LARAMIE COUNTY
COMMUNITY COLLEGE

# Flex-Tech Educational Environment

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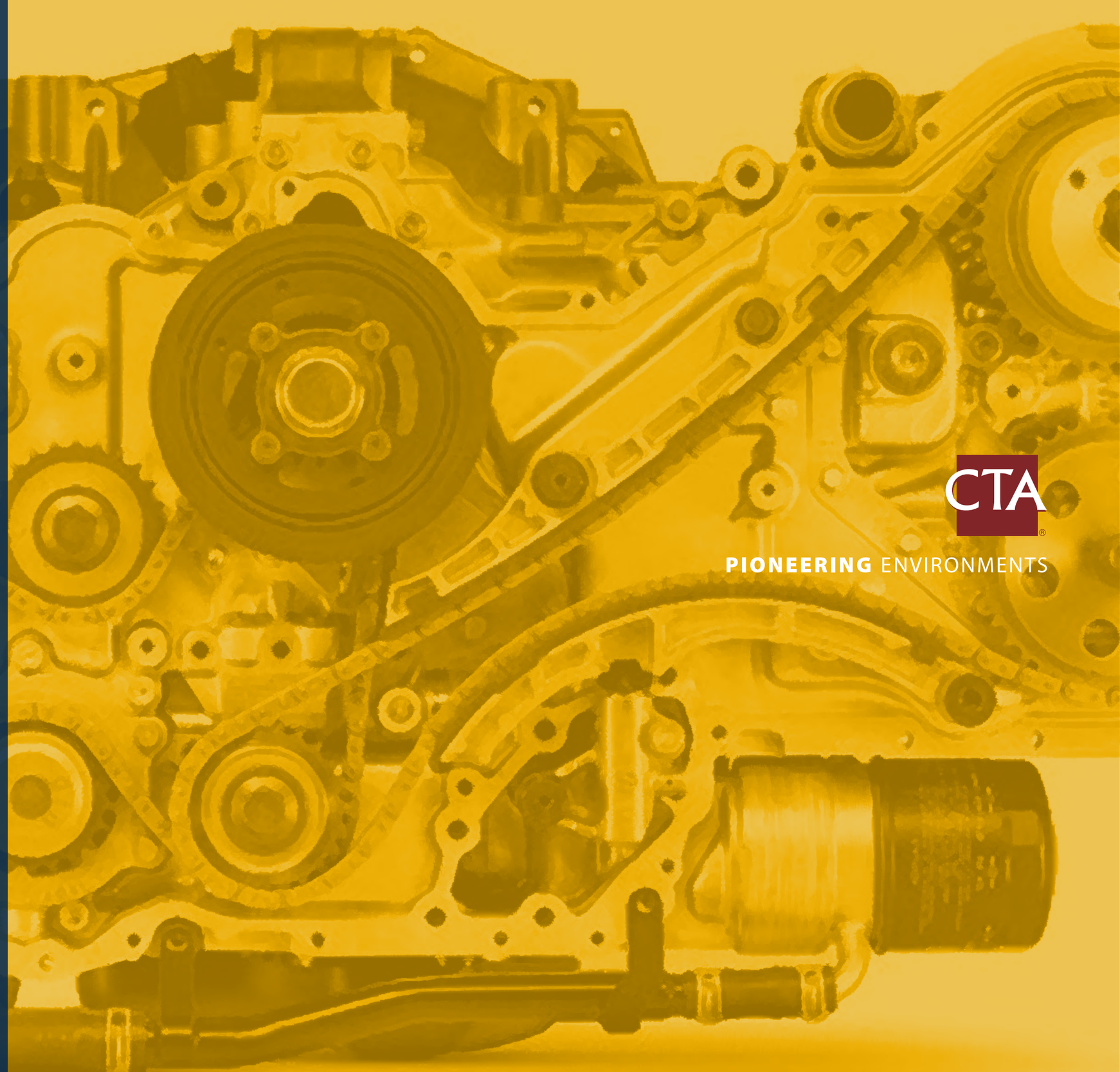

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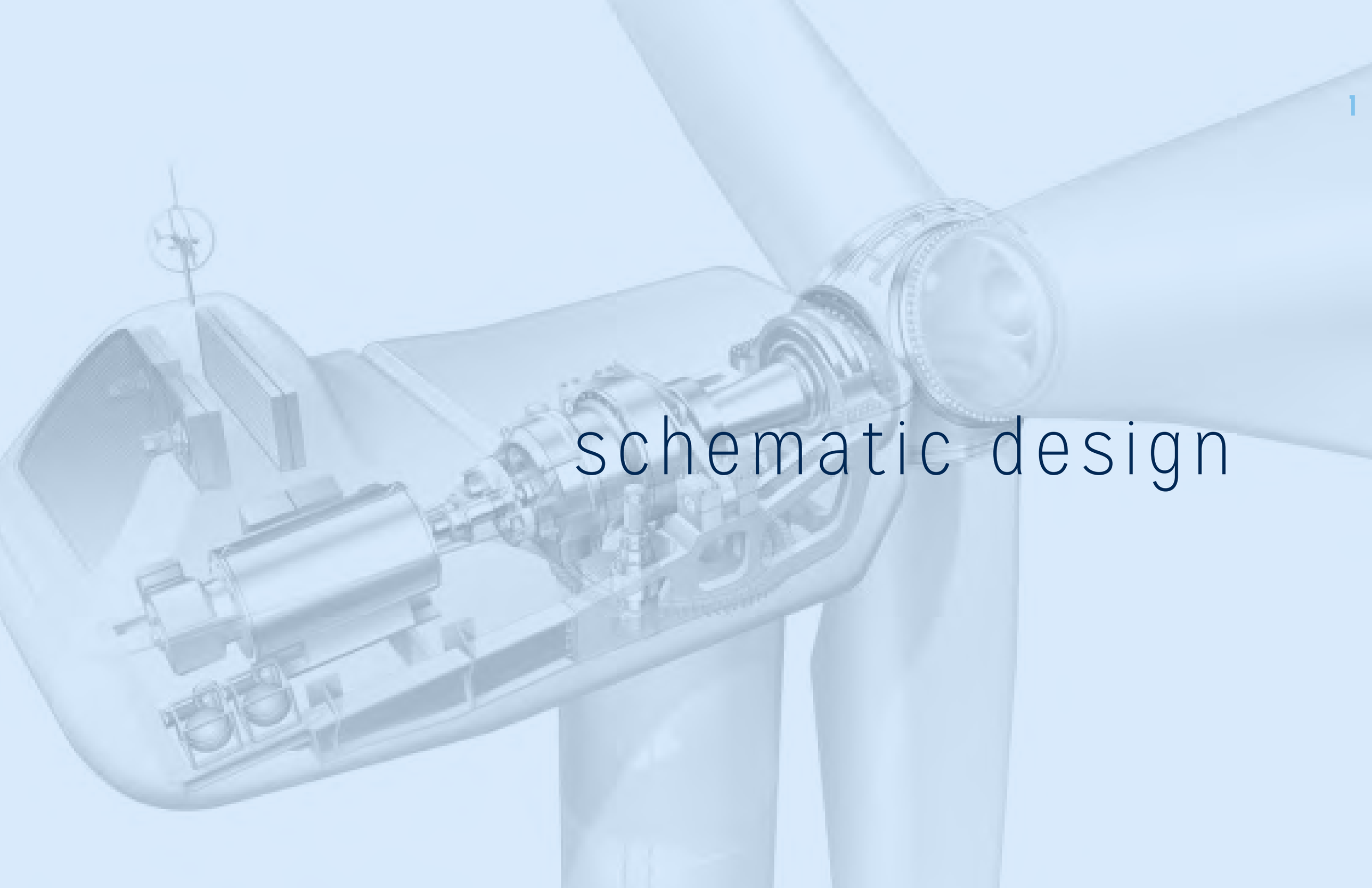
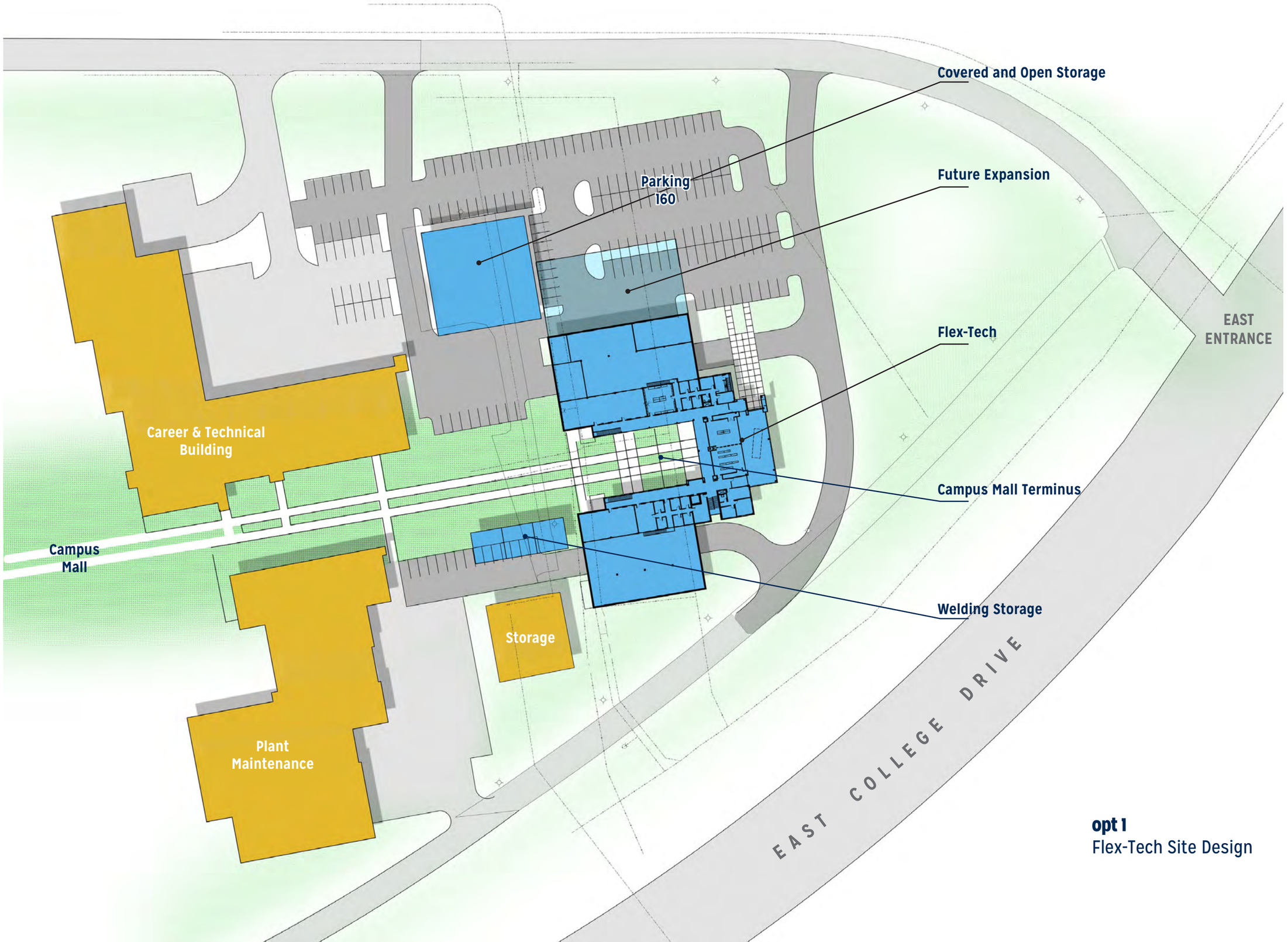
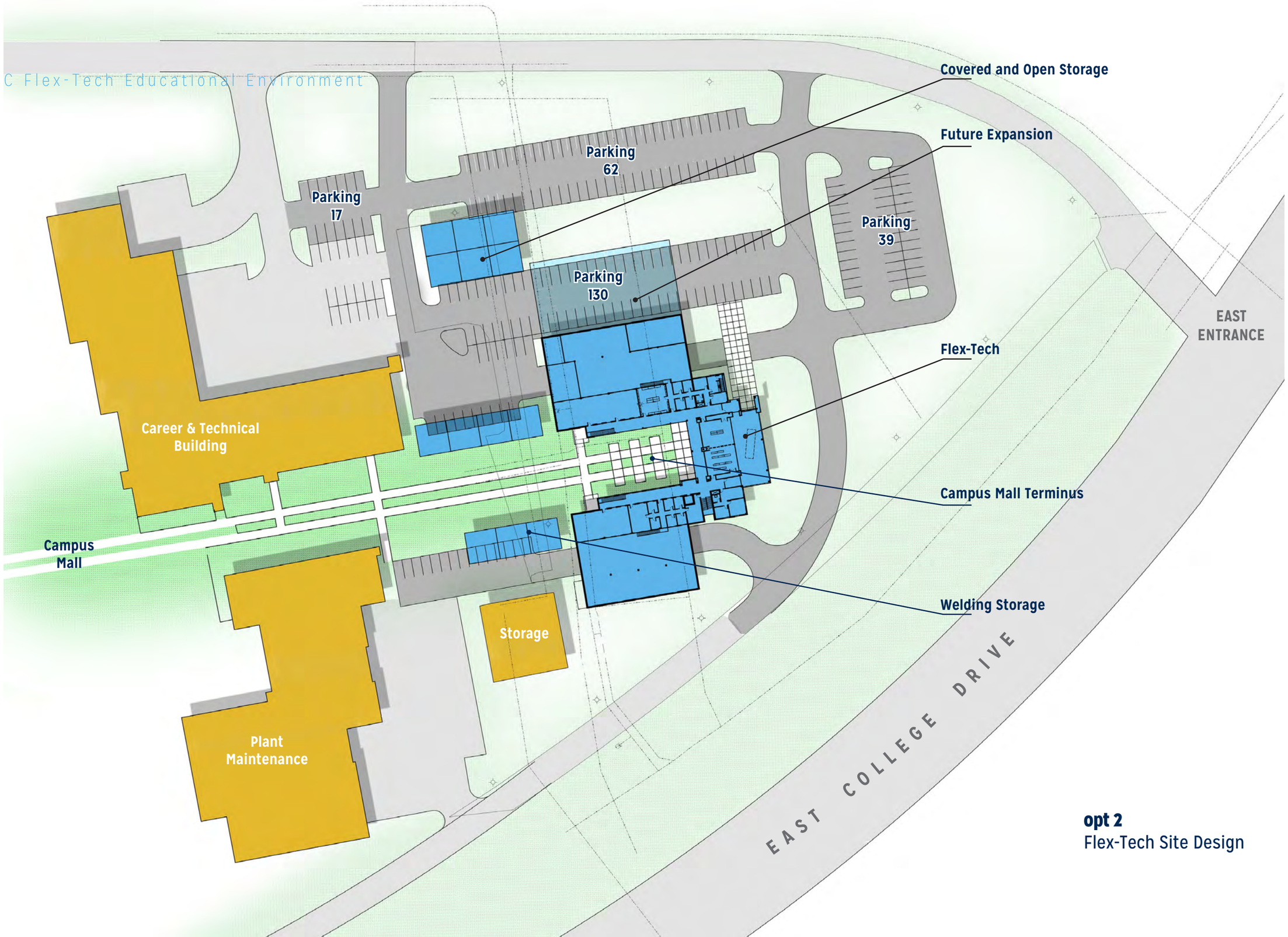
# schematic design



