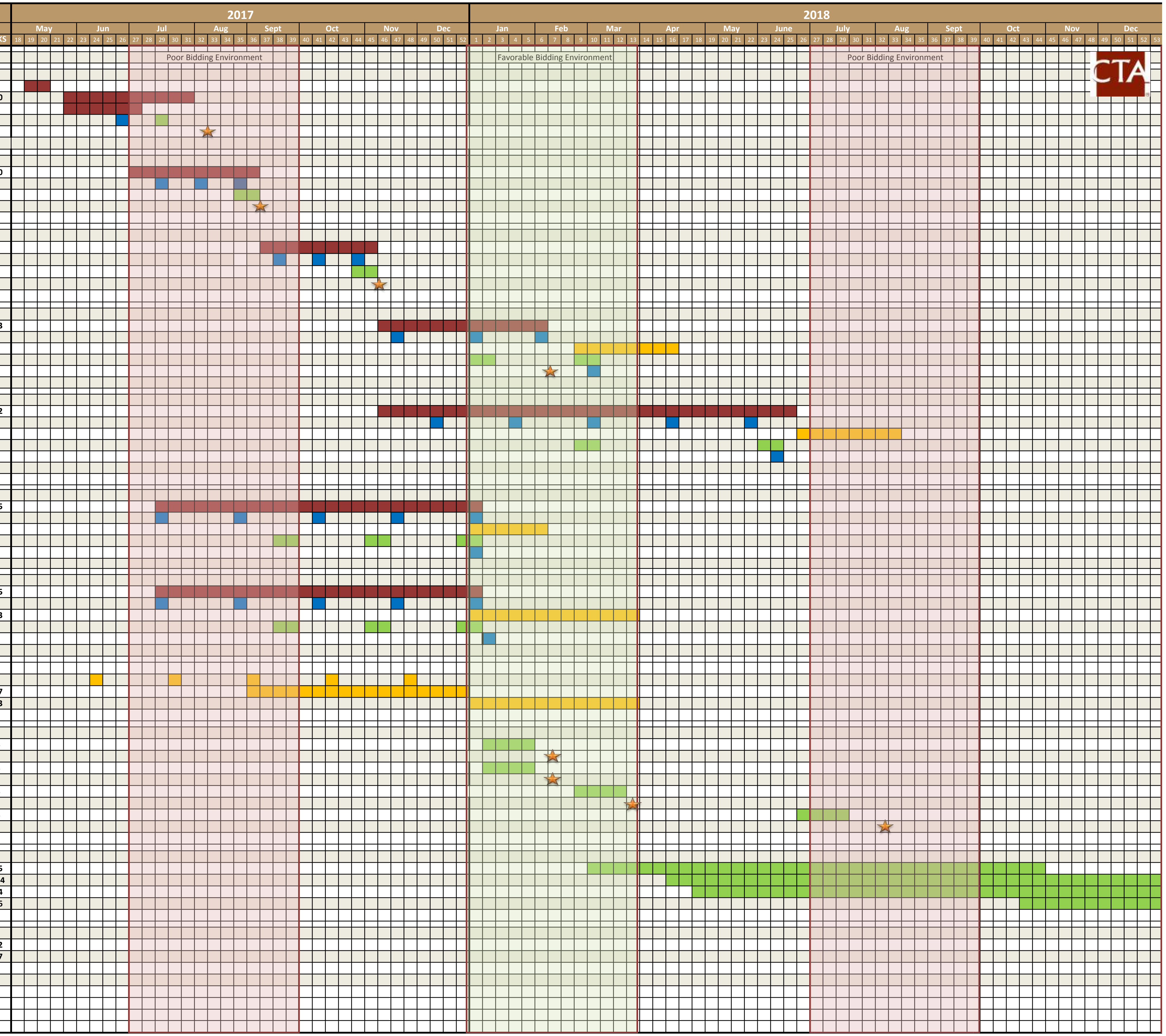




DRAFT PROJECT SCHEDULE

Bozeman School District - New High School
8/11/17

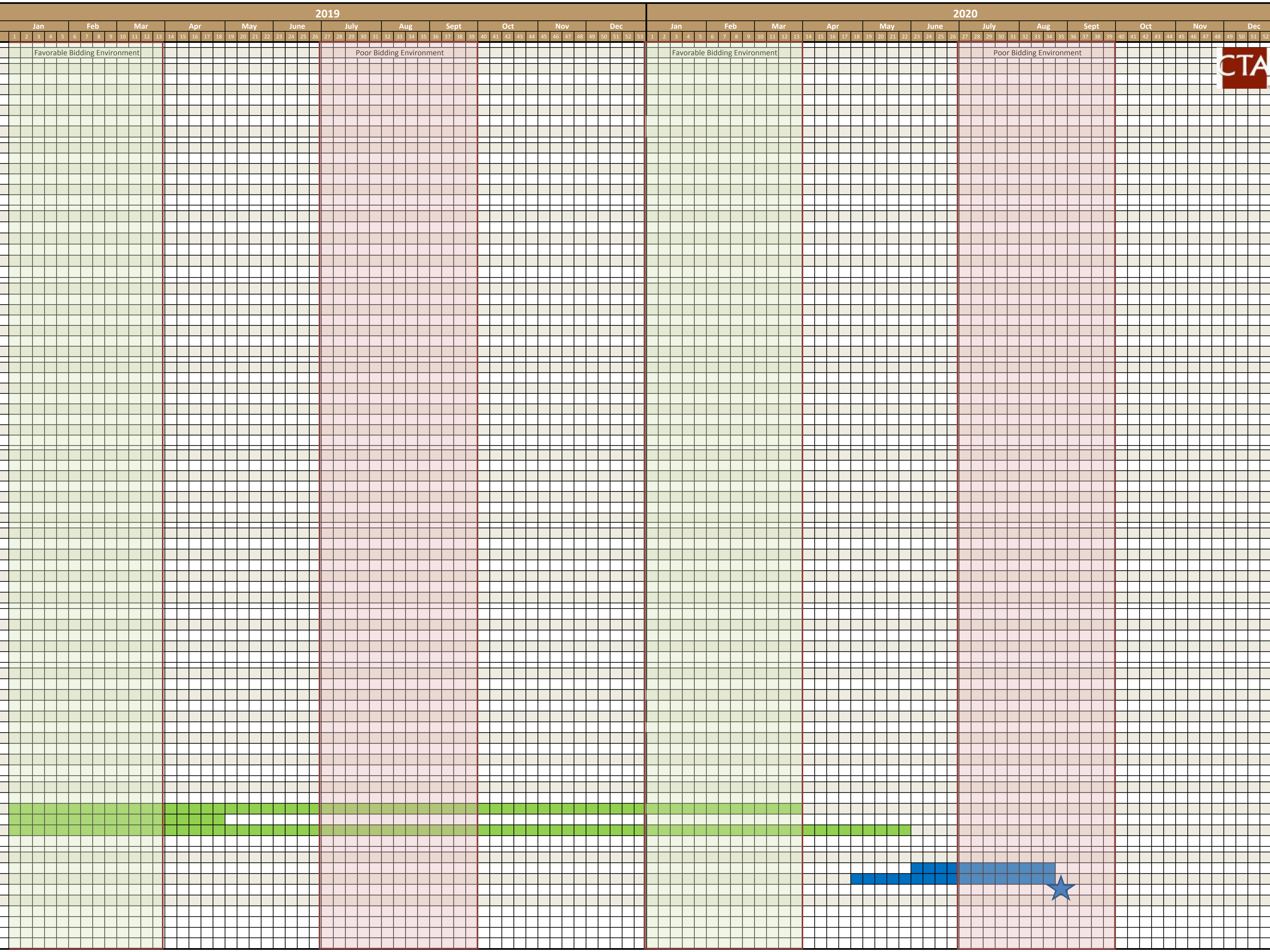
		Start	Finish	WKS
1	**Bond Approval**			-
2	**Predesign**			
3	Project Kick-off			-
4	Programming			10
5	Conceptual Design			6
6	Estimate of Construction Cost			1
7	Board Meeting - Review - Approval Ed. Specs.	08/14/17		
8				
9	**Schematic Design**			
10	Schematic Design			10
11	Builsding Committee Work Session(s)	3 week intervals		-
12	Estimate of Construction Cost			2
13	Board Presentation - Review & Approval SD	09/11/17		-
14				
15	**Design Development**			
16	Design Development Design			9
17	Building Committee Work Session(s)	3 week intervals		-
18	Estimate of Construction Cost			-
19	Board Meeting - Review & Approval DD	11/13/17		-
20				
21	**Construction Documents (Core & Shell)**			
22	Core and Shell			13
23	Building Committee Work Session(s)	6 week intervals		-
24	Permitting Core and Shell			8
25	Estimate of Construction Cost			-
26	Board Meeting - Review & Approval CD C&S	02/12/18		1
27				
28	**Construction Documents (Interior)**			
29	Interiors			32
30	Building Committee Work Session(s)	6 week intervals		-
31	Permitting Interiors			8
32	Estimate of Construction Cost			-
33	Board Meeting - Review & Approval CD INT			1
34				
35				
36	**Off-site Civil**			
37	Off-Site Civil Design			25
38	Building Committee - Work Session(s)	6 week intervals		-
39	Permitting Off-site Civil			6
40	Estimate of Construction Cost			-
41	Owner Review & Approval			1
42				
43	**On-site Civil**			
44	On-Site Civil Design			25
45	Building Committee Work Session(s)	6 week intervals		-
46	Permitting Off-site Civil			13
47	Estimate of Construction Cost			-
48	Owner Review & Approval			1
49				
50	**City of Bozeman Submittals**			
51	Informal Meetings	6 week intervals		-
52	Annexation			17
53	Development Review Committee			13
54				
55	**Bidding/ Final Pricing**			
56	Off-Site Civil			4
57	Board Meeting - Bid Approval Off-Site	02/12/18		-
58	On-Site Civil			4
59	Board Meeting - Bid Approval On-Site	02/12/18		-
60	Core and Shell			4
61	Board Meeting - Bid Approval Core & Shell	03/26/18		-
62	Interiors			4
63	Board Meeting - Bid Approval Interiors	08/06/18		-
64				
65	**Construction**			
66	Off-Site Civil			35
67	On-Site Civil			104
68	Core and Shell			54
69	Interiors			86
70				
71	**Owner Move-In / Final Completion**			
72	Owner Setup			12
73	Commissioning			17
74	Classes Begin			-
75				
76				
77				
78				



DRAFT PROJECT SCHEDULE

Bozeman School District - New High School
8/11/17

#	Task	Duration: Start	Duration: Finish
1	**Bond Approval**		
2	**Predesign**		
3	Project Kick-off		
4	Programming		
5	Conceptual Design		
6	Estimate of Construction Cost		
7	Board Meeting - Review - Approval Ed. Specs.	08/14/17	
8			
9	**Schematic Design**		
10	Schematic Design		
11	Builsding Committee Work Session(s)	3 week intervals	
12	Estimate of Construction Cost		
13	Board Presentation - Review & Approval SD	09/11/17	
14			
15	**Design Development**		
16	Design Development Design		
17	Building Committee Work Session(s)	3 week intervals	
18	Estimate of Construction Cost		
19	Board Meeting - Review & Approval DD	11/13/17	
20			
21	**Construction Documents (Core & Shell)**		
22	Core and Shell		
23	Building Committee Work Session(s)	6 week intervals	
24	Permitting Core and Shell		
25	Estimate of Construction Cost		
26	Board Meeting - Review & Approval CD C&S	02/12/18	
27			
28	**Construction Documents (Interior)**		
29	Interiors		
30	Building Committee Work Session(s)	6 week intervals	
31	Permitting Interiors		
32	Estimate of Construction Cost		
33	Board Meeting - Review & Approval CD INT		
34			
35			
36	**Off-site Civil**		
37	Off-Site Civil Design		
38	Building Committee - Work Session(s)	6 week intervals	
39	Permitting Off-site Civil		
40	Estimate of Construction Cost		
41	Owner Review & Approval		
42			
43	**On-site Civil**		
44	On-Site Civil Design		
45	Building Committee Work Session(s)	6 week intervals	
46	Permitting Off-site Civil		
47	Estimate of Construction Cost		
48	Owner Review & Approval		
49			
50	**City of Bozeman Submittals**		
51	Informal Meetings	6 week intervals	
52	Annexation		
53	Development Review Committee		
54			
55	**Bidding/ Final Pricing**		
56	Off-Site Civil		
57	Board Meeting - Bid Approval Off-Site	02/12/18	
58	On-Site Civil		
59	Board Meeting - Bid Approval On-Site	02/12/18	
60	Core and Shell		
61	Board Meeting - Bid Approval Core & Shell	03/26/18	
62	Interiors		
63	Board Meeting - Bid Approval Interiors	08/06/18	
64			
65	**Construction**		
66	Off-Site Civil		
67	On-Site Civil		
68	Core and Shell		
69	Interiors		
70			
71	**Owner Move-In / Final Completion**		
72	Owner Setup		
73	Commissioning		
74	Classes Begin		
75			
76			
77			
78			



Collaborative for High Performance Schools (CHPS)

Project Scorecard: 2014 US-CHPS Criteria™

School Name: Bozeman High School | **Project #: BZNHS**

Expected Completion: | **Current Phase:**

School District: | **Website:**

School Address: | **City:** | **State:** | **Zip:**

School Contact: | **Phone:** | **E-mail:**

Student Capacity: | **Notes:**

Approximate Square Feet:

Verification

Is this the final CHPS Scorecard?

Registered Principal Architect (Signature) | **Project Manager** (Signature)

Name, Title, Date (Please print) | **Name, Title, Date** (Please print)

Use this scorecard to track expected scores. Note that prerequisites have points associated with them even though they are required. This enables project teams to talk more meaningfully about the effort being put into each section of the Criteria. Prerequisite point columns are also highlighted for reference. Mark each credit as ready for review by using the appropriate column for each phase of the review.