# site planning



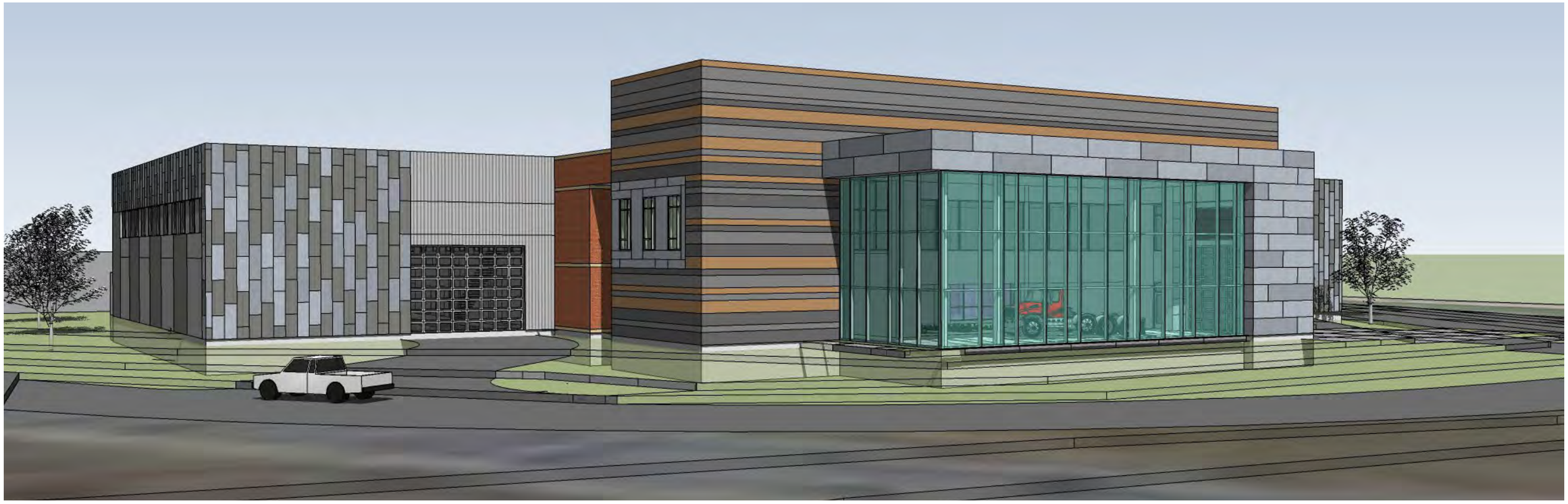

**opt 1**
Flex-Tech Site Design



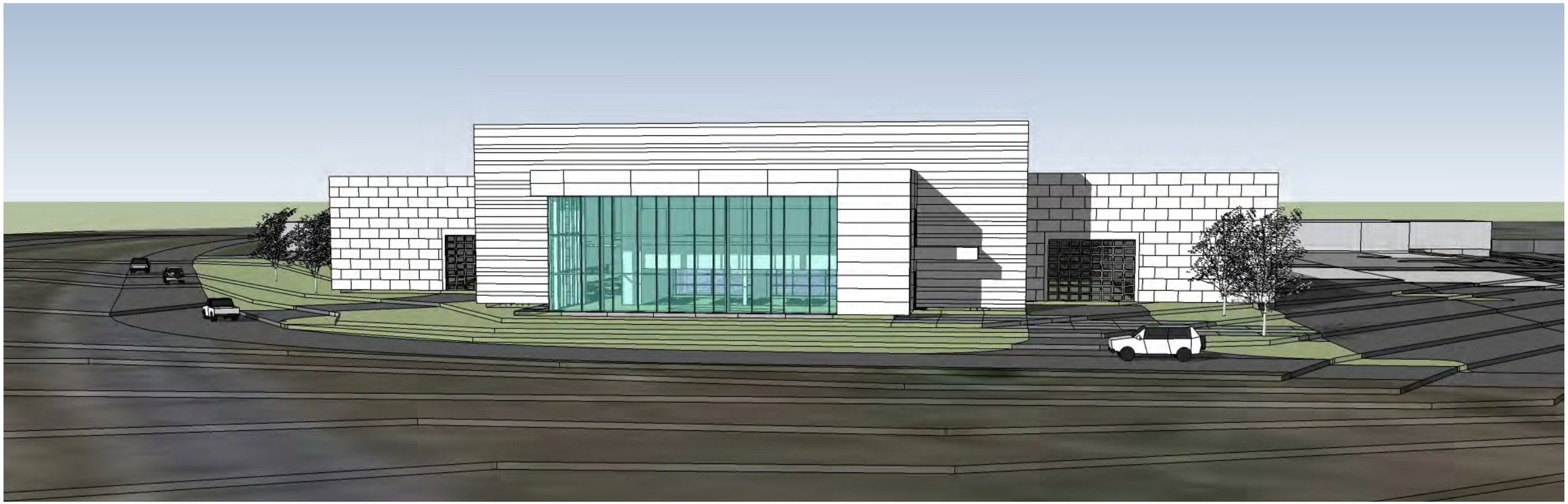

**opt 2**
Flex-Tech Site Design

# building design

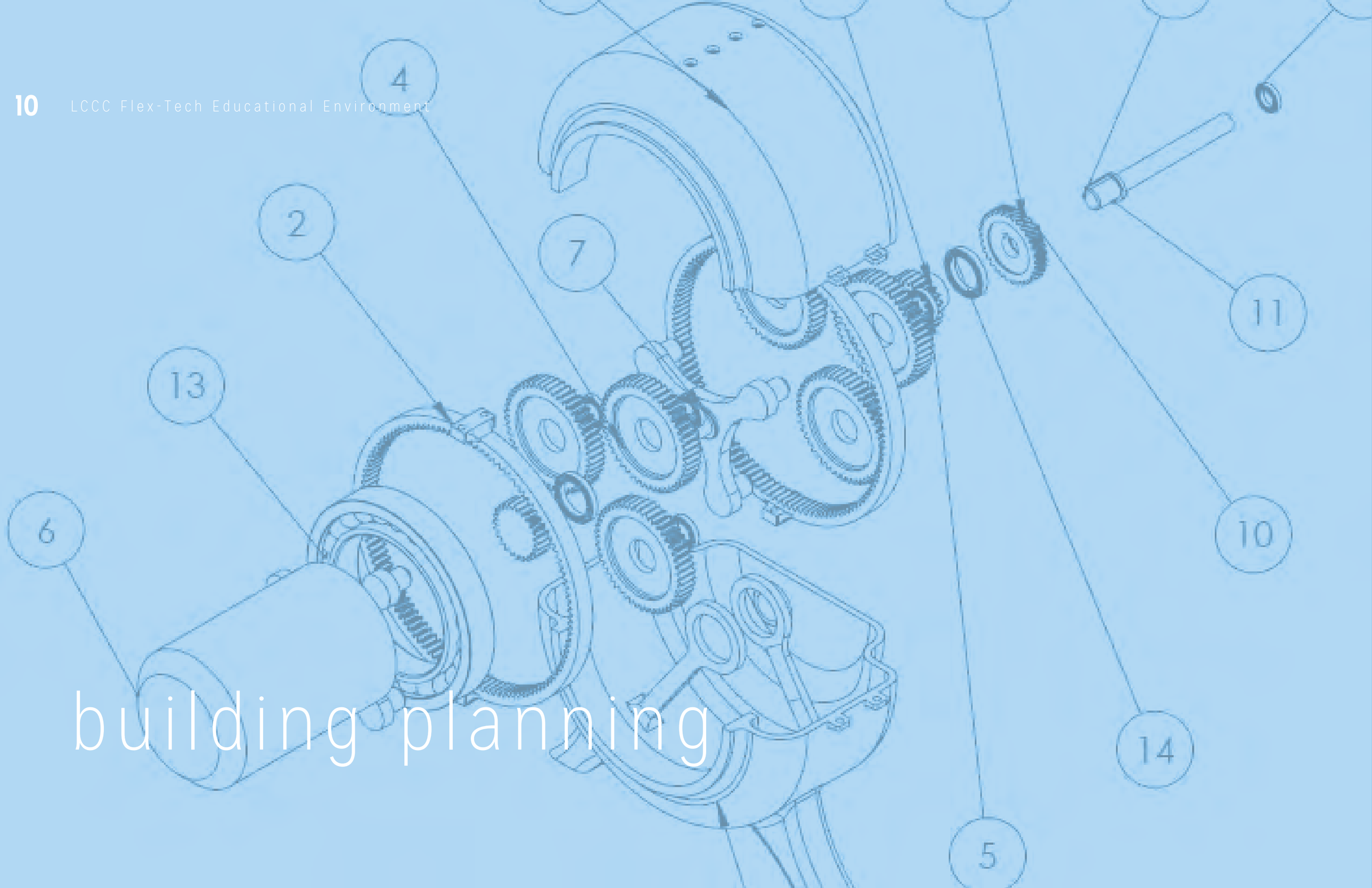
courtyard terminus



from the highway



east campus entrance




# building planning

## First Level Floor Plan
# LCCC Flex-Tech Building


Area Summary

| | Programmed Space | Expansion Space | |
|---|---|---|---|
| Level One | 25,785 sf | 7,210 sf | |
| Level Two | 12,874 sf | 1,981 sf | |
| Total | 38,659 sf | 9,191 sf | 47,850 sf |

11.6.14
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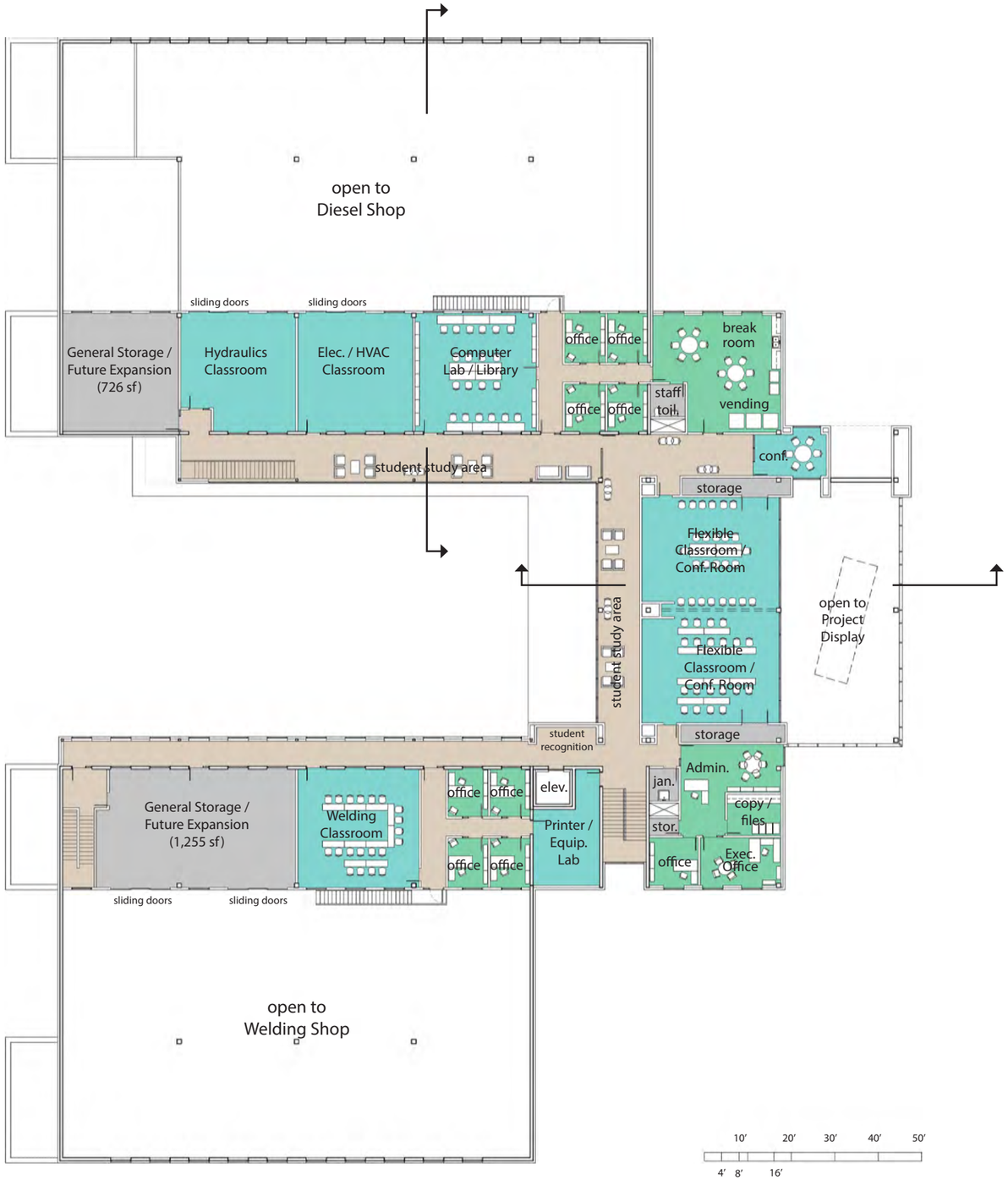
## Second Level Floor Plan
# LCCC Flex-Tech Building

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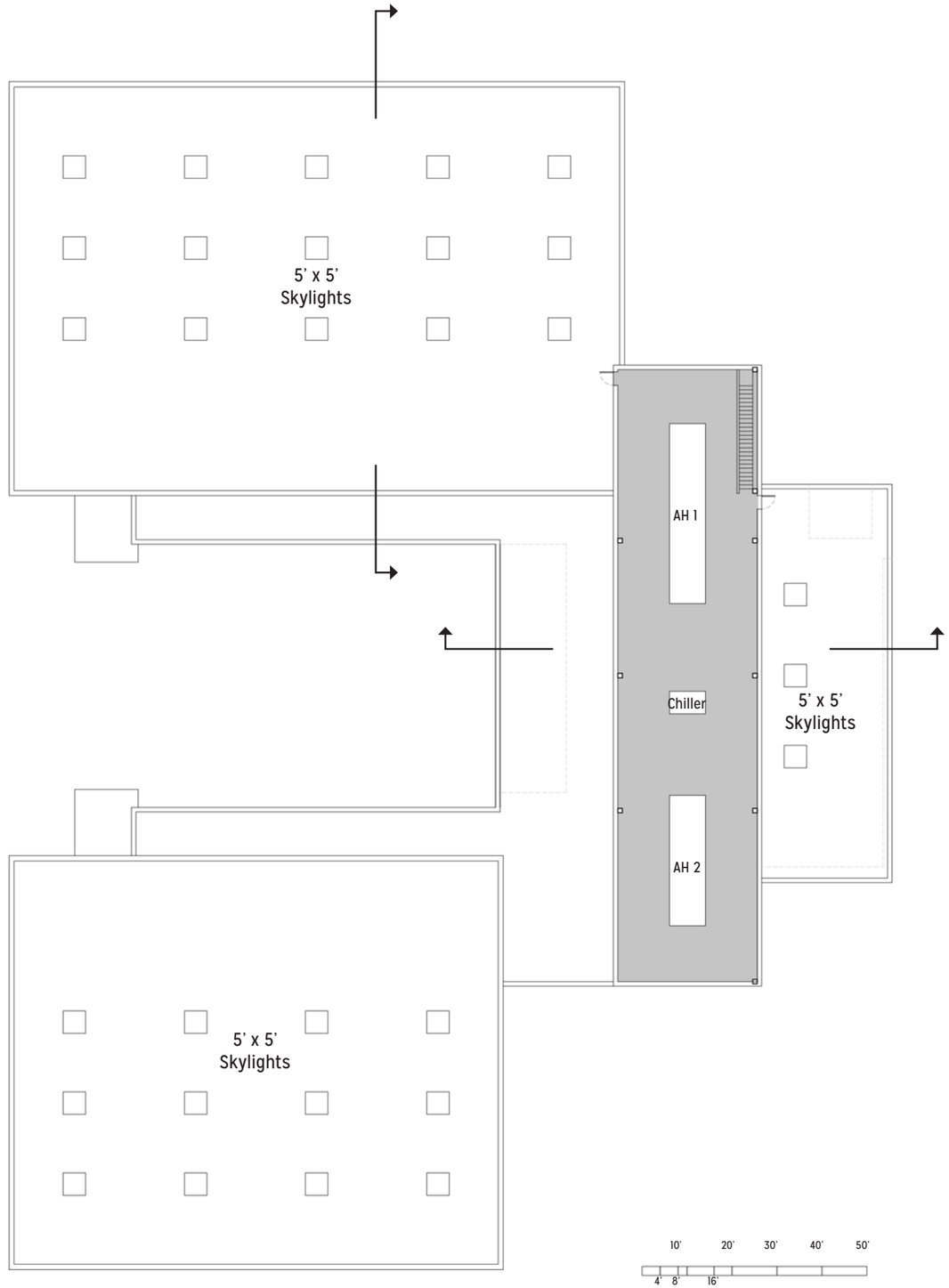
## Third Level Floor Plan
# LCCC Flex-Tech Building