Key: **P** - Prerequisite; **PS** - CHPS Plan Sheet Required; **CD** - Construction Documents Required; **A** - Attachment Required

Criteria	Title	Prerequisite	Max Possible Pts	Points Targeted	Likely Points	Maybe Points	Unlikely Points	Not Pursued	Responsible Team Member	Design Review Requirements	Ready for Design Review	Construction Review Requirements	Ready for Construction Review	Performance Review Requirements	Ready for Performance Review	Annotation
	Total		**250**	**125**	**25**	**74**	**13**	**19**	***110 points = CHPS Verified; 160 points = CHPS Verified Leader***							
Integration and Innovation	**Subtotal**		**21**	**6**	**2**	**11**	**2**	**1**								
II 1.0	Integrated Design	P	1	1						CD		A				
II 1.1	Enhanced Integrated Design		2	2						A						
II 2.1	District Level Commitment		2	2						A						
II 3.1	School Master Plan		2			2				A						
II 4.1	High Performance Transition Plan		1					1		A		A				
II 5.1	Educational Display		1	1		1				CD		A				
II 6.1	Educational Integration		2		2							A				
II 7.1	Demonstration Area		1			1				CD		A				
II 8.1	Climate Change Action / Carbon Footprint Reporting		3			3				A		A				
II 9.1	Crime Prevention Through Environmental Design		2				2			A		A				
II 10.1	Innovation (CHPS Verified Projects only)		4			4				VARIES		VARIES				
Indoor Environmental Quality	**Subtotal**		**82**	**47**	**7**	**22**	**3**	**3**								
EQ 1.0	HVAC Design - ASHRAE 62.1	P	7	7						PS1						
EQ 1.1	Enhanced Filtration		2	2						PS1 CD		A				
EQ 1.2	Dedicated Outdoor Air System		5	5						PS1 CD		A				
EQ 2.1	Polluntant and Chemical Source Control		3		2	1				CD A		A				
EQ 3.1	Outdoor Moisture Management		3	3						CD		A				
EQ 4.1	Ducted Returns		2	2						PS1 CD						
EQ 5.1	Construction Indoor Air Quality Management		6	6						PS1 CD		A				
EQ 5.2	(Indoor) Moisture Management		3	3												
EQ 6.1	Post Construction Indoor Air Quality		1	1						CD		A				
EQ 7.0	Low Emitting Materials	P	2	2						PS CD		PS A				
EQ 7.1	Additional Low Emitting Materials		6				3	3		PS CD		PS A				
EQ 8.1	Low Radon		1		1					PS1 CD		A				
EQ 9.1	Thermal Comfort - ASHRAE 55		4	4						PS1 CD						
EQ 10.1	Individual Controllability		2	2						CD		A				
EQ 10.2	Controllability of Systems		1			1				CD		A				
EQ 11.0	Daylighting: Glare Protection	P	4	4						CD A		A				
EQ 11.1	Daylight Availability		5			5				PS CD A		A				
EQ 12.1	Views		3			3				PS CD						
EQ 13.1	Electric Lighting Performance		2	2						CD A						
EQ 13.2	Superior Electric Lighting Performance		6			6				CD		A				
EQ 14.0	Acoustical Performance	P	4	4						PS CD A		A		A		
EQ 14.1	Enhanced Acoustical Performance		6			6				PS CD A		A		A		
EQ 15.1	Low-EMF Wiring		2		2					CD		A				
EQ 15.2	Low-EMF Best Practices		2		2					CD A		A				
Energy	**Subtotal**		**63**	**31**	**0**	**28**	**0**	**4**								
EE 1.0	Energy Performance	P	5	5						CD A						
EE 1.1	Superior Energy Performance		40	16		24				CD A						
EE 2.1	Zero Net Energy Capable		3			3										
EE 3.0	Commissioning	P	5	5						CD A		A				
EE 3.1	Additional Commissioning Qualifications		1	1						CD A		A				
EE 3.2	Building Envelope Commissioning		2	2						CD A		A				
EE 4.1	Environmentally Preferable Refrigerants		1			1										
EE 5.1	Energy Management System		2	2						CD						
EE 5.2	Advanced Energy Management System and Submetering		2					2		CD						
EE 6.1	Natural Ventilation & Energy Conservation Interlocks		2					2		PS CD		A				
Water	**Subtotal**		**20**	**8**	**2**	**7**	**3**	**0**								
WE 1.1	Minimum Reduction in Indoor Potable Water Use		5	5												
WE 2.1	Reduce Potable Water Use for Sewage Conveyance		4	2		2										
WE 3.1	Irrigation and Exterior Water Budget - Use Reduction		4			4				CD		A				
WE 4.1	Reduce Potable Water Use for Non-Recreational Landscaping		4		2	1	1			CD A		A				
WE 5.1	Recuce Potable Water Use for Recreational Landscaping		2				2			CD		A				
WE 6.1	Irrigation Systems Commissioning		1	1						A		A				
Sites	**Subtotal**		**24**	**12**	**5**	**3**	**2**	**7**								
SS 1.0	Site Selection	P	3	3						A						
SS 2.1	Environmentally Sensitive Land		3					3		PS CD A						
SS 3.1	Minimize Site Disturbance		1					1		PS CD						
SS 4.1	Construction Site Runoff Control and Sedimentation		1	1						CD		A				
SS 5.1	Post Construction Stormwater Management		2	2		2				PS CD		A				
SS 6.1	Central location		2					2		PS A						
SS 7.1	Located Near Public Transportation		1	1				1		A						
SS 8.1	Joint-Use of Facilities		1	1						CD A						
SS 9.1	Human-Powered Transportation		2	2						PS CD		A				
SS 10.1	Reduce Heat Islands - Landscaping and Sites		2				2			CD						
SS 11.1	Reduce Heat Islands - Cool Roofs and Green Walls		2		1	1				CD		A				
SS 12.1	Avoid Light Pollution and Unnecessary Lighting		2	2	2					CD		A				
SS 13.1	School Gardens		1		1					CD A		A				
SS 14.1	Use Locally Native Plants for Landscape		1		1					PS CD						
Materials and Waste Management	**Subtotal**		**21**	**11**	**0**	**3**	**3**	**4**								
MW 1.0	Storage and Collection of Recyclables	P	2	2						CD		A				
MW 2.1	Construction Site Waste Management		4	3		1				CD		A				
MW 3.1	Single Attribute - Recycled Content		2			2				CD		PS A				
MW 4.1	Single Attribute - Rapidly Renewable Materials		1				1			CD		PS A				
MW 5.1	Single Attribute - Certified Wood		1				1			CD		PS A				
MW 6.1	Single Attribute - Materials Reuse		1				1			CD		PS A				
MW 7.1	EPDS		3	3						PS CD		PS A				
MW 8.1	Building Reuse - Exterior		3					3		CD		PS A				
MW 9.1	Building Reuse - Interior		1					1		CD		PS A				
MW 10.1	Health Product Related Information Reporting		3	3						CD		PS A				
Operations & Metrics	**Subtotal**		**19**	**10**	**9**	**0**	**0**	**0**								
OM 1.0	Facility Staff and Occupant Training	P	2	2						CD		A				
OM 2.1	Post-Occupancy Transition		2		2					A		A				
OM 3.0	Performance Benchmarking	P	2	2						A		A		A		
OM 4.1	High Performance Operations		5		5					A		A		A		
OM 5.1	Systems Maintenance Plan		1	1								A				
OM 6.1	Indoor Environmental Management Plan		2	2								A				
OM 7.1	Green Cleaning		2	2								A		A		
OM 8.1	Integrated Pest Management		1		1					PS		A				
OM 9.1	Anti-Idling Measures		1	1						A						
OM 10.1	Green Power		1		1					PS		A				

BOZEMAN PUBLIC SCHOOLS

NEW HIGH SCHOOL PROGRAM

Updated: 08/07/17

NEW HIGH SCHOOL FACILITY - SUMMARY

Space	Programming Calculations		TS	Pre-Bond	Program Notes
Students Served		**1,500**		1,500	Targeted maximum capacity with 80% utilization
# of Teaching Stations		**72**		72	72 X 26 X 0.8 = 1,498 Students (1,500 targeted)
Gross Square Feet per Student		**203**		203	
Learning Communities (Classrooms & Labs)		**100,035**	**54**	100,178	98,090 SF OH State Standard (54 teaching stations)
Commons / Kitchen		**27,180**	**0**	30,360	35,390 SF OH State Standard (cafetorium model)
Admin / Student Services		**8,665**	**0**	7,950	8,490 SF OH State Standard
Special Education / Resource		**6,693**	**0**	6,305	6,550 SF OH State Standard
Visual Arts		**7,566**	**3**	6,656	6,100 SF OH State Standard
Music		**10,764**	**3**	10,387	11,860 SF OH State Standard
Performance Hall (Drama)		**13,644**	**1**	13,284	0 SF OH State Standard (cafetorium model)
Athletics / Activities / Health		**71,628**	**6**	71,598	42,930 SF OH State Standard (1 main gym, 1 court aux)
Library / Media Center		**10,075**	**0**	10,075	9,180 SF OH State Standard
Career Technical Education		**29,760**	**5**	28,275	17,760 SF OH State Standard (doesn't include shops)
Building Support		**18,941**	**0**	18,932	22,850 SF OH State Standard
	High School Total	**304,951**	**72**	304,000	259,200 SF OH State Standards (2017)
FUTURE GROWTH PLANNING					
Students Served		**1,800**		1,800	Targeted maximum capacity with 80% utilization
# of Teaching Stations		**87**		87	87 X 26 X 0.8 = 1,810 Students (1,800 targeted)
Gross Square Feet per Student		**195**			
High School Total		**304,951**		304,000	
Future Addition		**46,306**		40,800	3 story addition adjacent to the learning communities, plus room for one story activities and drama additions.
	High School Total	**351,257**	**87**	344,800	
NEW HIGH SCHOOL CAMPUS					
Street Improvements		**Yes**		Yes	
Separate Bus & Student Drop-off Zones		**Yes**		Yes	
Student/Staff/Public Parking Spaces		**900**	**ea**	900	300 of theses spaces to be at the north city fields
Bike Parking Spaces		**90**	**ea**	90	
8-Lane Running Track & Football Field		**1**	**ea**	1	Future 10-lane track & stadium expansion + comfort station
Artificial Turf Upgrade		**0**	**ea**	0	Desired, but not budgeted
Competition Soccer Field		**1**	**ea**	1	To be constructed at the new north city fields
Field Events		**1**	**ea**	1	Discus, shotput, long jump, pole vault (fenced)
Practice Fields		**3**	**ea**	3	
Softball Fields		**2**	**ea**	2	Provide space for 2 additional fields
Tennis Courts		**8**	**ea**	8	10' fence, plus small storage shed
Art Kiln / Storage Facility		**400**	**sf**	0	Easy defined additive alternate
Facilities Storage Building / Yard		**7,200**	**sf**	0	Easy additive alternate. Could include district IT center.
Track & Field Storage Facility		**500**	**sf**	500	Easy additive alternate. Could include district IT center.
CTE Shop Yard		**16,000**	**sf**	10000	Includes 400 sf metal foundry, covered storage, work areas
Loading Dock		**1**	**ea**	1	

BOZEMAN PUBLIC SCHOOLS
PROPOSED NEW HIGH SCHOOL PROGRAM

PROGRAM DETAIL PER AREA

Space	Programming Calculations					TS	Pre-Bond	Program Notes
LEARNING COMMUNITIES								
Small Classrooms	0	@	700	=	**0**	**0**	5,600	24 students / classroom
Standard Classrooms	35	@	850	=	**29,750**	**35**	22,100	28 students / classroom
Combo Classroom	10	@	900	=	**9,000**	**10**	7,200	28 students / classroom (w/ folding partition)
Science Labs (Chemistry)	2	@	1,500	=	**3,000**	**2**	3,900	28 students / classroom
Science Labs (Biomed)	1	@	1,500	=	**1,500**	**1**	0	28 students / classroom
Science Labs (Physics)	1	@	1,500	=	**1,500**	**1**	3,900	28 students / classroom
Science Labs (Biology)	2	@	1,300	=	**2,600**	**2**	3,600	28 students / classroom
Science Labs (General)	3	@	1,200	=	**3,600**	**3**	3,600	28 students / classroom
Science Prep / Work	4	@	400	=	**1,600**	**0**	1,800	Two labs to share prep / work rooms
Teacher Work/Planning Areas	8	@	500	=	**4,000**		4,000	
Collaborative Plazas	8	@	1,600	=	**12,800**		14,400	
Small Group Conference Room	8	@	250	=	**2,000**		2,000	
Learning Community Storage	8	@	220	=	**1,760**		1,760	
Learning Community Display	8	@	80	=	**640**		0	
Learning Community Locker Alcoves	16	@	200	=	**3,200**		3,200	2-tier, 12"w x 15"d x 6'h vision lockers with combo locks
								188 lockers per learning community = 1,504 total
Non-Assignable Increase	30%	@	76,950	=	**23,085**		23,118	
	Department Total				**100,035**	**54**	100,178	
COMMONS / KITCHEN								
Learning Street	600	@	12	=	**7,200**		11,250	Breakout areas, comfortable seating, study spaces
Commons Town Square	600	@	20	=	**12,000**		11,250	Tables for seating 600 students
Kitchen	1	@	1,000	=	**1,000**		1,500	
Dry Storage	1	@	1,200	=	**1,200**		400	
Walk-In Refrigerator	1	@	375	=	**375**		240	
Walk-In Freezer	1	@	375	=	**375**		160	
Office	1	@	100	=	**100**		100	
Staff Room	1	@	150	=	**150**		150	
Restroom	1	@	50	=	**50**		50	
Servery	0	@	2,750	=	**0**		0	Food court service, multiple windows, open seating
Concessions	1	@	200	=	**200**		200	
Non-Assignable Increase	20%	@	22,650	=	**4,530**		5,060	
	Department Total				**27,180**	**0**	30,360	