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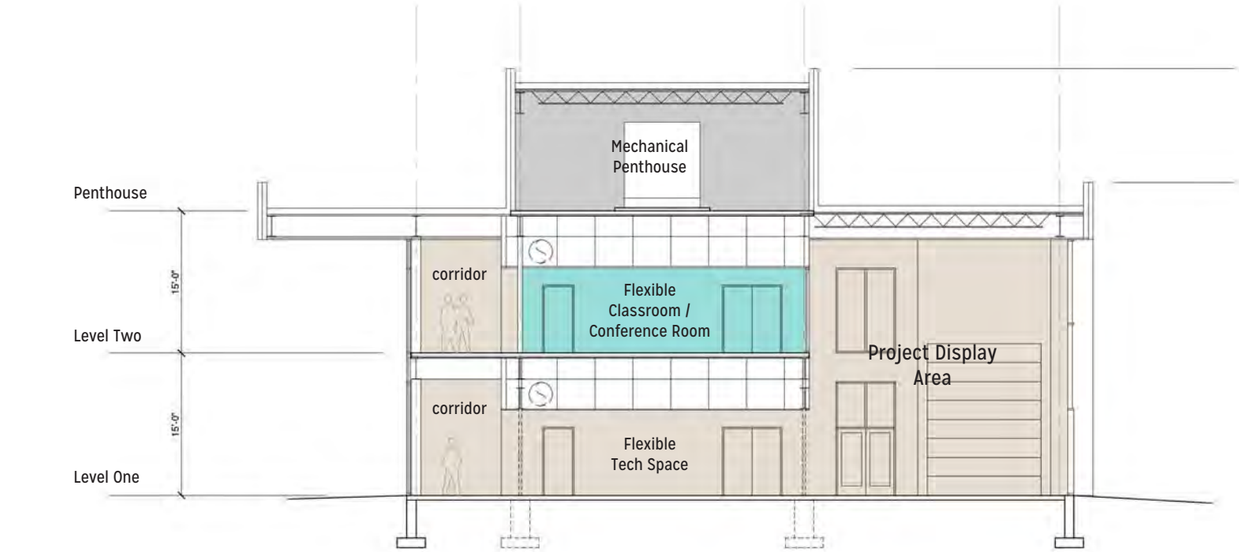
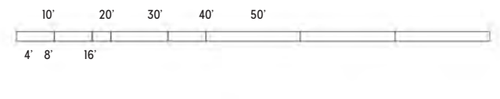
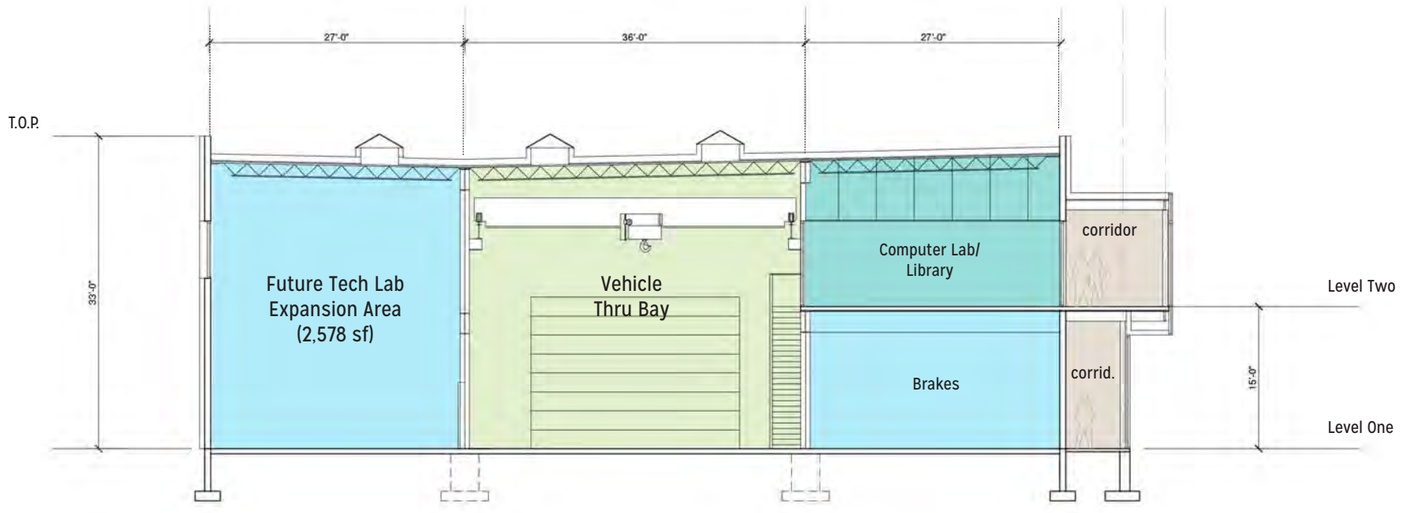
## Sections
# LCCC Flex-Tech Building

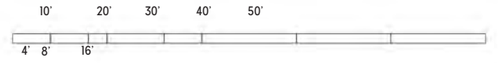



Flexible Classrooms




Diesel Bay

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# design narratives

## Civil SD Narrative Summary

This project involves the construction of a new Flex-Tech Building for Laramie County Community College (LCCC). The gross area of the proposed building is approximately 47,047 square feet. This building is located in Cheyenne, Wyoming at LCCC along College Drive in Laramie County.

Note: Description of existing infrastructure is based in part upon utility maps provided by LCCC and survey provided by Inberg-Miller.

## Domestic Water

Domestic water within the LCCC campus is provided by the South Cheyenne Water and Sewer District. An existing water main is located within the LCCC Campus near the proposed LCCC Flex-Tech site:

- Existing Water Main – minimum 8" main

From the latest proposed building layout location provided by CTA Architects, a portion of the existing water main will need to be relocated a minimum of 20 feet from the proposed LCCC Flex-Tech building with a minimum bury depth of 5.5 feet. It appears from the utility map provided from LCCC, that the eastern water main running north to south parallel to the western existing water main has been abandoned.

Information from the South Cheyenne Water and Sewer District has and is currently being collected. The static and residual pressure ranges in this area is undetermined at this time. There is one existing fire hydrant (FH #16) located within 100 feet of the proposed building site that has a blue painted top. This would indicate good existing flow rates of more than 1500 gpm. Good flow and pressure will be needed for domestic water and fire protection at the site.

The new building will require a new domestic water service line and fireline, both of which may be tapped off of the proposed relocated water main. At this point, the Mechanical Engineer needs a 3" domestic water line and outside meter pit and a 6" ductile iron fireline for building sprinkler system. The Laramie County Fire Department will require new fire hydrants and fire lane access road to be installed around the perimeter of the site to serve the new building per the 2009 International Fire Code.

Any required hot water lines required by the Mechanical Engineer are assumed to be direct buried and not require a utility tunnel to the proposed building. A utility tunnel would impact existing and proposed utilities.

A 1 1/2" irrigation line from the building is assumed from conversations with the Mechanical Engineer designed by the Landscape Architect if needed.

As part of the approval process for new building construction, Laramie County requires that the site plan be reviewed and signed by the Laramie County Fire Department, verifying the required fire flow and locations of fire hydrants, building fire line, and fire department connection. Although not anticipated as a requirement for this project, Laramie County also requires that any new public water mains extended into a site be within easements unless private. No existing easements were shown on the survey provided by Inberg-Miller. Construction plans for water mains, domestic taps, fire lines, water meters and fire hydrants are submitted to the South Cheyenne Water and Sewer District for review and approval in addition to Laramie County.

# civil

## Sanitary Sewer

The South Cheyenne Water and Sewer District is the agency that accepts sanitary sewerage within the LCCC area and conveys it through a series of public mains to the treatment plants. We have assumed no existing sanitary system improvements or upsizing.

According to the South Cheyenne Water and Sewer District, LCCC utility maps, GIS maps, and survey provided by Inberg-Miller, the site has the following existing sanitary sewer infrastructure located near the proposed building:

- Existing Manhole #31 located northeast of the existing Career and Technical Building: Rim: 6001.72
- Invert In (South): 5982.75
- Invert Out (West): 5982.75

Per conversations with the Mechanical Engineer, a proposed single 6" waste sanitary sewer service (minimum of 4' deep) is proposed to tie in to the proposed water room on the west side of the building and proposed to drain to Sanitary Sewer Manhole #31. We have assumed that the Mechanical Engineer will need a sand/oil separator just outside of the water room. We have also assumed that no sanitary sewer lift station will be needed. The minimum slope required for the sanitary sewer to cross the existing utilities to the west of the proposed building and reach the water room on the west side of the proposed building may determine the finished floor elevation of the building. Sanitary sewer service cleanouts will be spaced at 150 foot intervals.

Per code requirements, floor drains must be connected to a sand/oil interceptor. The interceptor is then required to discharge to sanitary sewer.

## Drainage

Laramie County and the Laramie County Engineer is the agency that accepts stormwater runoff within the County, and conveys it through a series of public storm sewer and drainage channels to major outfalls, and ultimately Crow Creek.

According to the topographic survey and utility maps, there is a 12" pvc storm drain with reinforced concrete flared end section that conveys water from the existing service road from the south of the proposed building to the drainage ditch to the north of the proposed building. This drainage ditch flows to the west alongside the south side of the existing north interior road through a series of culverts.

The existing slope of the site drains generally from west to east. In order to save costs on the amount of fill that will be required to get the building to the finished floor elevation, we propose a detention pond at the east end of the site to generate a substantial amount of fill material that will be needed for construction. The drainage is proposed to be metered out via an outlet structure at historic rates.

The existing 12" PVC storm culvert may need to be relocated for drainage. The existing 12" PVC culvert location on the topographic survey actually appears to be released further to the northeast as shown by spot elevations on the topographic survey (closer to Borehole #10 than shown near Borehole #7).

Storm runoff via downspouts from the building is proposed to be collected on the east side of the building with an underground storm sewer culvert system that will tie into the proposed detention pond. A surface drainage swale could be utilized if a below grade roof drain collection system is not required.

As part of the site approval process, Laramie County requires an approved Site Plan, Grading, Erosion and Sediment Control (GESC) permit and Storm Water Pollution Prevention Plan (SWPPP). Construction plans for the proposed storm sewer and detention/stormwater quality systems will also require review and approval.

## Dry Utilities

***Fiber Optics***

Design of proposed fiber optics lines are by others.

***Gas***

Existing gas lines are available on site. Design of proposed gas lines are by others.

***Electric***

Existing electric lines are available on site. Design of proposed electric lines and lightpoles are by others.

***Access Roads***

An access road for the fire lane will be required around the proposed building for emergency vehicle access to the proposed fire hydrants during this contract but is assumed to be under a separate contract. Truck turning movements are being evaluated to assure vehicular flow in and around the proposed building. An existing access road cut and surfacing replacement will be required to the east of Sanitary Manhole #31 for the proposed sanitary sewer service, also under a separate contract.

It is assumed that a portion of the existing south access road will be removed.

***Parking***

Parking for approximately 171 spots is assumed to be under a separate contract as directed. Masterplanning for these future parking lots will be incorporated. Grading could occur for future parking lots during this contract so that drainage design could be done once under this contract. Then parking lot surfacing could be completed in the future.

***Perimeter Drain***

A perimeter drain around the building is assumed and would be designed by others.

***Future Building Expansion***

Future Flex-Tech Building Expansion to the north of the proposed Flex-Tech Building is assumed and proposed utilities will be designed to accommodate future building expansion.

## Hardscape

The landscaping and hardscape at the main entry and continuation of the mall will be designed to integrate with the architectural style and the campus mall. The finished grade of outdoor spaces will be physically and visually connected to the first floor interior spaces.

Hardscape at the main entry will primarily be standard concrete with a broom finish. Textured and colored concrete may be integrated into the design to complement the architectural style and to develop a unique campus identity.

Design standards for emergency access and accessibility will be followed for the campus mall. The layout and size of walks and outdoor spaces will be designed to LCCC standards.

## Landscape, Plants and Trees

Landscape areas will contain perennials, ornamental grasses, and hardy shrubs and trees to enhance outdoor spaces, complement the architecture and screen utilities. Planting beds will be mulched with a combination of stone and organic mulch on weed barrier fabric. Landscape edging will be steel or aluminum. Plants will be selected for vigor, local hardiness, and integration to existing campus landscaping. Xeriscape and water conservation will be a primary concern when selecting plant species. These plants will reduce maintenance and reduce irrigation operating cost.

## Irrigation

All turf areas and planting areas will have permanent irrigation. The system will be designed to integrate with existing campus systems. CTA will investigate and integrate all available water conservation strategies available, including but not limited to Smart Control, drip, passive irrigation and high efficiency heads.

# landscape

## Design Concept

The Flex Tech building occupies a significant site within the Laramie County Community College Campus. It is both the east terminus of the central mall linking the academic core as well as the first impression of the college from an eastern approach. This siting dovetails with the purpose of the Flex Tech building as an important career program offering for LCCC's students as well as a link to the community and industry partners.

The building has been designed according to the Campus Master Plan and Guiding Principles established during the design kick-off meetings. The primary principles are:

### *Flexibility and Growth*

- The building is designed to have "maximum flexibility" for the current career tech program allowing for the interchangeability of future programs. The diesel program contains the largest programmatic requirements with the need for movement of semi-trucks through the building. The program requires a 3 parallel bay system – a central 36' wide through maintenance bay with overhead crane flanked by 27' bays on either side dedicated to specific instruction spaces as well as unprogrammed high bay space for future programs.
- The 3 parallel bay system was repeated for the shop space housing welding, although instead of 135' long, the welding shop is one bay shorter at 108' long to keep initial overall square footages in line with project budget. While the welding program does not require the through movement of semi-trucks, the space could be converted in the future to house another automotive program or program requiring large bays, through movement and overhead space. The south shop space contains both unprogrammed shop space for a future program as well as space for future expansion of the welding program.
- The building is conceived as 2 separate shop spaces linked by a steel framed classroom and administrative space. The shop spaces are built using a tilt up concrete wall system, similar to "big box" commercial warehouse construction. This allows for future additions and expansion of space using the 27' x 27' x 30' high structural module. The central bay is comprised of 27' x 36' x 30' high structural modules.  The increased width allows for work areas within the through bay to be served by the overhead crane.  The 30' height of the shop space represents a full 2 story space. Today a portion of this space is utilized as second floor space. Expansion within the building could occur by building out additional second floor space. The building contains approximately 9,191 s.f. of unprogrammed space for the growth of future programs including 2,141 s.f. of shop space for an additional 20 welding booths.
- The idea of "maximum flexibility" is repeated by the design of the mechanical penthouse. It is currently sized to accommodate a stand alone mechanical system. If it is determined that the Flex Tech building can be tied into the campus central plant, then the minimal additional space will accommodate future building expansion or expansion of programs that may require a higher level of mechanical conditioning.
- The "big box" shop spaces will feature exposed systems. This will allow the future relocation of infrastructure to accommodate a changing or new program.
- The classroom spaces will provide flexibility by having large storage areas within them to allow for the storage of furniture for different uses. This will allow a drafting studio to be reconfigured into a lecture style learning environment or a conference room to ensure maximum utilization throughout the day. Classrooms will be reconfigurable through the use of moveable wall systems so they may be converted to conference spaces and large function areas. This allows for a reduction in the total number of dedicated class room spaces in favor of shop space.
- Intersections and spaces for interdisciplinary collaboration are provided for with the flexibility of the program. Areas that allow for students to gather outside of faculty office space, above the project work area or within the wide second floor corridor are the result of careful planning. These may at first appear to be "unused" space or circulation in the plan, but these are the eddies that collect students in interesting spaces to provoke collaboration.

### *Safety*

- Safety for students and programs is achieved through good acoustics, ventilation and spatial separation.
- The shops are separated from the remainder of the building areas by tilt up concrete wall panels. This type of construction allows for both fire/hazard and acoustic separation. Specifically, the grinding area was given a dedicated space outside of the shop area to help mitigate noise. Gas storage was treated similarly to control the hazard. Special consideration will be given to acoustic design and planning. Additional information is provided below under "Interior".
- Maintaining good indoor air quality in the shop spaces and classroom and administrative areas is critical to the safety and comfort of the building users. The mechanical ventilation for this building is intense and covered in greater detail in the mechanical narrative.
- Providing adequate space for each program is critical to the safety of the users. Ensuring that there is workability around equipment will help contribute to safety. The programming exercise took care to ensure size requirements were both adequate for today and provided the "loose fit" as technology evolves.

### *Sustainability*

- Passive solar strategies are proposed for the south courtyard elevation. The glazed corridor system adjacent to the tilt up concrete wall would be designed as a solar collector, collecting heat in the winter to be distributed by a heat pump. Overhangs would shade this area during cooling months.
- Daylighting is be provided in the shop spaces through clerestory windows and skylights, minimizing the need for artificial lighting.

# architectural

### *Modern Showcase*

- The building is designed as a high tech and aesthetically pleasing entrance and anchor to campus, to showcase a professional tech environment, and through those efforts engaging employers and recruiting students.
- The east facade of the building faces the community and is a double height curtain wall of glass housing the project display area. At night this space will be illuminated to showcase the efforts of LCCC Career Tech students. The east façade is based on the understanding that this is the college's face to the external world.
- The west face of the building forms a courtyard around the extension of the central academic mall. The west façade will be glass with a large (and very cool) feature graphic welcoming students, faculty and visitors to the Flex Tech building. The west façade faces internally and features a smaller scale, broken down between first and second floors, connecting to the outdoor mall space, and drawing students into the building.

### *Connection to the east campus mall*

- In order to maintain the connection to the campus mall, the building is located as far west as practical. The water line will need to be relocated, but a fire loop is required regardless of building placement. Additionally, this locates the building higher on the existing grade, reducing the amount of cut and fill required. The current Auto Body storage yard will need to be relocated to achieve this building placement as shown on the proposed site plans. This was necessary to maintain the connection to the mall. As the building moved farther east, the connection grew more tenuous.
- The west face of the building forms a courtyard around the extension of the central academic mall. Truck access will be provided to the north and south of the mall preserving the pedestrian nature of the mall. The courtyard will provide a space for students to gather and hang out within the protected confines of the building mass.

### *Maintainability*

- The shop spaces will be largely defined by the materials used to construct them – concrete floors, tilt up concrete walls and exposed acoustic roof deck – to result in the most durable surfaces for these industrial spaces.
- The classroom and administrative spaces will be defined by quality materials appropriate for a higher learning facility. High tech systems and equipment will be provided throughout both the shop and classrooms spaces.

### *Building as a Teaching Tool*

- The building systems will be exposed to provide opportunities to showcase the technology.
- The project display area will be transparent, displaying learning to the community.
- Within the building providing visual connections between classrooms and shop space, offices and shops, project areas and classrooms and project areas and break out spaces is critical and care has been taken to realize many opportunities to display learning.

## Exterior

The building will be designed using materials to compliment the recent Student Housing project and Health Sciences Center and in accordance with the Architectural Guidelines articulated in the Master Plan. Specifically, the Flex Tech building is identified by the master plan as “campus drive architecture”. The primary cladding material will be a metal panel rainscreen contributing to the flexibility of future additions. The metal wall panels and metal trim will reference the dark gray/zinc tone of the reference buildings. Pre-finished colored metal wall panels will be used at the entry facade. Masonry will be used as an accent material and will be in keeping with the masonry palette used on recent campus buildings. Sun shades will be provided where they complement the passive solar design. Windows will relate to the building program and solar orientation will be taken into account. The glazing systems shall be clear, high performance assemblies and spandrel glazing will be light in color.  The grade level will be physically and visually connected to the outdoor spaces articulated in the landscape design narrative.

The exterior walls on the shop portions of the building will be largely opaque and clad in metal wall panels as shown in the exterior renderings. Clerestory windows will complete the materials palette. Typical exterior wall assembly at the shop portions of the building: metal wall panel rain screen, air space, rigid insulation, tilt up concrete wall panel.

The classroom, administrative and circulation areas will be clad primarily in masonry, metal wall panels and glass curtain wall and storefront with masonry accents as shown in the rendering. The curtain wall is oriented to the east to provide a transparent glimpse into the building from the approach to campus. A stepped storefront system will be used on the west facade to further the connection between the outdoor mall on campus.

## Interior

Interior finishes will be per LCCC Construction Quality Standards. The shop spaces will be left largely “exposed to structure” with a limited amount of finishing. Classroom and administrative spaces will have a higher level of finish appropriate for a college learning environment.

The shop spaces will be defined the by the tilt up concrete panel system. This will result in durable, non-combustible wall surfaces along the exterior extents of the shop space. Interior walls defining individual spaces within the shop will be steel stud framed walls clad with impact resistant gypsum board. Infrastructure will be surface mounted and fully exposed to allow for future flexibility for relocating outlets, exhaust and other dedicated features. The floors will be sealed concrete with embedded raceways for conduit. The ceilings will be exposed to the acoustic deck roof structure, or to the underside of the mezzanine floor framing. The overall feel for the shop spaces is exposed systems – from the tilt-up structure, mechanical ductwork, and electrical conduit.

The classroom and administrative spaces will be defined by framed walls on the interior and glazed curtain wall or storefront on the exterior. Many of the classroom spaces are intended to be flexible and will feature a combination of glazed and acoustic moveable wall systems. The overall feel for the classroom and administrative area will be high-tech glass and metal panel systems, exposed ductwork, raceways, lighting, and embossed rubber flooring.

Interior walls will be steel stud framed walls. Where sound separation is important such as between learning spaces, walls will extend from the floor to the deck above with sound insulation in the cavity. Where greater sound control is required, offset studs, resilient channels or additional layers of gypsum board will be considered. The shop spaces are generally separated from the classroom and administrative functions of the building by one-hour construction to achieve hazard control areas as outlined in the building code narrative section. The tilt up concrete panel construction of the shop spaces will contribute to the hazard and acoustic separation due to the mass of the concrete panels. This will help mitigate sound from the diesel and welding programs. The classrooms located on the mezzanine spaces within the shop areas will require special acoustic treatment (as outlined above or greater, depending on further study). Generally, these classrooms are in support of the shop space below and the opportunity to visually connect the classroom learning space to the shop space should not be missed.  Special consideration will be given to the acoustic properties of the proposed glazing system to make that opportunity possible.

## Windows

Daylight is an important feature to learning spaces. Challenges of east and west facing glass will be met with daylight control features within the architecture (using wall thickness, overhangs, and canopies), as well as interior treatments for daylight control. Window systems in the building will incorporate energy efficient glazing to bring light into the building, manage heat gain and loss, and control glare. Daylighting analysis and glazing performance studies will inform the design process.

Double height curtain wall glazing will span the east façade of the project display area. A combination of curtain wall and storefront systems will be used at the terminus of the campus mall courtyard on the west.

All exterior glazing systems will be thermally broken, heavy commercial grade aluminum. Glazing will be 1” insulated glass with low E coating. Higher performing glass may be selected for specific locations, pending performance analysis. Operable units will be projecting and provided with insect screens.

Roof windows are a key element to lighting the shop spaces, in conjunction with clerestory windows. Skylights will be provided in size and number according to the daylighting analysis to result in daylit spaces and minimize the need for artificial lighting.

Good window design requires shading elements that will maximize the building energy efficiency and is key to providing daylight and views without compromising control and comfort for interior spaces.

## Roof

The roof will be a sloped structure with rigid insulation and membrane roof. The roof will be insulated to meet energy code requirements. Internal roof drains will carry water away from the building. On the shop portions of the building, tilt up concrete walls will form a parapet capped with metal flashing. On the classroom portions of the building, roof overhangs will extend over glazed walls as part of the passive solar design.  Opaque walls will extend to form parapets.

## Applicable codes adopted by the state of Wyoming:

2012 International Building Code (IBC)
2012 International Fire Code (IFC)
2012 International Mechanical Code (IMC)
2012 International Energy Conservation Code (IECC)
2014 National Electrical Code (NEC)

## Use and Occupancy Classification per IBC Chapter 3:

**Primary Use A:**
Machine shop vocational learning spaces (welding and diesel engine work/rebuilding)

**Primary Use B:**
Classrooms, offices, and miscellaneous educational spaces (library/computer labs)

**Secondary Use A:**
Hazardous material storage within shop areas.

**Secondary Use B:**
Conference rooms and event spaces.

Educational programs within this building are for students above 12th grade. Such programs are classified as Group B "business" use. Shop spaces are categorized as Group F "factory" use.

IBC Occupancy Classification: Group F-1 and Group B (unseparated mixed use).

- Small accessory assembly spaces are classified as part of the Group B occupancy.
- Group H "hazardous" occupancy spaces are not anticipated to be required.

# building code

## Hazardous Materials Storage Requirements per IBC Chapters 3 and 4:

Known hazardous materials quantities are below thresholds for separated Group H occupancies. To accommodate future growth and/or program changes, the building is proposed to be separated into control areas, separated from each other by 1-hour rated fire barriers. The ground floor of a building may contain up to four control areas.

Each shop wing will act as an enclosed control area. The materials storage room in the Welding wing will be constructed as a third control area. Additional gas cylinder storage space will be provided outside the building.