ADMIN / STUDENT SERVICES								
MAIN OFFICE								
Waiting / Secretarial Office / Reception	1	@	600	=	**600**		800	
Admin Offices	4	@	150	=	**600**		600	Decentralized administration configuration
Admin Assistant	1	@	120	=	**120**		120	
Staff Break Room	1	@	280	=	**280**		280	
Staff Restrooms	2	@	60	=	**120**		120	
Work / Mail Room	1	@	240	=	**240**		240	
Large Conference	2	@	250	=	**500**		600	With folding partition between
Small Conference / Misc Rooms	2	@	150	=	**300**		300	
Secure Storage / Records	1	@	150	=	**150**		150	
Detention	1	@	300	=	**300**		300	
Storage	1	@	100	=	**100**		100	
Business / Attendance Office	1	@	275	=	**275**		275	
Admin Offices	1	@	150	=	**150**		150	
Counseling Plaza with Reception	1	@	300	=	**300**		400	
Counseling Offices	4	@	120	=	**480**		480	Reduced to 4 (1 counselor per 400 students)
Secure Storage	2	@	120	=	**240**		240	
Career Center Suite	1	@	500	=	**500**		600	
Counseling Classroom	0	@	850	=	**0**		0	Share with an adjacent general classroom
Offices (specialists, support, mentors, etc.)	4	@	120	=	**480**		0	Reduced to 4 from 8
Conference Room	1	@	250	=	**250**		250	
Health Center / Nurses Station	1	@	500	=	**500**		500	
Restrooms	3	@	60	=	**180**		120	
Non-Assignable Increase	30%	@	6,665	=	**2,000**		1,325	
	Department Total				**8,665**	**0**	7,950	
SPECIAL EDUCATION / RESOURCE								
Plaza / Resource Center	1	@	400	=	**400**		0	
Classrooms (CCCR/AAS, TAPS/SEB)	4	@	850	=	**3,400**		2,550	
Restrooms / Shower	2	@	100	=	**200**		200	
OT / PT Room	1	@	250	=	**250**		250	
Resource Center	0	@	850	=	**0**		850	Share with plaza above
Specialist Offices	1	@	400	=	**400**		400	Suite w/ private conf rooms
Smal private conference rooms	3	@	120	=	**360**		300	
Storage Rooms	2	@	150	=	**300**		300	
Non-Assignable Increase	30%	@	4,610	=	**1,383**		1,455	
	Department Total				**6,693**	**0**	6,305	
VISUAL ARTS								
Teacher Work/Planning Areas	1	@	250	=	**250**		250	Shared with CTE
Small Conference	1	@	120	=	**120**		120	
Art Labs (2D, 3D)	2	@	2,000	=	**4,000**	**2**	3,750	
Art Classroom (maker space)	1	@	850	=	**850**	**1**	400	Shared with CTE learning commuity
Art Storage	2	@	200	=	**400**		400	
Indoor - Kiln / Storage	1	@	200	=	**200**		200	
Outdoor - Kiln / Storage	0	@	500	=	**0**		0	Easy Additive Alternate (Separate Outdoor Facility)
Non-Assignable Increase	30%	@	5,820	=	**1,746**		1,536	
	Department Total				**7,566**	**3**	6,656	

MUSIC								
Teacher Work/Planning Areas	3	@	120	=	**360**		250	Reduced office size
Small Conference	0	@	120	=	**0**		120	
Music Studio (Band)	1	@	2,000	=	**2,000**	1	2,000	
Music Studio (Orchestra)	1	@	2,000	=	**2,000**	1	2,000	
Music Studio (Choir)	1	@	1,500	=	**1,500**	1	1,600	Reduced sf (could be back half of performance hall)
Music Plaza	1	@	800	=	**800**		400	
Small Practice Room	4	@	80	=	**320**		320	
Large Practice Room	2	@	150	=	**300**		300	
Ensemble Practice Room	1	@	250	=	**250**		250	
Music Storage	3	@	250	=	**750**		750	
Non-Assignable Increase	30%	@	8,280	=	**2,484**		2,397	
	Department Total				**10,764**	3	10,387	
PERFORMANCE HALL (DRAMA)								
750 Seat Sloped Auditorium Seats	750	@	7.0	=	**5,250**	1	5,250	Could be split space w/ upper folding stadium seating
Control Booth	1	@	150	=	**150**		150	
Stage	1	@	2400	=	**2400**		2,400	
Stage Storage	1	@	400	=	**400**		250	
Stage Shop	1	@	400	=	**400**		600	Could be shared with the CTE wood shop
Tickets / Sound Lobby	1	@	150	=	**150**		150	
Dressing Restrooms	2	@	400	=	**800**		800	
Small Dressing / Restrooms	2	@	60	=	**120**		120	
Drama Costume Storage	1	@	200	=	**200**		150	
Drama Classroom (Speech & Debate)	1	@	1500	=	**1500**		1,200	
Non-Assignable Increase	20%	@	11,370	=	**2,274**		2,214	
	Department Total				**13,644**	1	13,284	

ATHLETICS / ACTIVITIES / HEALTH

Gymnasium - Competition 2,500 Seats	1	@	17,300	=	**17,300**	2	17,300	Main floor seats with end zone bleachers
Gymnasium Balcony - Add 1,000 Seats	0	@	4,800	=	**0**		0	Future 1,000 balcony seats w/ PE phased space
Auxiliary Gym - (2 Courts Each)	2	@	11,400	=	**22,800**	4	22,400	Primary court with bleacher seating for approx 200/gym
Wrestling Room (42'x42' matt size)	1	@	2,200	=	**2,200**		2,400	Future balcony seating
Fitness Center / Weight Room	1	@	3,600	=	**3,600**		3,600	Reduced size. Future balcony seating conversion
Team Locker Room	2	@	1,600	=	**3,200**		3,200	
PE Locker Rooms	4	@	1,200	=	**4,800**		4,000	
Small Locker Rooms	2	@	100	=	**200**		200	
PE Office	2	@	270	=	**540**		540	
Staff Lockers / Showers	2	@	200	=	**400**		400	
Officials Rooms	2	@	100	=	**200**		200	
Team Rooms	2	@	850	=	**1,700**		1,600	
Training Room	1	@	500	=	**500**		500	
Laundry	1	@	250	=	**250**		250	
AD Office	1	@	135	=	**135**		135	
Coaching Center	2	@	270	=	**540**		540	
Storage	6	@	200	=	**1,200**		800	
Health Enhancement Classrooms / Labs	0	@	850	=	**0**		1,600	See general classrooms
Entry Lobby	1	@	150	=	**150**		0	Secondary events entry was requested
Non-Assignable Increase	20%	@	59,565	=	**11,913**		11,933	
	Department Total				**71,628**	6	71,598	

LIBRARY / MEDIA CENTER

Collaboration Area (stacks and social seating)	1	@	2,500	=	**2,500**		2,500	Adjacent to collaborative breakout space
Research Area (quiet seating and study)	1	@	2,250	=	**2,250**		2,250	
Small Study Rooms	4	@	150	=	**600**		600	
Large Study Rooms	3	@	200	=	**600**		500	
Library Work & Storage	1	@	600	=	**600**		600	
Writing Lab	1	@	900	=	**900**		1,000	
Circulation Area	1	@	300	=	**300**		300	
Non-Assignable Increase	30%	@	7,750	=	**2,325**		2,325	
	Department Total				**10,075**	0	10,075	Reduced to pre-bond area allocations

CAREER TECHNICAL EDUCATION

Metal / Welding Lab	1	@	4,300	=	**4,300**		4,000	Area for art metal-smithing / jewelry
Woods / Construction Lab	1	@	3,500	=	**3,500**		4,000	Potential sharing with drama stage set
Auto / Engines Lab	1	@	3,500	=	**3,500**		4,000	
Classrooms	3	@	700	=	**2,100**	3	1,700	Shared with art & learning community for utilization
Arch/Eng Lab	1	@	1,400	=	**1,400**		1,500	
Storage	5	@	280	=	**1,400**		800	
Offices	5	@	100	=	**500**		400	
Exterior Courtyard and Storage Yard	1	@	16,000	=	**0**		0	Exterior storage yard not in calc. See outdoor spaces.
FCS Lab / Classroom (Culinary Arts)	1	@	1,750	=	**1,750**		1,500	What type of kitchen, size of room, and shared spaces
FCS Lab (Storage, Refrig, Freezer)	1	@	250	=	**250**		250	Reduced the sf from original programming session
FCS Classroom	1	@	850	=	**850**		0	Fashion, interiors, childhood development
Daycare	0	@	0	=	**0**		0	Not programmed
Photo / Graphics Lab	1	@	1,400	=	**1,400**		0	To include small dark room
Production Studio	1	@	600	=	**600**		600	Green screen, broadcasting and recording
Business Lab	1	@	1,350	=	**1,350**	1	2,400	28 students / classroom
Business Classroom	1	@	850	=	**850**	1	0	Could be a shared classroom
Conference Room	1	@	250	=	**250**		0	
Student Store (DECA)	1	@	500	=	**500**		400	
Store Storage	1	@	300	=	**300**		200	
Non-Assignable Increase	20%	@	24,800	=	**4,960**		6,525	
	Department Total				**29,760**	5	28,275	

BUILDING SUPPORT								
Large Restrooms	12	@	250	=	**3,000**		3,000	
Small Restrooms	6	@	60	=	**360**		360	
IT Rooms	7	@	80	=	**560**		560	
IT Office	1	@	200	=	**200**		200	Reduce in size. Office to support 1-2 staff.
IT Storage Staging	0	@	900	=	**0**		0	See separate facilities facility
IT Computer Lab	0	@	1,350	=	**0**		0	See separate facilities facility
Receiving / Storage	1	@	800	=	**800**		800	
Maintenance Shop	1	@	800	=	**800**		800	
Office	1	@	150	=	**150**		150	
Break Room	1	@	300	=	**300**		300	
Custodial Storage	1	@	600	=	**600**		600	
Custodial Rooms	6	@	100	=	**600**		600	
Mech / Elec	4	@	1,800	=	**7,200**		7,200	
Outside Storage and Yard	0	@	5,000	=				See exterior facilites building
Loading Dock	0	@	1,500	=				Exterior loading dock not in interior sf calc
Non-Assignable Increase	30%	@	14,570	=	**4,371**		4,362	
	Department Total				**18,941**	**0**	18,932	
Total Non-Assignable Increase					**61,071**		62,250	
TOTAL GROSS BUILDING AREA	**203**	**sf/**	**Student**		**304,951**	**72**	304,000	
FUTURE ADDITION								
Small Classrooms	0	@	700	=	**0**		1,400	24 students / classroom
Standard Classrooms	9	@	850	=	**7,650**	**9**	7,650	28 students / classroom
Combo Classroom	3	@	900	=	**2,700**	**3**	1,800	28 students / classroom (w/ folding partition)
Labs (Science / Prep / Computer)	2	@	1,500	=	**3,000**	**2**	3,000	28 students / classroom
Teacher Work/Planning Areas	3	@	500	=	**1,500**		1,000	
Collaborative Breakout Spaces	3	@	1,800	=	**5,400**		3,700	One is to be the future Bridger Charter Academy commons
Small Group Conference Room	3	@	250	=	**750**		500	
Learning Community Storage	3	@	220	=	**660**		450	
Learning Community Lockers	3	@	200	=	**600**		800	
Learning Community Display	2	@	80	=	**160**		160	
Black Box Theatre (Allow for Future Space)	1	@	7,200	=	**7,200**	**1**	7,200	Create for future area near drama if desired
Activities/ Athletics 1,000 Balcony Seat Addition	1	@	7,800	=	**7,800**		4,800	Create for future area near activities
Non-Assignable Increase	30%	@	29,620	=	**8,886**		8,340	
	Department Total				**46,306**	**15**	40,800	3-Story Learning Community Addition
TOTAL FUTURE GROSS	**195**	**sf/**	**Student**		**351,257**	**87**	344,800	

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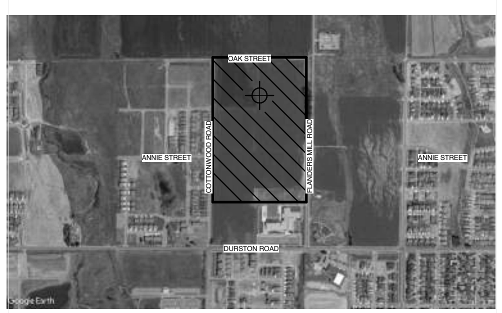
PROJECT LOCATION

VICINITY MAP: *Locator*



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SHEET INDEX

CODE SHEETS
G201 CODE PLAN
G202 CODE PLAN

CIVIL
C101 SITE LAYOUT, ACCESS, & CIRCULATION
C201 GRADING & DRAINAGE PLAN
C301 WATER, SEWER, & STORMDRAIN PLAN
C401 PEDESTRIAN TUNNEL PLAN & PROFILE
C501 PEDESTRIAN TUNNEL DETAILS
C502 TYPICAL ON-SITE PAVEMENT SECTIONS
C503 TYPICAL ARTERIAL ROAD SECTIONS

LANDSCAPE
L101 NORTHERN SITE PLAN
L102 CENTRAL SITE PLAN
L103 SOUTHERN SITE PLAN

ARCHITECTURAL
A101 FIRST FLOOR PLAN
A102 SECOND FLOOR PLAN
A103 THIRD FLOOR PLAN

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CODE PLAN LEGEND

8888 SF / XXX/XX / 8888	OCCUPANCY TAG: SPACE AREA; NUMBER OF OCCUPANTS; OCCUPANT LOAD FACTOR
→	EXIT PATH
▬ ▬ ▬	1 HOUR FIRE BARRIER - SEAL PERMIETER AND PENETRATIONS PER DETAILS
60M	UL RATED FIRE DOOR AND FRAME WITH RATING AS INDICATED - SEE SHEET A601
FEC	NEW SEMI-RECESSED CABINET AND FIRE EXTINGUISHER - SEE SPECIFICATIONS
FE	SURFACE MOUNTED FIRE EXTINGUISHER - SEE SPECIFICATIONS
– – –	EXIT PATH DISTANCES

NOTE: SEE ELECTRICAL FOR ILLUMINATED EXIT SIGNS.