**Hazardous material classifications per IBC/IFC:**

- Acetylene compressed gas cylinders are classified as a "flammable gas".
  - Propylene welding fuel is classified in the same category as acetylene.
- Oxygen compressed gas cylinders are classified as an "oxidizing gas".
- Diesel fuel is classified as a "Class IIIA fuel oil".
- Motor oil is classified as a "Class IIIB combustible liquid".

**Maximum quantities allowed per control area in a fully sprinklered building:**

- Acetylene cylinder storage is Group H-2 when capacities exceed 2000 cu.ft @NTP
- Oxygen cylinder storage is Group H-3 when capacities exceed 3000 cu.ft @NTP
- Diesel fuel storage is Group H-3 when capacities exceed 660 gallons.
- Motor oil storage is Group H-3 when capacities exceed 13,200 gallons.

## Height and Area per IBC Chapter 5:

Construction Type: II-B, fully sprinklered.
Combustible materials are not allowed in Type II-B construction.

**Standard allowable height and area per IBC Table 503 for Construction Type II-B, Group F-1 (most restrictive):**

- 55'-0" building height, two (2) stories, 15,500 s.f. per story.

**Modified allowable height and area per IBC sections 504/506 for a fully-sprinklered building:**

- 75'-0" building height, three (3) stories, 46,500 s.f. per story.
- It is anticipated that 100% of the building perimeter will have a separation of 30'-0" or more from adjacent buildings. This allows an additional 11,600 s.f. area per story.

**Actual Height and Area:**

- Building Height: 42'-0" (approximate height at mechanical penthouse)
- Stories: Three (3) stories (third story at mechanical penthouse only)
- Ground Floor Area: 32,995 s.f.
- Second Floor Area: 14,855 s.f.
- Third Floor Area: 4,339 s.f. (approximate)

**Future Unseparated Expansion Allowed Under Current Code:**

- Ground Floor Area: 25,105 s.f.
- Second Floor Area: 43,245 s.f.
- Third Floor Area: 53,761 s.f. (approximate)

Separated Expansion Areas would be larger depending on method employed by code. Future expansion is based on general assumptions for future use/programs. Programs operating under higher hazards, such as a wood shop with combustible materials would have code and systems impacts outside of this study that would need to be considered at that time.

## Occupant Load Estimates per IBC Chapter 10:

- Miscellaneous and Shared Space occupant count:
  307 occupants
- Diesel Tech occupant count:
  203 occupants
- Welding Tech occupant count:
  198 occupants
- Engineering Tech occupant count:
  58 occupants

Total preliminary occupant count: **766 occupants**

To accommodate future growth, restrooms and exit access requirements are based on an occupant load of 800-900 occupants.

## Egress Width and Exit Access per IBC Chapter 10:

**Exit width:**

- Per IBC Section 1005 (other egress components):
  900 occupants x .2 = 144.2" required

**Travel Distances:**

- Exit Access Distance per IBC Table 1016.2: 250' (Group F-1, Fully-Sprinklered)

Note: Group F-1 is more restrictive than Group B (300')

At 160 occupants per exit (3'-0" door), six (6) exits would be required. The actual number of exits required will depend on separation distance and the distribution of occupants between the first and second floors.

Per IBC Table 1018.1, corridors are not required to be rated in a fully-sprinklered building (applicable to both Group F and B).

## Plumbing Fixture Counts per IBC Chapter 29:

Requirements per IBC Table 2902.1 for Group B Occupancy (more restrictive than Group F)

- Water Closets: 9M / 9F
- Lavatories: 6M / 6F
- Urinals (50% w.c. substitution allowed per IPC): 4 substitutions.
- Drinking Fountains: 8
- Service Sinks: 1

## Executive Summary

The LCCC Flex-Tech building consists of two large shop wings, connected to one another with a two-story classroom space and large project display area. The two large shop wings are anticipated to be "High Bay" spaces with exterior tilt-up wall panels with interior steel columns. The roof structure will consist of a metal deck roof diaphragm supported by open web steel joists. Roof joists will bear on steel beams at interior columns lines and tilt-up concrete walls at the exterior. The interior steel framed gravity system provides the greatest flexibility for multiple uses and future modification, as well as providing for relatively long spans to allow for considerable open space. The tilt-up exterior wall will also be utilized for the lateral system in the shop wings. The two story classroom area will be standard steel construction, with steel columns supporting composite beams and girders at the second floor, and open web steel joists and girders at the roof. This area will utilize the adjacent tilt-up walls, as well as have masonry shear walls or steel braces, for its lateral system. There will be a large mechanical penthouse on the roof of the two story steel structure. This area will have a composite steel system with beams and girders beneath it, with a metal roof deck on joists and girders. Both areas will be founded on a standard shallow spread footing system with slab-on-grade. Below further defines both structural systems.

# structural

## Building Code

The governing building code for the Project will be 2012 IBC with local amendments. The fundamental design criteria are anticipated to be as follows:

- 2012 International Building Code
- ASCE 7-10

## Loading & Design Criteria

### Roof Snow Loads:

| | | |
|---|---|---|
| Design Roof Snow Load | = | 23.1 psf (plus drift load, by location) |
| Flat Roof Snow Load | = | 30 psf |
| Snow Exposure Factor (Ce) | = | 1.00 |
| Importance Factor (I) | = | 1.10 |
| Thermal Factor (Ct) | = | 1.00 |
| Ground Snow Load (Pg) | = | 30.0 psf |
| Rain on Snow Surcharge | = | 0.0 psf |
| Sloped Roof Factor (Cs) | = | 1.00 |

### Wind Design Data:

| | | |
|---|---|---|
| Basic Wind Speed | = | 120 mph |
| Mean Roof Height | = | ± 30ft |
| Risk Category | = | III |
| Exposure Category | = | C |
| Enclosure Classification | = | enclosed building |
| Internal Pressure Coeff. | = | +/- 0.18 |
| Directionality (Kd) | = | 0.85 |
| Topographical Factor (Kzt) | = | 1.0 |

### Earthquake Design Data:

| | | |
|---|---|---|
| Risk Category | = | III |
| Importance Factor (I) | = | 1.25 |
| Mapped Spectral Response Accelerations: | | |
| Ss | = | 0.155 |
| S1 | = | 0.054 |
| Site Class | = | D |
| Spectral Response Coefficient: | | |
| Sds | = | 0.165 |
| Sd1 | = | 0.086 |
| Seismic Design Category | = | SDC = B |
| Basic Structural System | = | Bearing Wall Systems, Steel Frame Systems |
| Seismic Resisting System | = | Ordinary Reinforced Concrete Shearwalls and Steel Systems Not Specifically Detailed for Seismic Resistance |
| Design Base Shear V | = | Cs*W |
| Seismic Response Coef. (Cs) | = | 0.069 |
| Response Mod. Factor (R) | = | 3 |
| Analysis Procedure | = | Equivalent Lateral Force Analysis |

**Frost Depth:** 36 inches pending geotechnical report

### Design Loads:

| | | |
|---|---|---|
| Dead Load | = | weight of structure |
| Mechanical Loads | = | weight of equipment, but not less than 125 PSF |

## Structural System

The proposed structural systems described below are a representation of preliminary analysis and design.

### Foundation:

- The foundation will be constructed of conventional continuous strip footings (supporting walls) and individual shallow spread footings (supporting columns or other isolated loads). Over-excavation of the native soils and placement of compacted engineered fill will be required beneath footings and slabs-on-grade as recommended in the geotechnical report:
- Allowable bearing pressure of 2000 psf.
- Strip footings will be a minimum of 36 inches wide by 12 inches thick under exterior bearing walls, and 24 inches wide by 12" thick under exterior wall in steel framed portion.
- Spread footings beneath interior and exterior columns are anticipated to be ten foot square by 18 inches thick at the tilt-up walls. Size and reinforcing will vary by location in an effort to balance footing pressures and minimize differential

settlement. Spread footings beneath interior and exterior columns in the "connector" are anticipated to be six foot square by 14" thick.

- Bottom of exterior strip and spread footings shall be typically located 42 inches below finished slab-on-grade to meet the requirements for frost protection with some variation in exterior grading. Top of pilasters or interior footings may be placed a minimum of four inches below the bottom of slabs-on-grade.
- f'c = 4,500 psi for footings and pilasters.
- Slabs-on-grade will be utilized at the floor and are anticipated to be six to eight inches thick typically to facilitate forklift loading and anchorage of testing equipment within the shop wings. In the classroom portion, a four inch slab-on-grade is anticipated
- f'c = 4,000 psi for slabs-on-grade. Macro-fiber reinforcement will be used in the mix to supplement mild reinforcement for crack control. Mild reinforcement may be assumed to consist of #4 bars at 16 inches on center each way for estimating purposes.

**Above Grade Framing Systems:**

Gravity Systems

***Shop Areas: High Bay Spaces***

- Load bearing tilt-up concrete walls are anticipated at the perimeter of the high bay space. Tilt-up concrete facilitates the long vertical spans from foundation to roof at the exterior, thereby eliminating the need for wind columns and girts. The concrete panels provide a stiff backup to the masonry veneer and a durable interior surface. Additionally, the tilt-up concrete can be placed and erected more quickly than structural masonry, is less susceptible to adverse weather delays, and requires significantly reduced special inspection. The tilt-up panels are anticipated to be 7 ¼" solid panels with rigid insulation on the exterior face. The panels will extend to the footings such that no stem wall on the footings will be required. Knock-out panels can be detailed in the walls as directed by the Owner to provide flexibility for future uses.
- f'c = 4000 psi for tilt-up concrete.
- Steel sister columns will be present along the exterior walls at 20 to 26 foot spacing inboard of the tilt-up panels. W14x90 sister columns may be assumed for the purposes of estimating and will extend up to the bearing elevation of the steel crane runway beams.
- Two interior lines of steel columns will be present at approximately a 30'x30' grid. The interior columns will support steel crane runway beams on either side and will extend up to support the roof framing. W14x120 interior column sections may be assumed for the purposes of estimating.
- Crane runway beams are anticipated to be wide flange sections with hat channels. W24x94 beams with C15x33.9 hat channels may be assumed for the purposed of estimating.
- The second level spaces within the high bay area are largely classroom or future use spaces and will be designed for a live load of 250 PSF. To accommodate a storage use, these floors will be a composite system, with wide-flanged beams and girders and a 2VLI deck and a 4" concrete topping (6" total slab thickness) with shear connectors on the beams.
- 1 ½" Type B metal roof deck (assumed 20 gage) over K series steel joists will be used at the roofs. Joists will be supported by steel beams framing between columns at the interior column line and will bear on haunches attached to embed plates at the inside of the tilt-up panels at the exterior.

***Classroom Areas: Two Story Steel Structure***

- HSS tubes will likely be used as columns. An average column size of HSS6x6x3/8 can be assumed for estimating.
- A composite steel floor will be utilized to support the second level, with steel wide flange beams and girders, a 2VLI deck with 4" of concrete topping (6" total slab thickness) with shear connectors on the beams.
- Roof framing will be designed to support penthouse framing, and mechanical units with associated concrete pads as required. These areas will also require a composite slab construction.
- Mechanical penthouse framing is assumed to consist of steel columns and beams with roof joists and braced frames at the perimeter.

**Lateral Framing Systems:**

- The metal roof decks will act as flexible horizontal diaphragms that deliver lateral loads to the tilt-up concrete panels in the shop areas, which will be designed as ordinary reinforced concrete shear walls.
- The Seismic Response Coefficient (R) for Steel Systems Not Specifically Detailed for Seismic Resistance is conservatively used for flexibility for retrofit and future modifications using steel braced frames or moment frames.