1 / G201 FIRST FLOOR CODE PLAN
1/32" = 1'-0"

NORTH

CODE REVIEW INFORMATION

CODES:
- 2012 INTERNATIONAL BUILDING CODE (IBC)
- 2012 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
- 2012 INTERNATIONAL FIRE CODE (IFC)
- 2014 NATIONAL ELECTRIC CODE (NEC)
- 2012 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CHAPTER 13, STANDARD FOR INSTALLATION OF FIRE SPRINKLERS
- 2010 AMERICANS DISABILITY ACT STANDARDS (ADA)
- 2009 AMERICAN NATIONAL STANDARD INSTITUTE (ANSI) A117.9 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
- 2012 UNIFORM PLUMBING CODE AND MCA ARM 24.301.351

THE FOLLOWING STANDARDS ARE APPLICABLE IN ADDITION TO ANY OTHER LOCAL REQUIREMENTS:
- UNDERWRITERS LABORATORIES (UL)
- OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

2012 INTERNATIONAL BUILDING CODE FACILITY USE AND OCCUPANCY CLASSIFICATION IBC CHAPTER 3
OCCUPANCY CLASSIFICATION: GROUP E (EDUCATIONAL)

AREA / HEIGHT / OCCUPANCY (IBC TABLE 503 AND TABLE 601)
SECTION 503, TABLE 503.1
TYPE IB_ WITH AUTOMATIC SPRINKLER SYSTEM TOTALS INCLUDE:
- 160' ALLOWABLE + 20' INCREASE = 180' HEIGHT
- 5 STORIES ALLOWABLE + 1 STORY INCREASE = 6 STORIES
- (UNLIMITED) UL SF ALLOWABLE PER STORY

HEIGHT INCREASES
SECTION 504.2 AUTOMATIC SPRINKLER SYSTEM
- MAX BUILDING HEIGHT INCREASED BY 20 FT
- MAX STORY INCREASE = 1
- MAX AREA - SEE 506.2 & 506.3:
- 200% INCREASE FOR OVER 1 STORY ABOVE GRADE
- 300% INCREASE FOR SINGLE STORY BUILDING

BUILDING AREA MODIFICATION
SECTION 506.2 : FRONTAGE INCREASE : TYPE IB: NONE APPLICABLE FOR FRONTAGE INCREASE : ALLOWABLE AREA PER STORY = UL(UNLIMITED) SF GROSS AREA PROVIDED (LEVELS 1-3 + MECHANICAL LEVEL): 302,618 SF

TYPES OF CONSTRUCTION
SECTION 601 - FIRE RATING REQUIREMENTS FOR BUILDING ELEMENTS TYPE IB: RESISTIVE CONSTRUCTION REQUIREMENTS: IBC TABLE 601

ELEMENT	TYPE IB
PRIMARY STRUCTURAL FRAME	2
BEARING WALLS (EXTERIOR)	2
BEARING WALLS (INTERIOR)	2
NON-BEARING WALLS (EXTERIOR)	0 (SEE TABLE 602)
NON-BEARING WALLS (INTERIOR)	0
FLOOR CONSTRUCTION & SECONDARY MEMBERS	2
ROOF CONSTRUCTION & SECONDARY MEMBERS	2

SECTION 602 - FIRE SEPARATION DISTANCE AND EXTERIOR WALL RATINGS GROUP E: TYPE IB:
- X<5' = 1 HR ;
- 10 </= X < 30' = 1 HR;
- >30'= 0 HR
- *** ALL EXTERIOR WALLS ARE >30' FROM PROPERTY LINES.

FIRE AND SMOKE / BUILDING SEPARATIONS / PROTECTION 705 EXTERIOR WALL REQUIREMENTS
705.8.1.1 - 1.1 AND 1.2: UNLIMITED ON FIRST STORY ABOVE GRADE PLANE.
705.8 - OPENINGS (% SHOWN BELOW INDICATES SPRINKLERED/UNPROTECTED OPENINGS)

3-5 FEET:	15% MAX OPENINGS OF WALL AREA
5-10 FEET:	25% MAX OPENINGS OF WALL AREA
10-15 FEET:	45% MAX OPENINGS OF WALL AREA
15-20 FEET:	75% MAX OPENINGS OF WALL AREA
20+ FEET:	NO LIMIT MAX OPENINGS OF WALL AREA

*** FIRE SEPARATION IS > 20 FEET.

706 FIRE WALLS
TABLE 706.4: FIRE WALL FIRE-RESISTANCE RATINGS GROUP E = 3 HR (UNLESS TYPE II OR V CONSTRUCTION, THEN 2 HOUR RATING)

SECTION 707 - FIRE BARRIERS
- 707.3.1 - PER 713.4 - SHAFT ENCLOSURES: 1-HR CONNECTING < 4 STORIES, 2-HR CONNECTING 4+ STORIES
- 707.3.2 - PER 1022.2 -STAIR ENCLOSURES: 1-HR CONNECTING < 4 STORIES, 2-HR CONNECTING 4+ STORIES
- 707.3.10 - FIRE AREAS: FIRE BARRIERS OR HORIZONTAL ASSEMBLIES SHALL BE 2-HR RATED

SECTION 713 SHAFT ENCLOSURES
713.4 - FIRE-RESISTANCE RATING: 1-HR FIRE RESISTANCE RATING CONNECTING < 4 STORIES
****ELEVATOR, STAIRS, AND MECHANICAL CHASES WILL BE CONSIDERED AS SHAFTS.
713.14.1 EXCEPTION 4: ELEVATOR LOBBIES ARE NOT REQUIRED WHEN BUILDING IS SPRINKLERED.

SECTION 716 OPENING PROTECTIVES
716.5.5.1 GLAZING IN DOORS: FIRE PROTECTION RATED < 100 SQ IN., FIRE-RESISTANT RATED >100 SQ IN WHEN TESTED AS COMPONENT OF DOOR ASSEMBLY

INTERIOR FINISH CLASSIFICATIONS
CHAPTER 8, 803.1.1: INTERIOR WALL AND CEILING FINISH MATERIALS TABLE 803.9 FULLY SPRINKLERED

OCCUPANCY GROUP	EXITS	EXIT ACCESS	OTHER SPACES /ROOMS
E	CLASS-B	CLASS-C	CLASS-C

FIRE PROTECTION SYSTEMS
SECTION 903 AUTOMATIC SPRINKLER SYSTEMS
903.2.3 REQUIRED AT GROUP E: REQUIRED AT FIRE AREAS OVER 12,000 SF, REQUIRED AT FLOORS NOT AT LEVEL OF EXIT DISCHARGE UNLESS EVERY CLASSROOM AT THAT LEVEL HAS AT LEAST ONE EXTERIOR DOOR AT GROUND LEVEL.
903.2.4 REQUIRED AT GROUP F-1: IF AREA EXCEEDS 12000 SF
903.2.1 REQUIRED AT WOODWORKING OPERATIONS: IF AREA EXCEEDS 2500 SF

905.3.1 - STANDPIPES
-REQUIRED: TOP LEVEL FROM LOWEST POINT OF FD ACCESS BELOW IS MORE THAN 30'.
-EXCEPTION 1: CLASS I STANDPIPES IN STAIRWELL. TO BE LOCATED IN EVERY INTERIOR EXIT STAIRWELL.
906: PORTABLE FIRE EXTINGUISHERS: WITHIN 75' OF TRAVEL PER NFPA 10
906.1 WITHIN 30' OF COMMERCIAL COOKING EQUIPMENT
907 FIRE ALARM AND DETECTION: FIRE ALARM SYSTEM WILL BE PROVIDED.

EANS OF EGRESS
SECTION 1004 OCCUPANT LOAD
SECTION 1004.1.2 - OCCUPANT LOADS

CLASSROOM	= 1 OCCUPANT/20 NET SQUARE FEET
SHOPS/VOCATIONAL RM	= 1 OCCUPANT/50 NET SQUARE FEET
EXERCISE ROOMS	= 1 OCCUPANT/50 GROSS SQUARE FEET
KITCHEN (COMMERCIAL)	= 1 OCCUPANT/200 GROSS SQUARE FEET
LIBRARY	
READING	= 1 OCCUPANT/50 NET SQUARE FEET
STACKS AREA	= 1 OCCUPANT/100 GROSS SQUARE FEET
STAGES AND PLATFORMS	= 1 OCCUPANT/15 NET SQUARE FEET
ASSEMBLY TABLES AND CHAIRS	= 1 OCCUPANT/15 NET SQUARE FEET
ASSEMBLY FIXED SEATS	= 1 OCCUPANT PER SEAT
STORAGE / MECHANICAL EQUIPMENT	= 1 OCCUPANT/300 GROSS SQUARE FEET
BUSINESS AREAS	= 1 OCCUPANT/100 GROSS SQUARE FEET

OCCUPANT LOADS	SF	SF ALLOWED/OCC	OCCUPANT TOTALS
TOTAL PER FLOOR: SECTION 1			
1ST FLOOR	X SF	VARIES	2734
2ND FLOOR	X SF	VARIES	122
TOTAL SECTION 1			2856
TOTAL PER FLOOR: SECTION 2			
1ST FLOOR	X SF	VARIES	300
TOTAL SECTION 2			300
TOTAL PER FLOOR: SECTION 3			
1ST FLOOR	X SF	VARIES	1253
TOTAL SECTION 3			1253
TOTAL PER FLOOR: SECTION 4			
1ST FLOOR	X SF	VARIES	379
2ND FLOOR	X SF	VARIES	611
3RD FLOOR	X SF	VARIES	463
TOTAL SECTION 4			1453
TOTAL PER FLOOR: SECTION 5			
1ST FLOOR	X SF	VARIES	489
2ND FLOOR	X SF	VARIES	326
TOTAL SECTION 5			815
TOTAL PER FLOOR: SECTION 6			
1ST FLOOR	X SF	VARIES	291
2ND FLOOR	X SF	VARIES	290
3RD FLOOR	X SF	VARIES	290
TOTAL SECTION 6			871

SECTION 1005 MEANS OF EGRESS SIZING
SECTION 1005.3.1 - STAIR WIDTH: =(EXCEPTION 1) .2 INCH/OCCUPANT WITH SPRINKLER SYSTEM
1005.3.2 - OTHER EGRESS COMPONENTS = 0.15/OCCUPANT (EXCEPTION 1)

SECTION 1007 ACCESSIBLE MEANS OF EGRESS
SECTION 1007.1 ACCESSIBLE SPACES SHALL BE PROVIDED WITH NOT LESS THAN ONE ACCESSIBLE MEANS OF EGRESS. WHERE MORE THAN ONE MEANS OF EGRESS IS REQUIRED FROM ANY ACCESSIBLE SPACE, EACH ACCESSIBLE PORTION OF THE SPACE SHALL BE SERVED BY NOT LESS THAN TWO ACCESSIBLE MEANS OF EGRESS.

SECTION 1007.3 STAIRWAYS
1007.3.1 - 48" CLEAR BETWEEN HANDRAILS NOT REQUIRED WITH FIRE SPRINKLERS. STAIR WIDTH MUST BE A MINIMUM OF 44" WIDE (CROSS-REFERENCE WITH 1009.4)
1007.3.2 - AREAS OF REFUGE NOT REQUIRED AT STAIRS WITH FIRE SPRINKLERS
SECTION 1007.4 ELEVATORS
1007.4.2 - AREAS OF REFUGE NOT REQUIRED AT ELEVATORS WITH FIRE SPRINKLERS

SECTION 1014 EXIT ACCESS
1014.3 COMMON PATH OF EGRESS TRAVEL E = 75 FEET

SECTION 1015 EXIT AND EXIT ACCESS DOORWAYS
1015.1 TWO EXITS, OR EXIT ACCESS STAIRWAYS WHERE OCCUPANT LOAD EXCEEDS VALUES OF TABLE 1015.1: OCCUPANT LOAD GREATER THAN 49 FOR E OCCUPANCIES.
1015.1.1 THREE EXITS OR EXIT ACCESS DOORWAYS WHERE OCCUPANT LOAD IS BETWEEN 501-1000 PER SPACE OR STORY. FOUR EXITS WITH OCCUPANT LOAD GREATER THAN 1000 PER SPACE OR STORY.
SECTION 1015 EXIT AND EXIT ACCESS DOORWAY ARRANGEMENT
SECTION 1015.2.1 EXCEPTION 2 REQUIRED SPACING BETWEEN 2 REQUIRED EXIT DOORS = 1/3 THE DIAGONAL DIMENSION.

SECTION 1016 EXIT ACCESS TRAVEL DISTANCE
TABLE 1016.2 - EXIT ACCESS TRAVEL DISTANCE WITH SPRINKLER
GROUP E = 250 FEET

SECTION 1018 CORRIDORS
TABLE 1018.1 - CORRIDOR RATING - 0 HOURS, E OCCUPANCY WITH SPRINKLER SYSTEM
TABLE 1018.2 - GROUP E WITH A CORRIDOR HAVING A REQUIRED CAPACITY OF 100 OR MORE = 72 INCHES WIDTH (MINIMUM)
1018.4 - DEAD END CORRIDORS SHALL NOT EXCEED 20 FEET.
EXCEPTION 2: IN OCCUPANCY E WITH AUTOMATIC SPRINKLER SYSTEM LENGTHS OF DEAD END CORRIDORS NOT EXCEED 50 FEET.
EXCEPTION 3: DEAD END CORRIDOR SHALL NOT BE LIMITED IN LENGTH WHERE THE LENGTH OF THE CORRIDOR IS LESS THAN 2.5 TIMES THE LEAST WIDTH OF THE DEAD-END CORRIDOR.
1018.6 - CORRIDOR CONTINUITY
COMMENTARY FIGURE 1018.6 (5) DEPICTS THE OPTION FOR ADDITIONAL DOORS ON THE ELEVATOR HOISTWAY FOR MAINTAINING THE INTEGRITY OF THE CORRIDOR.

SECTION 1021 NUMBER OF EXITS AND EXIT CONFIGURATION
1021.2 TWO EXITS, OR EXIT ACCESS STAIRWAYS FROM ANY STORY WHERE OCCUPANT LOAD EXCEEDS VALUES OF TABLE 1021.2(2): OCCUPANT LOAD GREATER THAN 49 OR TRAVEL DISTANCE OF 75 FEET FOR E OCCUPANCIES.
1021.2.4 THREE EXITS OR EXIT ACCESS STAIRWAYS OR RAMPS AT STORIES WHERE OCCUPANT LOAD IS BETWEEN 501-1000 PER SPACE OR STORY. FOUR EXITS WITH OCCUPANT LOAD GREATER THAN 1000 PER SPACE OR STORY.
1021.3 EXIT CONFIGURATION IN ACCORDANCE WITH 1015.2.2 EXCEPTION 2 REQUIRED SPACING BETWEEN 2 REQUIRED EXIT DOORS = 1/3 THE DIAGONAL DIMENSION

ACCESSIBILITY
SECTION 1104 ACCESSIBLE ROUTE
1104.4 MULTISTORY BUILDINGS AND FACILITIES: ONE ACCESSIBLE ROUTE PROVIDED TO ALL ACCESSIBLE STORIES.
1109 FACILITIES:
1109.2 EACH TOILET ROOM SHALL BE ACCESSIBLE
1109.2.1 IN ASSEMBLY OCCUPANCIES AN ACCESSIBLE FAMILY OR ASSISTED-USE TOILET ROOM SHALL BE PROVIDED WHERE AN AGGREGATE OF SIX OR MORE MALE AND FEMALE WATER CLOSETS IS REQUIRED.
1111 SIGNAGE: ACCESSIBLE ENTRANCES, TOILET ROOMS

PLUMBING FIXTURE ANALYSIS: UPC W/ MT ARM 24.301.351 AMENDMENTS

EDUCATIONAL SECONDARY:
- WATER CLOSETS: 1 PER 100 MALE ; 1 PER 45 FEMALE
- LAVATORIES: 1 PER 2 WATER CLOSETS
- DRINKING FOUNTAINS: 1 PER FLOOR

ASSEMBLY:
- WATER CLOSETS: 1 PER 125 MALE ; 1 PER 75 FEMALE
- LAVATORIES: 1 PER 2 WATER CLOSETS
- DRINKING FOUNTAINS: 1 PER 1000

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CODE PLAN
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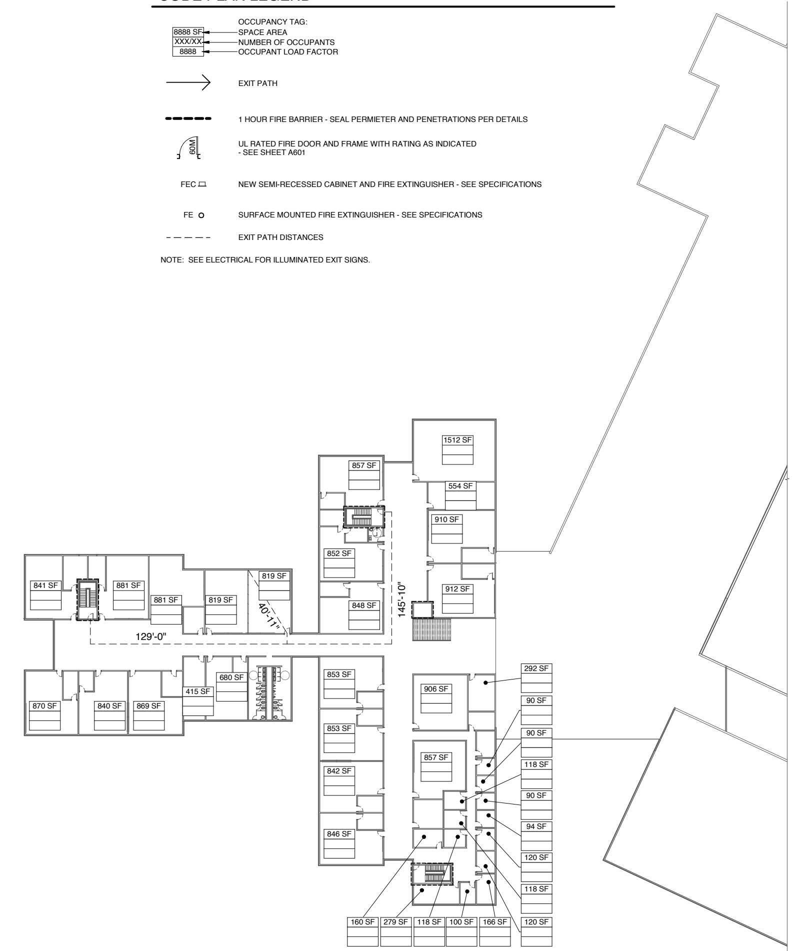
CODE PLAN LEGEND

- 8888 SF — OCCUPANCY TAG: SPACE AREA
- XXX/XX — NUMBER OF OCCUPANTS
- 8888 — OCCUPANT LOAD FACTOR
- EXIT PATH
- 1 HOUR FIRE BARRIER - SEAL PERMIETER AND PENETRATIONS PER DETAILS
- 60M — UL RATED FIRE DOOR AND FRAME WITH RATING AS INDICATED - SEE SHEET A601
- FEC — NEW SEMI-RECESSED CABINET AND FIRE EXTINGUISHER - SEE SPECIFICATIONS
- FE — SURFACE MOUNTED FIRE EXTINGUISHER - SEE SPECIFICATIONS
- EXIT PATH DISTANCES

NOTE: SEE ELECTRICAL FOR ILLUMINATED EXIT SIGNS.

1 G202 SECOND FLOOR CODE PLAN
1/32" = 1'-0"
NORTH



2 G202 THIRD FLOOR CODE PLAN
1/32" = 1'-0"
NORTH

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CODE PLAN
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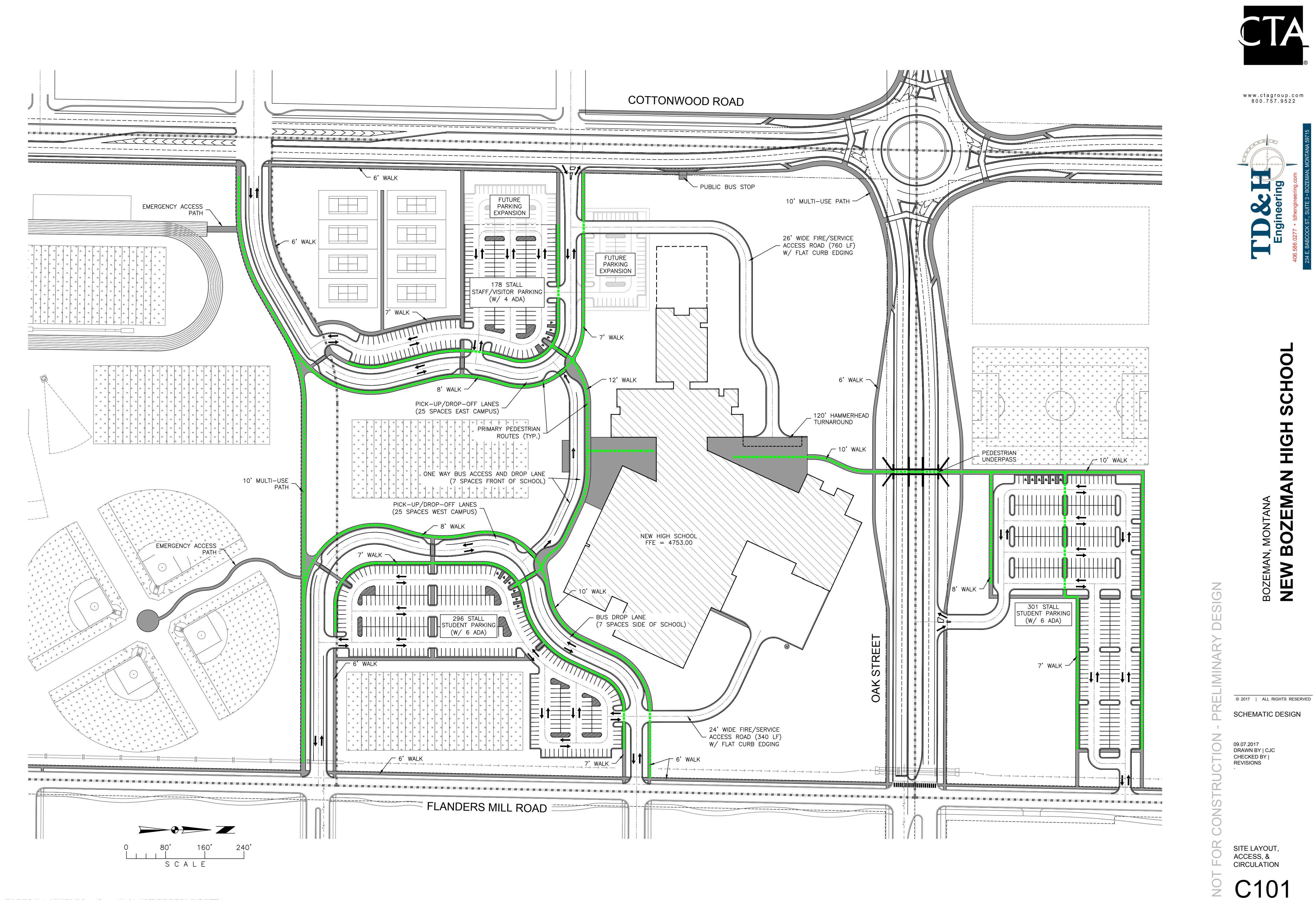
COTTONWOOD ROAD
FLANDERS MILL ROAD
OAK STREET
EMERGENCY ACCESS PATH
6' WALK
FUTURE PARKING EXPANSION
178 STALL STAFF/VISITOR PARKING (W/ 4 ADA)
7' WALK
PUBLIC BUS STOP
10' MULTI-USE PATH
26' WIDE FIRE/SERVICE ACCESS ROAD (760 LF) W/ FLAT CURB EDGING
12' WALK
8' WALK
PICK-UP/DROP-OFF LANES (25 SPACES EAST CAMPUS)
PRIMARY PEDESTRIAN ROUTES (TYP.)
120' HAMMERHEAD TURNAROUND
10' WALK
PEDESTRIAN UNDERPASS
ONE WAY BUS ACCESS AND DROP LANE (7 SPACES FRONT OF SCHOOL)
10' MULTI-USE PATH
PICK-UP/DROP-OFF LANES (25 SPACES WEST CAMPUS)
NEW HIGH SCHOOL FFE = 4753.00
BUS DROP LANE (7 SPACES SIDE OF SCHOOL)
296 STALL STUDENT PARKING (W/ 6 ADA)
301 STALL STUDENT PARKING (W/ 6 ADA)
24' WIDE FIRE/SERVICE ACCESS ROAD (340 LF) W/ FLAT CURB EDGING
0 80' 160' 240'
SCALE
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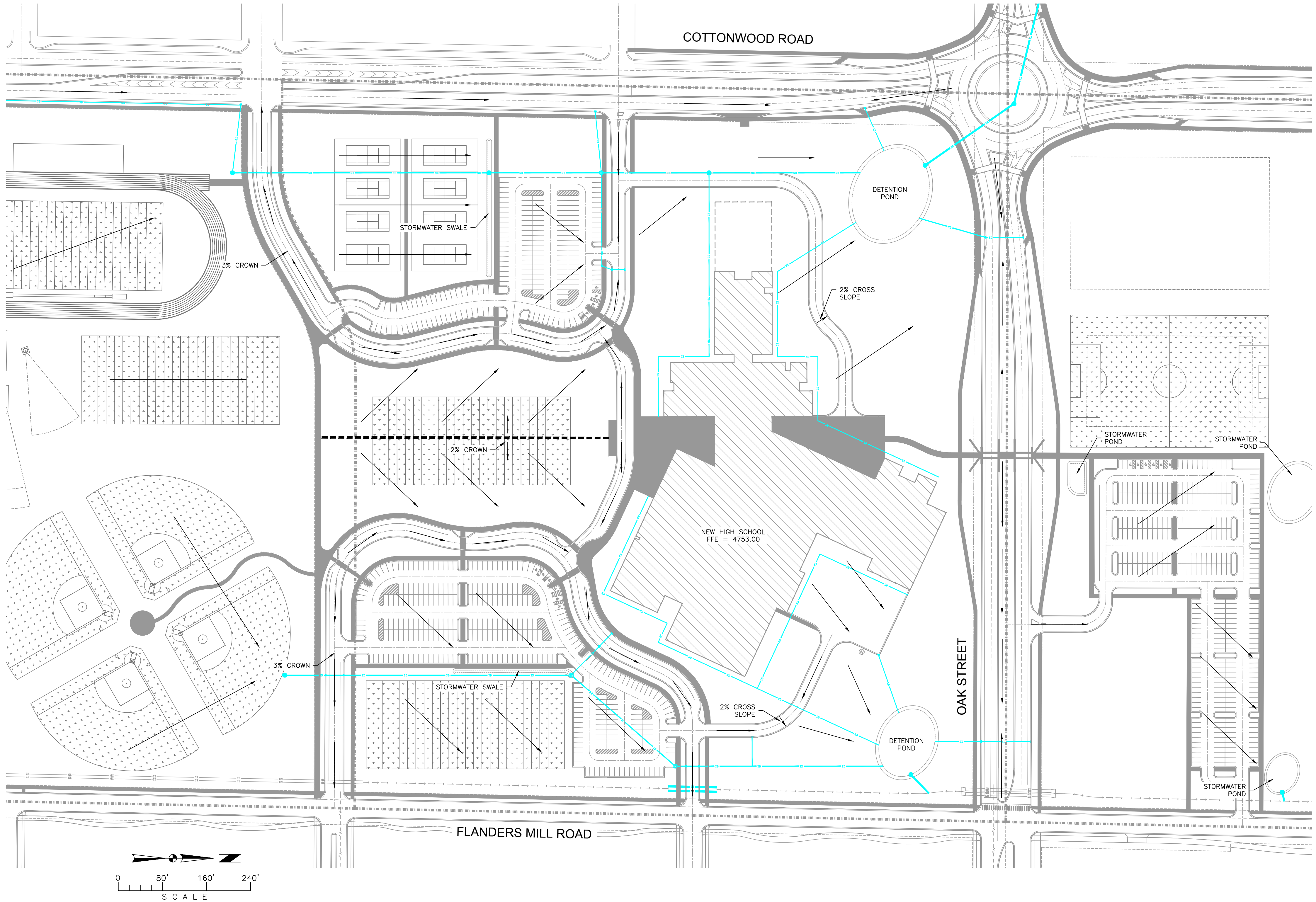
SITE LAYOUT, ACCESS, & CIRCULATION
C101