**Wall Framing of Ancillary Areas:**

- Where complexity warrants deviation from the tilt-up concrete wall systems in the shop areas, exterior wall construction will most likely be a cold formed metal stud system with sheathing. The exposed finishes are expected to be a masonry veneer or metal panel.
- A cold formed metal stud system with sheathing is anticipated to clad the two-story classroom portion.
- Exterior metal studs are dependent upon final architectural finishes, but the following may be used for estimating purposes:

**Metal Stud Wall Information**

| Unsupported Stud Height | Wall Finish | Stud Size, Gage, and Spacing |
|---|---|---|
| 18' | Metal panel, gypsum, or stucco | 600S162-97 @ 16" |
| 18' | Masonry veneer (CMU, Stone, brick, etc.) | 800S162-97 @ 12" |
| 16' | Metal panel, gypsum, or stucco | 600S162-68 @ 16" |
| 16' | Masonry veneer (CMU, Stone, brick, etc.) | 800S162-68 @ 12" |
| 14' | Metal panel, gypsum, or stucco | 600S162-43 @ 16" |
| 14' | Masonry veneer (CMU, Stone, brick, etc.) | 800S162-54 @ 16" |

- The interior walls will be primarily metals studs and drywall, that may be reinforced with sheathing or strapping to resist lateral loads as needed.

## Mechanical Codes and Standards:

2012 International Building Code

2012 International Fire Code

2012 International Mechanical Code

2012 International Plumbing Code

2012 International Energy Conservation Code

2012 International Fuel Gas Code

NFPA 13 2012 Edition – Installation of Sprinkler Systems

NFPA 14 2012 Edition – Installation of Standpipe and Hose Systems

NFPA 54 2012 Edition – National Fuel Gas Code

NFPA 70 2014 Edition – National Electrical Code

NFPA 72 2012 Edition – National Fire Alarm Code

NFPA 90A 2012 Edition – Installation of Air Conditioning and Ventilation Systems

Jurisdictional Utility Company Requirements

State Department of Labor Requirements

State Department of Health Requirements

State and Federal Safety and Health Laws

ASHRAE Standards including but not limited to 55, 62.1 and 90.1, applicable versions

# fire protection

## Design Conditions:

### Exterior Design Conditions:

| Winter | Summer | Wet Bulb | Project Elevation |
|---|---|---|---|
| -8oF DB | 95oF DB/WB | 64oF WB | 6200 ft |

### Interior Design Conditions:

| Mode | Winter | Summer |
|---|---|---|
| Occupied | 72oF DB | 75oF DB |
| Unoccupied | 65oF DB | 85oF DB |

## Fire Protection

### Executive Summary/Overview

The building will be provided with an automatic fire suppression system. The fire sprinkler system will be designed and installed per NFPA 13, applicable building and fire codes, local building and fire department requirements and requirements of client's insurance carrier. The dedicated fire sprinkler service entry assembly will enter the water room. A 6" fire line is anticipated.

The sprinkler system will be primarily a wet pipe sprinkler system.

### Code Areas (Hazards):

The following hazard classifications and associated hydraulic design criteria are based on NFPA 13 and are for guidance only. The design criteria will be verified with local fire department and client's insurance carrier.

Wet Systems:

***Light Hazard***

- Design Density: 0.10 gpm/sq. ft.
- Area of Operation: 1500 sq. ft. or the total area, whichever is less.
- Hose Stream Demand: 100 gpm.

***Ordinary Hazard Group 1***

- Design Density: 0.15 gpm/sq. ft.
- Area of Operation: 1500 sq. ft. or the total area, whichever is less.
- Hose Stream Demand: 250 gpm.

***Ordinary Hazard Group 2***

- Design Density: 0.20 gpm/sq. ft.
- Area of Operation: 1500 sq. ft. or the total area, whichever is less.
- Hose Stream Demand: 250 gpm.

***Skylights***

Sprinklers will be provided for skylights in excess of 32 ft. sq.

Specialty Areas:

***Exterior Roofs, Canopies, Porte-Cocheres, Balconies, Decks or Similar Projections:***

Provide sprinklers for any of the above unless they are constructed of a non-combustible material. Use dry type sidewall heads to protect these areas.

***Elevator***

Per the requirements of ASME 17.1 and NFPA 13, provide a sprinkler not more than 2 feet above the pit for the elevator shaft.

Specifications:

The piping used for the wet pipe sprinkler system will be black steel; schedule 40. Threaded or welded joints for 2" and less, welded or grooved for 2-1/2" and larger.

Connections between branches and heads may be by flexible stainless steel connectors. Sprinkler heads will be installed in the center of ceiling tiles.

The following types of heads are to be installed in the areas noted:

| Head Type | Area | Finish |
|---|---|---|
| Fully Concealed | Occupied | White |
| Upright Pendant | Unfinished spaces, mechanical rooms, elevator machine rooms and electrical rooms, shop spaces | Brass |
| Sidewall | Beneath overhangs and any canopies | White |

Where the system pressure exceeds 175 PSI pressure reducing valves will be provided at zone branch takeoffs. The pressure reducing valves will be UL listed for fire protection service, and rated for 300 psi pressure with field adjustable pilot control from 30 psi to 165 psi.

In mechanical rooms or areas without ceilings, provide sprinklers under ductwork and other obstructions greater than 48" wide as required by NFPA 13.

plumbing

## Plumbing

### Executive Summary/Overview

Plumbing systems will tie into the existing campus systems with local meters where needed. A single water and a single fire entry are anticipated for the building. Waste and storm will exit the building and coordinate with the site civil plan.

### Domestic Cold Water Entry

The building will be served by a new domestic cold water service line. The domestic cold water entry assembly will enter the water room (same as the fire entry). It will include the building shut-off valve, an outdoor utility owned water meter with remote readout, a reduced pressure backflow preventer with locking bypass, size will most likely be 3".

### Backflow

Per the requirements of the International Plumbing Code and Authority Having Jurisdiction, provide a reduced pressure principal backflow prevention device. The device will be located in the water entry room and be provided with direct drainage to an equipment room drain.

### Domestic Cold Water Distribution System

Downstream of the water entry assembly described above, will be type K for buried pipe and type L copper with soldered joints for all non-buried pipe. Distribution piping will be routed to bathroom groups and individual fixtures including hose bibbs and freeze proof wall hydrants. Where flush valves or solenoid valves are installed, water hammer arrestors will be provided just upstream of the last valve connection. All cold water lines will be insulated.

Plumbing fixtures will include: water closets, urinals, lavatories, break room stainless steel kitchen sinks, drinking fountains or electric water coolers and mop service basins, emergency eyewash/showers (one in each main shop). Wall boxes will be installed for refrigerator water connections.

### Domestic Water Heating Plant

#### *Water Heaters*

- Two (2) high efficiency natural gas fired condensing tank water heaters will be provided. Water will be heated from 40 deg. F to 140deg. F. Two water heaters will be located in the mechanical space in the penthouse. Thermostatic mixing valve will be provided on the outlet of the water heaters to mix the distributed water down to 110 deg. F.
- Flue for fuel fired water heaters to be AL429C and will be routed to the building's exterior. Combustion air is to be provided by dedicated combustion air duct from the same pressure region as the flues.
- A thermal expansion absorber will be provided between the cold water connection to the water heater and the buildings backflow preventer

#### *Circulation Pumps*

Domestic water heating maintenance systems will be provided by an all bronze impeller and casing hot water circulation pumps. Control of the pumps will be by the buildings DDC system based upon return water temperature.

#### *Hot Water Distribution System*

Downstream of the water heating systems described above, will be type L copper with soldered joints. Distribution piping will be routed to bathroom groups and individual plumbing fixtures. Where solenoid valves are installed, water hammer arrestors will be provided just upstream of the last valve connection. All hot water and circulation lines will be insulated.

#### *Irrigation piping*

All irrigation will come from within the building as there is not a close source from the campus main line A 1 ½" line is anticipated with proper backflow prevention.

Drain

***Sanitary Waste/Vent***

Extend building sewer lines to 5'-0" beyond the face of the building where they will be extended by the civil design; two-way cleanouts will be provided outside the building prior to the connection to the civil design. Waste and vent connections are to be provided to bathroom groups and individual fixtures located throughout the building. Waste and vent piping below grade are to be schedule 40 PVC with solvent welded joints; piping above grade are to be schedule 40 PVC with solvent welded joints and standard weight no-hub cast iron pipe with stainless steel no-hub bands or standard weight hub and spigot cast iron pipe with gasketed joints in return air plenums. An oil water separator will be required for any drain lines that service floor drains within the shops. A 1500 gallon separator is anticipated. Vent lines from the shop floor drains will not have vent lines, rather they will be vented through the oil water separator. All waste lines will direct to the west and will be a 6" main line.

***Elevator***

Expected elevator will be an oil-less traction type elevator. Provide an in pit sump pump with capable of producing 55 gpm flow at 10 feet of head. Discharge from sump pump to be to indirectly connected into the sanitary sewer or discharged to the exterior. Provide an alarm contact with controller to be tied into the building automation system.

# plumbing

***Storm/Overflow***

Extend building storm sewers to 5'-0" beyond the faces of the building where they will be extended by the civil design. Storm and overflow piping to roof drains and overflow drains is to be provided. Piping above grade is to be schedule 40 PVC with solvent welded joints and standard weight no-hub cast iron pipe with stainless steel no-hub bands or standard weight hub and spigot cast iron pipe with gasketed joints in return air plenums. Below grade will be coated service weight cast iron with bell and spigot fittings with elastomeric joints. All storm lines will direct to the east, with 3 main leaders to combine from the building into a 10" line. A perimeter drain system with a sump pump will be required and will tie into the 10" main line.

Natural Gas

A metered natural gas supply will provided to the building from the utility owned gas line located on the north side of the main entry road. The gas piping after the meter will be sized for the total load for the building. Comply with the requirements of the International Fuel Gas Code and NFPA-54 – National Fuel Gas Code. The natural gas piping system will consist of schedule 40 black steel with welded or threaded joints. The gas meter is to be located adjacent to the west side of the building near the mechanical room. Gas entry to the building will be in the mechanical room (same as fire/water entry). Distribution pressure downstream of the meter will be low pressure, 6-8" WG. Gas will service water heaters and shop spaces as required.

Specialty Piping Systems

An air compressor for each shop will feed compressed air to all respective areas and any bulk lubrication pumps as needed. Compressed air piping will be copper piping and any lubrication piping will be annealed steel rated for a higher pressure classification.

## Heating, Ventilating and Air-Conditioning

Executive Summary/Overview:

***Central Plant & Tunnel:***

Existing heating and chilled water piping will be extended from a new 10'X10' access vault built off the east end of the existing utility tunnel. Chilled and Hot water systems are derived from the existing primary loop system off of existing flanges. All new valves will be required. New system piping will be transitioned within the new vault to one of two delivery means: An extended tunnel with racked piping to the Flex Building, or direct burial to the building. In either scenario the new transition vault will be required. Current cost estimate is based on a direct burial delivery.

It is believed that the existing (south) physical plant has adequate capacity to support the new Flex building; however, it is also understood that a lack of balancing valves on the existing primary loop will make balancing the systems in the Flex building very difficult. Information regarding the capacities and arrangement of the central plant equipment as well as flow rates on the system will need to be verified and any required modifications in the central plant will be identified under a separate contract.

New pumps may be required in the central plant as the added length of piping will add additional static pressure to the piping and pump system. The new pipe tunnel and piping routed will intersect existing storm main, electrical lines, water and gas lines. Each will have to be coordinated and crossed; this may require special offset arrangements.