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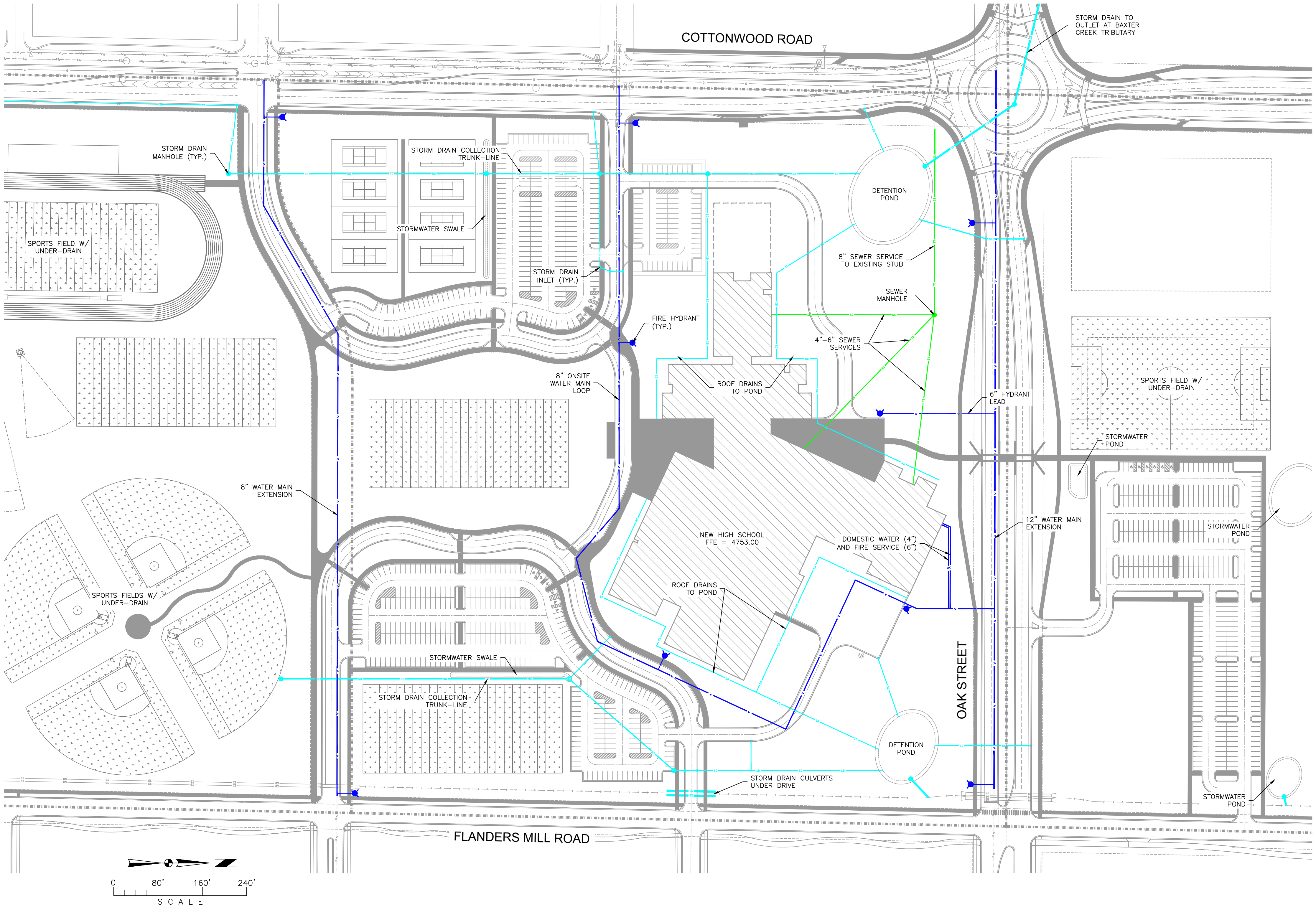
GRADING & DRAINAGE PLAN

C201



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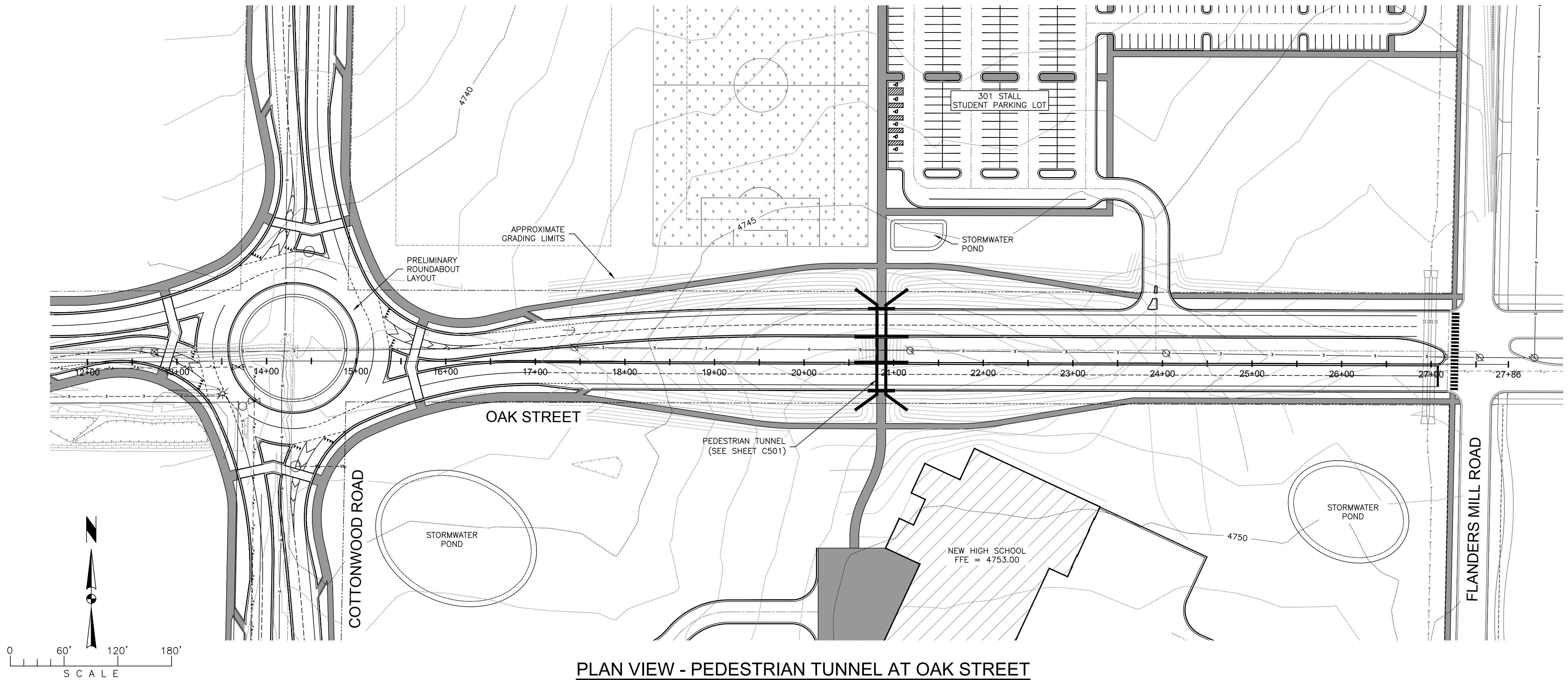
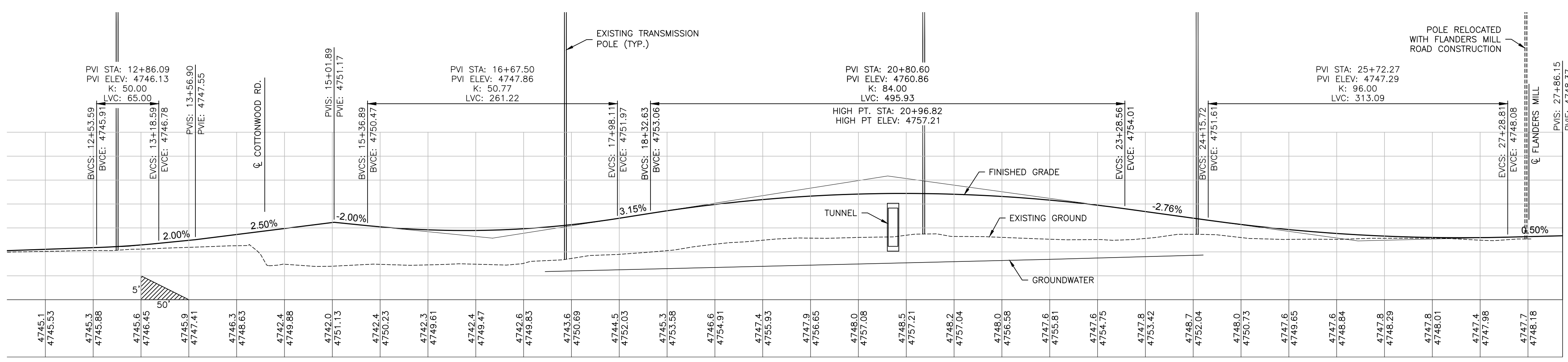
WATER, SEWER, & STORMDRAIN PLAN

C301



PLAN VIEW - PEDESTRIAN TUNNEL AT OAK STREET



PROFILE VIEW - PEDESTRIAN TUNNEL AT OAK STREET

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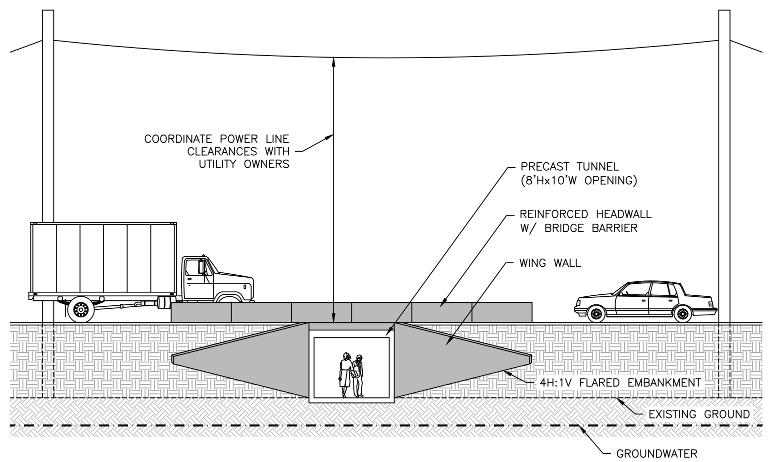
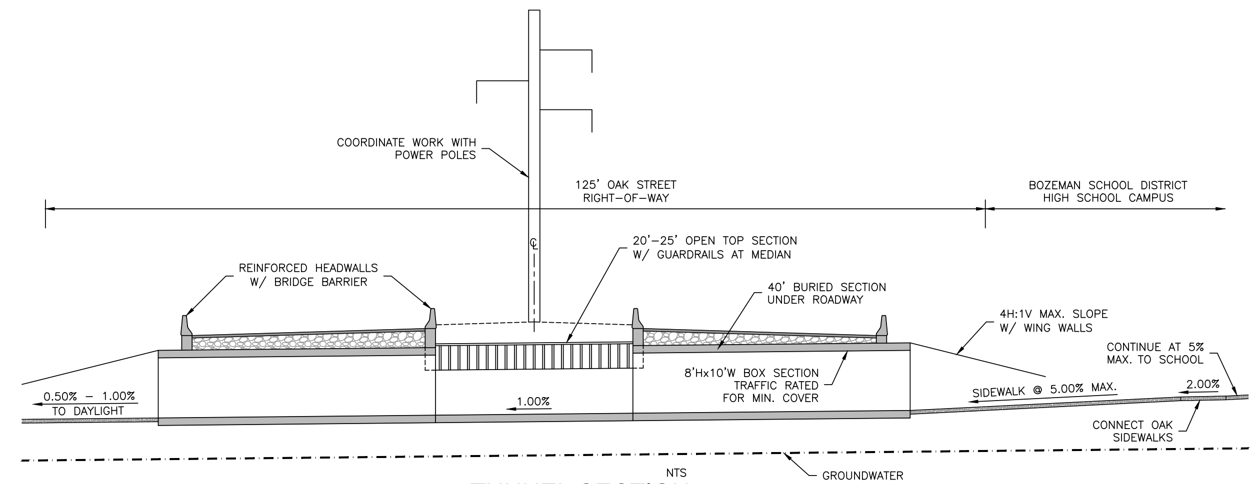
PEDESTRIAN TUNNEL
PLAN & PROFILE

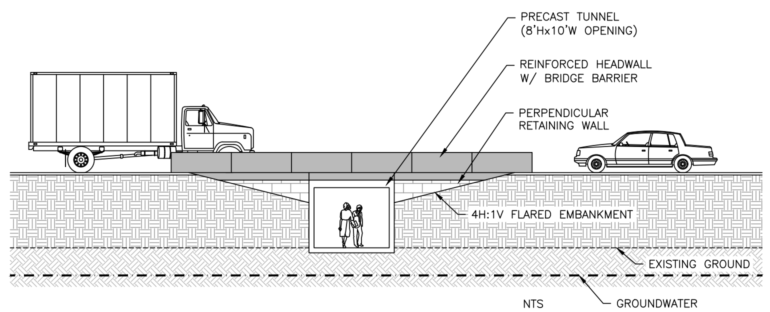
C401



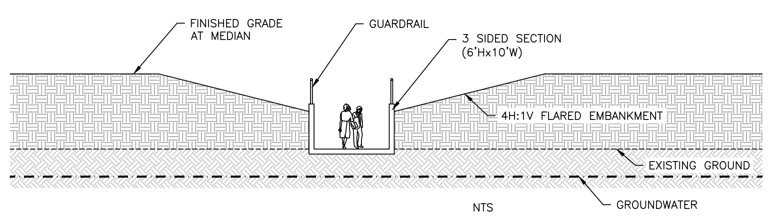
NTS
TUNNEL ENTRANCE



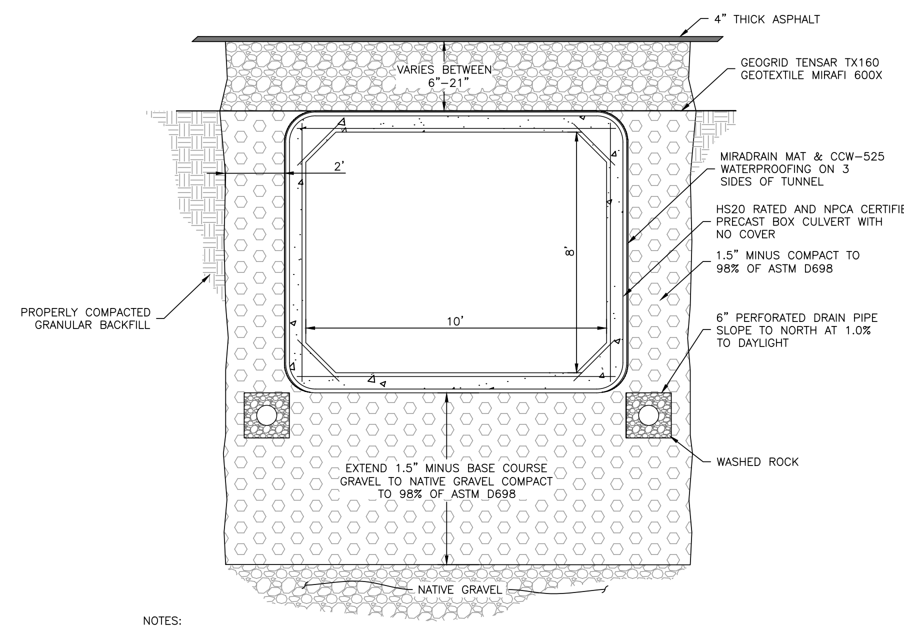
NTS
TUNNEL SECTION



NTS
ENTRANCE AT OPEN MEDIAN



NTS
OPENING AT MEDIAN



NOTES:

1. WRAP TUNNEL SECTION JOINTS WITH 12" WIDE EXTERIOR JOINT WRAP MATERIAL: CONSEAL CS-212 OR APPROVED EQUAL.
2. DRAIN PIPE SHALL CONSIST OF A MINIMUM 6-INCH DIAMETER, GEOTEXTILE- WRAPPED, FLEXIBLE, SLOTTED PIPE, ADVANCED DRAINAGE SYSTEMS (ADS) WITH DRAIN GUARD OR APPROVED EQUIVALENT.
3. GEOTEXTILE ENVELOPE SHALL INCLUDE A FULL WIDTH OVERLAY AT THE TOP. GEOTEXTILE SHALL BE CONTECH C-35NW, MIRAFI 140NC, ADS 4000, OR APPROVED EQUIVALENT.
4. FOOTING DRAINS SHALL HAVE A MINIMUM SLOPE OF 1.0 PERCENT TOWARDS PUMP OR DAYLIGHT.
5. DRAINAGE AGGREGATE SHALL BE WASHED OR SCREENED GRAVEL CONFORMING TO THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
1 1/2-INCH	100
3/4-INCH	75 - 95
3/8-INCH	10 - 20
NO. 4	0 - 5

PEDESTRIAN TUNNEL STRUCTURE DETAIL
NTS

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PEDESTRIAN TUNNEL DETAILS

C501

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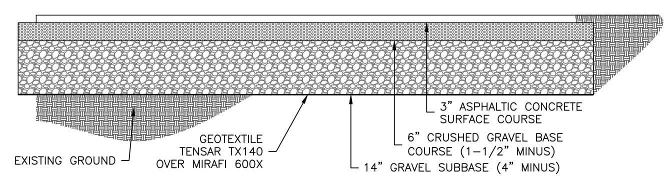
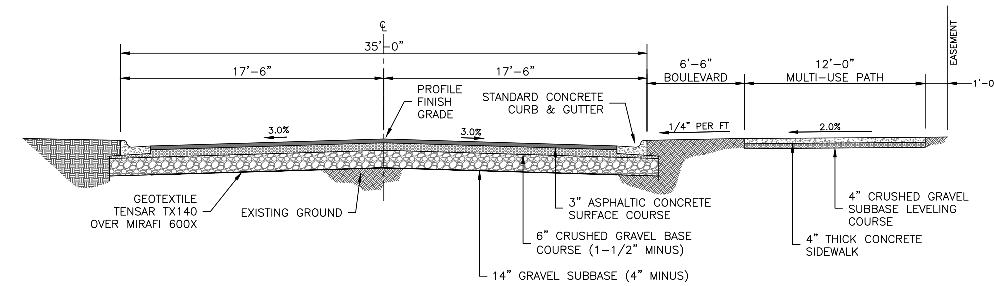
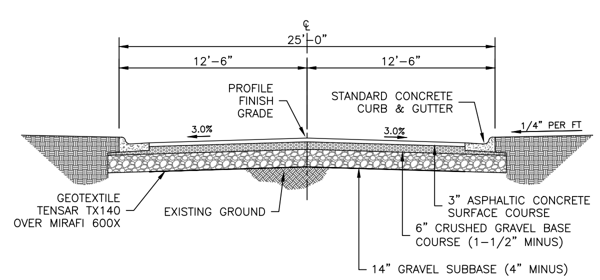


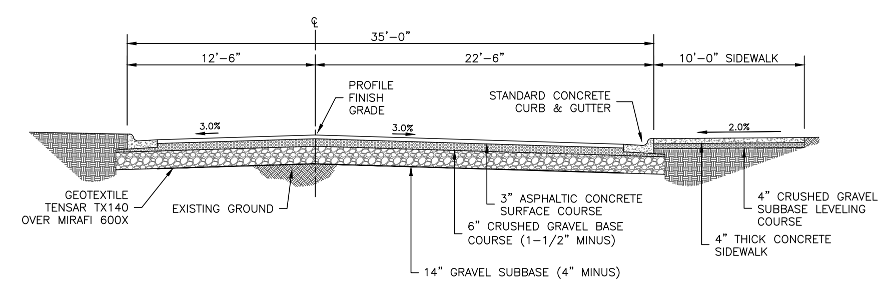
PARKING AREA (TYPICAL)



35' WIDE ROAD SECTION (TYPICAL)



25' WIDE ACCESS ROAD (TYPICAL)



25' WIDE ACCESS ROAD W PULLOUT (TYPICAL)

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TYPICAL ON-SITE PAVEMENT SECTIONS

C502

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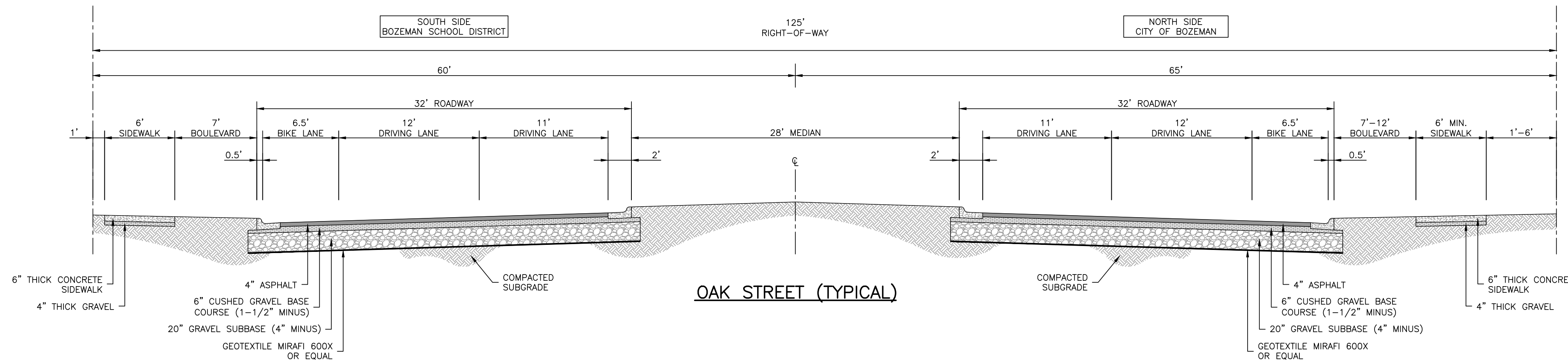
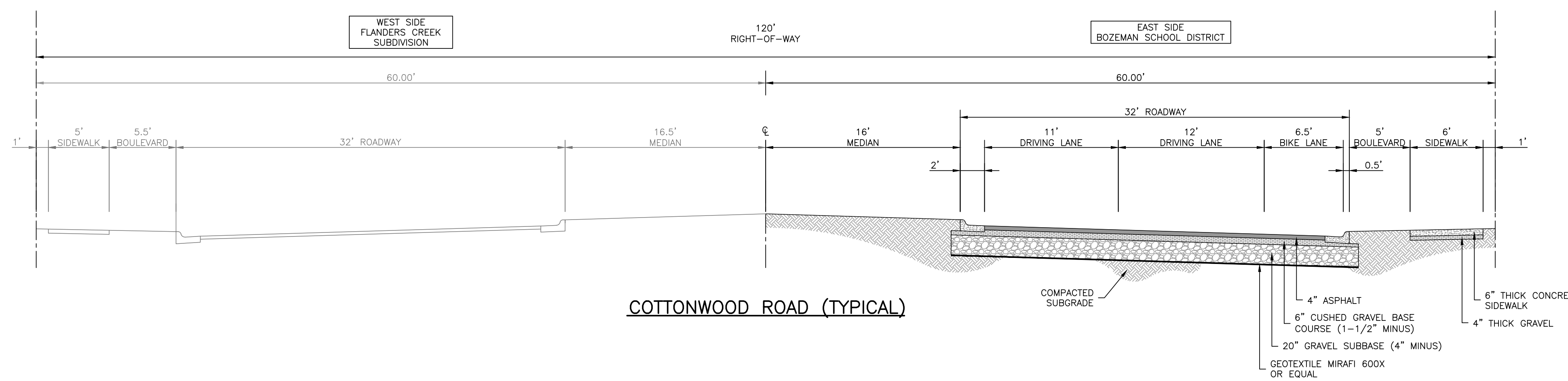


OAK STREET (TYPICAL)



COTTONWOOD ROAD (TYPICAL)

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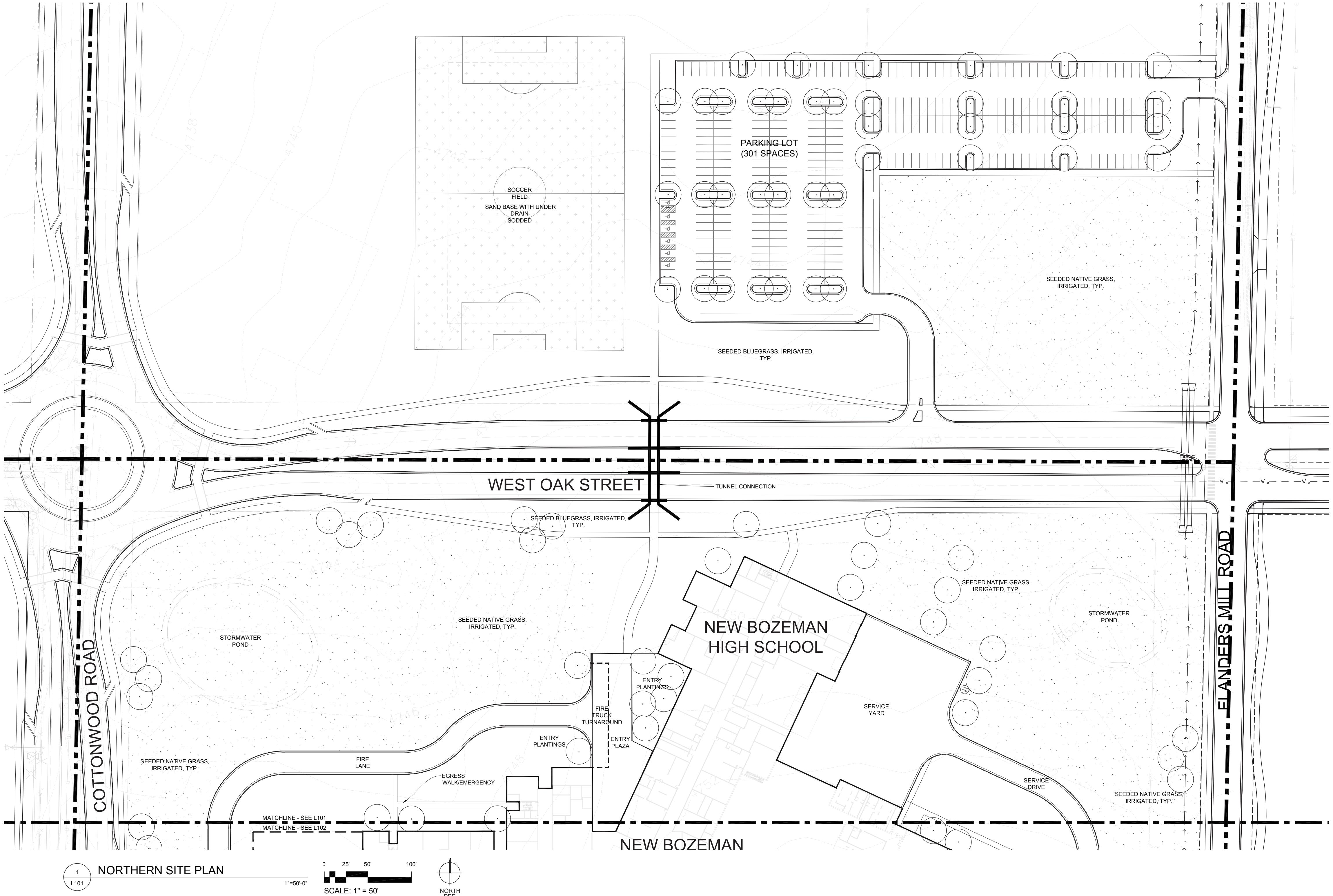
TYPICAL ARTERIAL ROAD SECTIONS

C503



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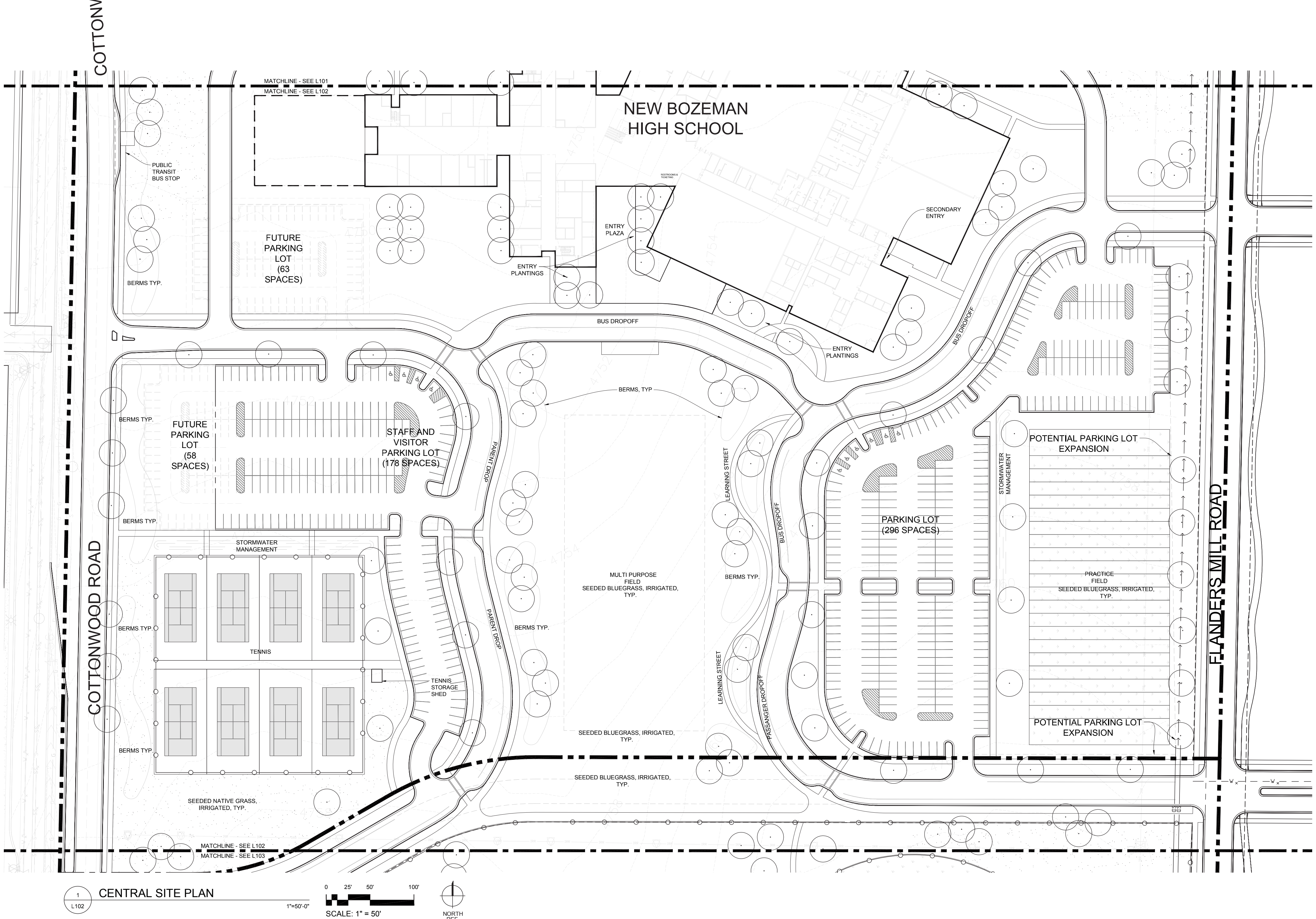
NORTHERN
SITE PLAN

L101



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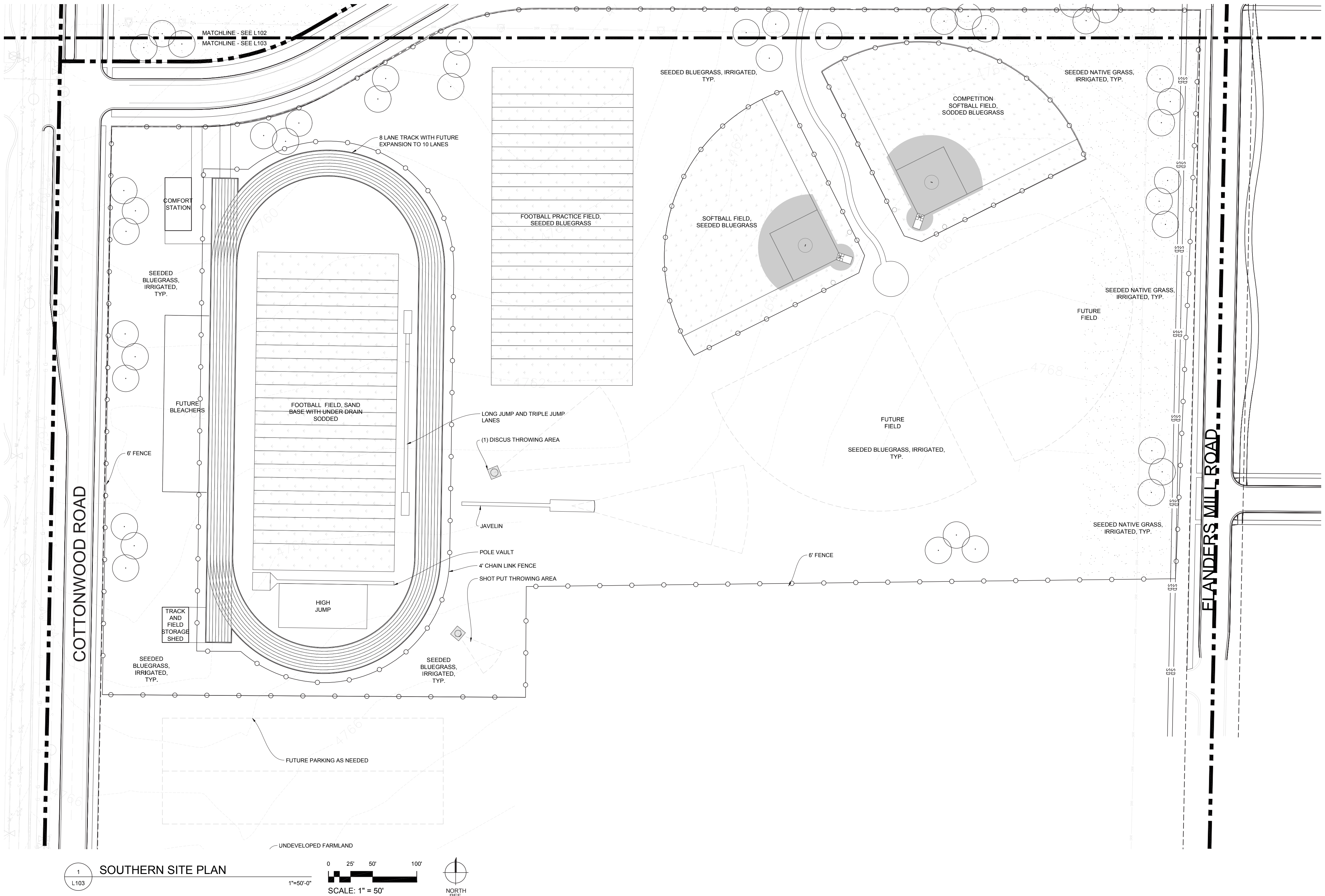
CENTRAL SITE PLAN

L102



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SOUTHERN SITE PLAN

L103

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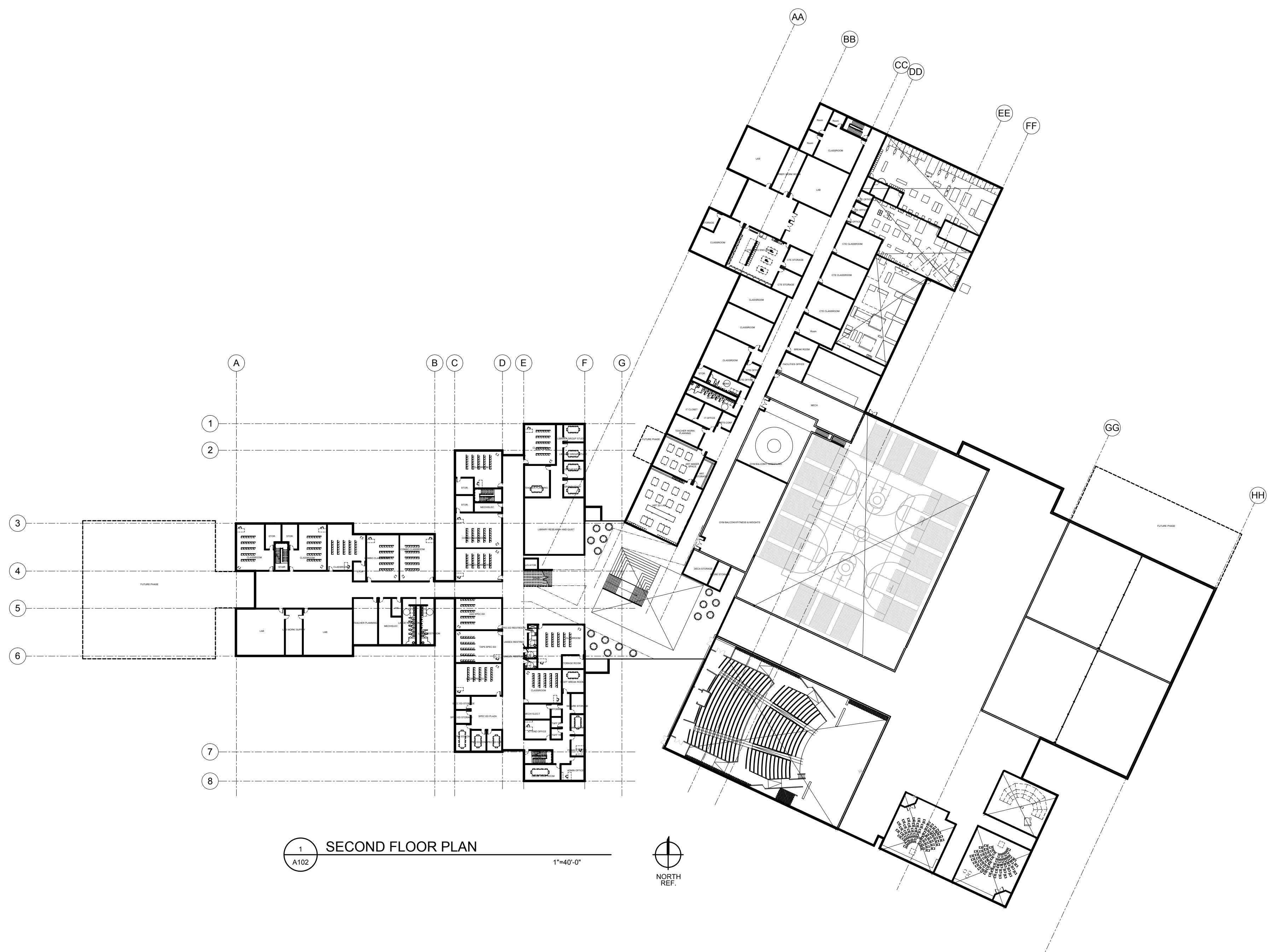
FIRST FLOOR PLAN

A101



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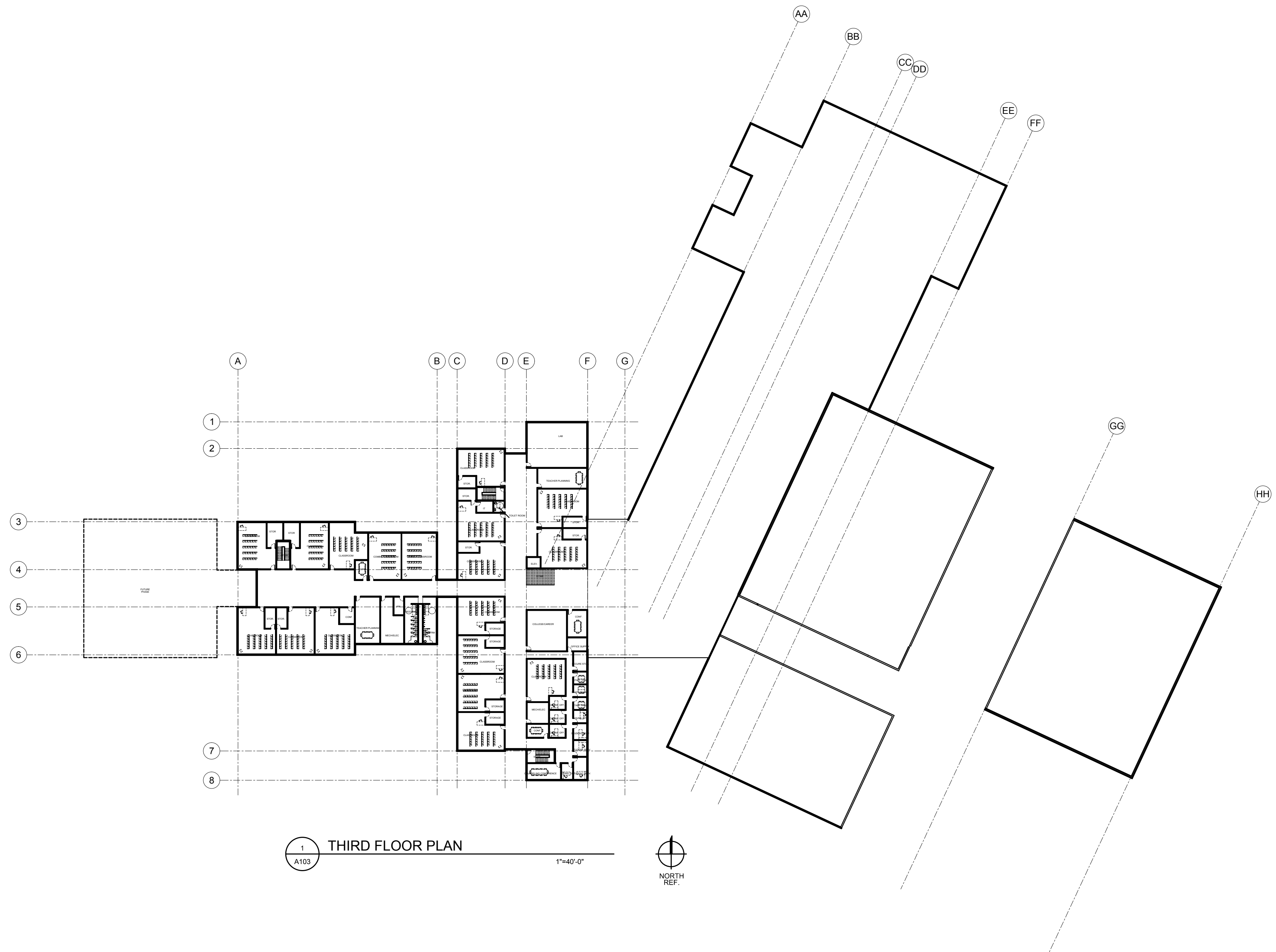
SECOND FLOOR PLAN
A102



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THIRD FLOOR PLAN

A103

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