***New Building Systems:***

The facility will be provided with building lead/lag pumps on the chilled and heating water systems. Variable speed pumping systems will be utilized with two-way control valves throughout. Building heating and chilled water systems will be provided with a 33% glycol solution for freeze protection. The building lead heating and chilled water pumps will be tied into the building emergency power system to protect the systems from freezing due to a power outage.

A plate type hot water heat exchanger located in the penthouse will be utilized to reduce the boiler plant heating water supply temperature of 180 degree F to the building heating water temperature of 150 degree F as well as separating the two hydronic systems.

A plate type chilled water heat exchanger located in the penthouse will be utilized to separate the building chilled water system from the primary tunnel main lines and allow for glycol.

The proposed mechanical heating, ventilating and air-conditioning system for the project will be multiple variable air volume systems with hot water reheat systems for the non-shop spaces.

Four penthouse air handling units (AHU-#, MAU-#) will serve the building. The AHU's will be dedicated as follows: 1st Floor (AHU-01), 2nd Floor (AHU-2), (1) make-up air unit (MAU-1) for the Diesel Shop and (MAU-2) make-up air unit for the Welding Shop.

Rough Unit sizes are:

- AHU-1 6,500 cfm
- AHU-2 13,000 cfm
- MAU-1 29,000 cfm
- MAU-2 20,000 cfm

# mechanical

Duct mains will commute from the penthouse equipment to the floors via dedicated vertical mechanical shafts. The shafts will be strategically located to minimize major trunk duct runs.

Pedestal mounted hydronic baseboard heating equipment will be utilized to buffer heat loss along glass curtain walls in the building. The pedestal will be custom built to encase the fin-tube heating elements.

***Air Side Systems:***

Due to the high exhaust rates, and thus outside air make-up rates required in the Flex spaces, these areas will be provided with dedicated outside air systems providing 100% outside air to the space. These units will provide tempered air in winter months to maintain the space at the design temperatures. This system will work in conjunction with the Infrared Radiant Heating System described below to meet all heating loads of the space.

Exhaust fans will be variable air volume and shall modulate along with the welding hoods and diesel engine shop systems to maintain a consistent exhaust air flow rate from the space, which also serves to minimize the total volume of make-up air to the space per Shop. Dedicated vehicle exhaust air system is anticipated for the engine shop.

Dust collection system for the grinding shop and welding hood areas will be provided with a dust collector exhaust system. Exhaust terminals will be located at point-of-source locations and will capture the dust and exhaust it to a collector drum.

Gas-Fired Radiant Heating System for the diesel engine flex space will consist of a complete infrared, non-condensing, vacuum tube, natural gas-fired radiant heating system. The system will be AGA certified and shall include vacuum pumps, burners with associated burner controls and combustion chambers, stainless steel and aluminum reflectors, radiant pipe, combustion air blower, and thermostat.

General exhaust air systems will utilize roof mounted fans and be integrated into the DDC control system. Exhaust ductwork will rise up the vertical chase next to the restrooms.

Heating will be provided to all normally occupied spaces by means of heating coils in the air handling units and VAV box secondary coils. Unit heaters will be utilized for any mechanical rooms and cabinet unit heaters will be utilized near exits from the building.

The air handlers will utilize an outdoor air economizer "free cooling" system to provide cooling using outdoor air whenever the outdoor air temperature is appropriate. The control system will also be used to provide a "night purge" to use outside air to pre-cool the building during the cooling season when temperatures allow. Chilled water coils will be provided in AHU's serving normally occupied areas that are to receive cooling. Heating coils will be used to neutralize the delivery airstream.

These coils will be sized for a 75 degree leaving air temperature from the unit and the downstream VAV boxes with reheat coils will handle the additional load to maintain space conditions. AHU-1 and 2 will be primarily a 100% outside air units. All supply for these systems will require large ventilation loads to satisfy all of the exhaust air systems required for flex spaces. Electrical and IT equipment rooms will be served by individual, dedicated chilled water fan coil units.

***TAB Statement of Work:***

Test and balance of the environmental systems will include but not be limited to air and water distribution systems and the equipment and apparatus connected thereto. The TAB contractor shall be an independent testing and balancing firm specializing in this work.

***Controls Statement of Work:***

Where noted in Building and System narratives below a microprocessor based Direct Digital Control (DDC) system for the monitoring and control of the mechanical and electrical equipment will be provided and connected into the central campus system. The DDC System will be of electronic components employing direct digital control to comprise a complete system, furnished and installed by the automatic temperature control contractor. Control valves will be modulating except where noted otherwise below. The system will be complete in all respects, put in operation and calibrated and adjusted under occupied conditions. All temperature control work will be done by a single source responsibility. The building DDC will be integrated with the campus central DDC system.

**Air Handlers (AHU-#, MAU-#):** Variable air volume air handlers and make up air units will be DDC controlled. We will allow for 25 unit points minimum including, but not limited to, the following: Outside Air damper, Return Air damper, Outside Air Temperature, Relief Air Damper, Mixed Air Temperature, Return Fan Status, Return Fan Start/Stop, Return Fan Modulation, Mixing Plenum Pressure, Filter Differential Pressure Sensor, Supply Fan Status, Supply Fan Start/Stop, Supply Fan Modulation, Heating Valve, Cooling Valve, Low Temperature Detection Alarm Thermostat, Unit Discharge Air Temperature, High Static Pressure Limit Switch, System Static Pressure Sensor, DAT Zone (per zone), Space Temperature (per zone), Building Static Pressure. Sequence will include, but will not be limited to, the following sections: Life/Unit safety, Warm up, Cool down, outside air flow reset, Discharge air temperature reset, static pressure reset, Occupied, Unoccupied. Units will also require DDC controls for all terminal boxes including damper modulation, damper position, space temperature, discharge air temperature, heating modulation.

**Fan Coil Units (FCU-#):** Chilled water fan coil units will be DDC controlled. We will allow for 8 points including, but not limited to, the following: Fan Start/Stop, Fan Status, DAT, Space Temperature, Cooling Valve, Chilled Water Supply & Return Temperature. Sequence will include, but will not be limited to, the following sections: Life/Unit safety, Occupied, Unoccupied.

**Cabinet Heaters (CUH-#):** Cabinet unit heaters will be DDC controlled. We will allow for 4points including, but not limited to, the following: Fan Start/Stop, Fan Status, DAT, Space Temperature. Sequence will include, but will not be limited to, the following sections: Life/Unit safety, Occupied, Unoccupied Unit Heaters (UH-#): Unit heaters controls will be stand-alone type.

**Ceiling Exhaust Fans (EF-#):** Exhaust fans will be stand alone and will run off a 120 V wall switch.

**Exhaust Fans (EF-#):** Exhaust fans will be DDC controlled. We will allow for 3 points including, but not limited to, the following: Discharge damper, Fan Start/Stop, Fan Status. Sequence will include, but will not be limited to, the following sections: Life/Unit safety, Occupied, Unoccupied.

**Fume Exhaust Hoods (FH#)**: Fume exhaust hoods located in science areas will be variable flow, high efficiency type hoods with point of use control.

# mechanical

### Design Intent

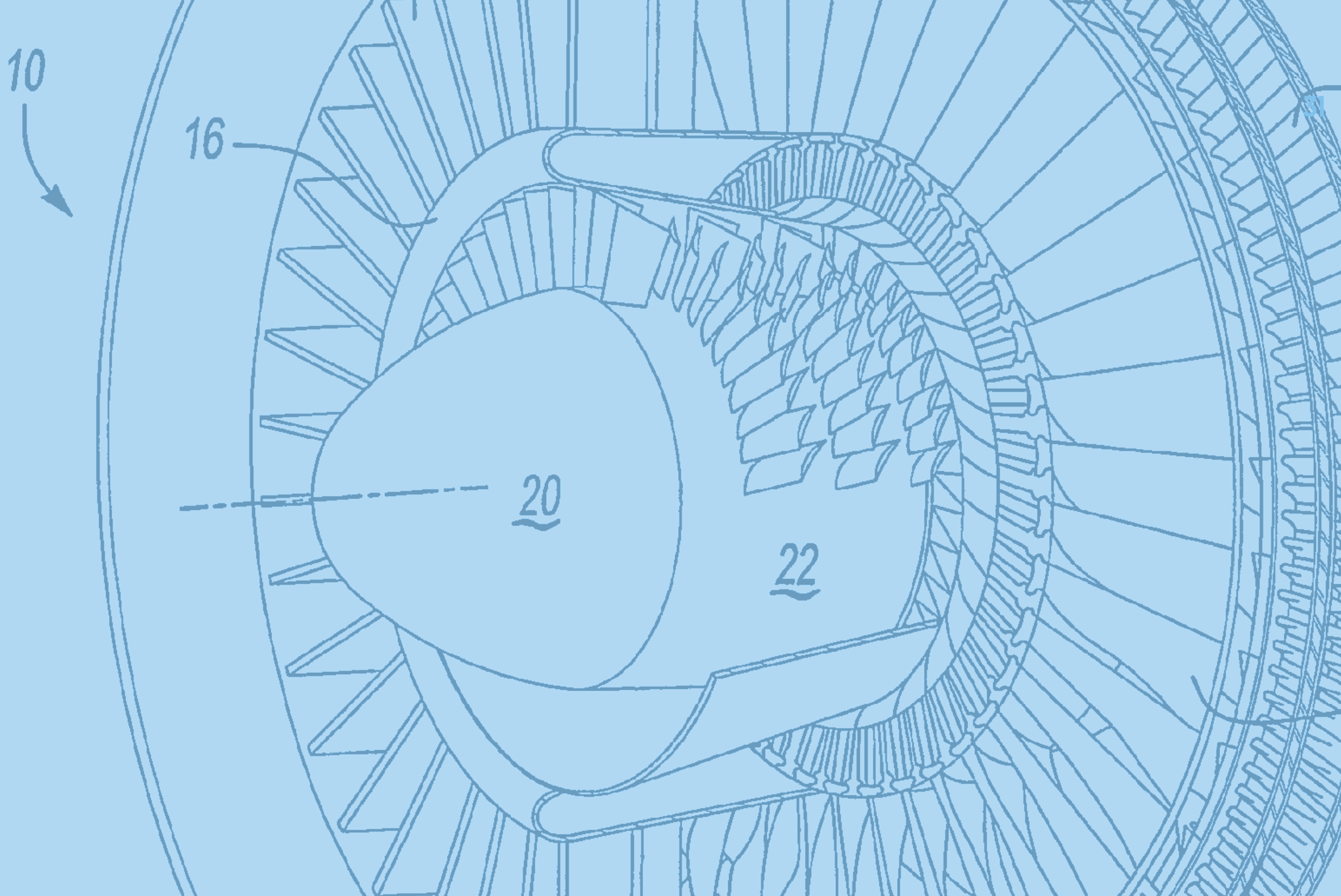
All chilled and hot water piping systems will be insulated. All base mounted pumps will be provided with inertia bases. All other mechanical equipment will be provided with spring and/or rubber vibration isolation. All equipment will be located on 4" housekeeping pads unless noted otherwise.

Sheet metal duct systems gauges and installation requirements will be in accordance with SMACNA HVAC Duct Construction Standards Manual. All round and oval ducts exposed to view will be spiral seam. Concealed round and oval ducts may be fabricated with lock type or welded longitudinal seams. All duct connections to motor driven equipment will be made with flexible connections. All radius elbows with radius of one and one half times the diameter or width of duct and an inside throat radius of one times the diameter or width. Radius elbows are to be provided with 90º duct turns. Manual balancing dampers will be provided at all takeoffs.

All supply, return, exhaust and transfer ductwork will be galvanized steel. No fiberboard will be allowed. All supply, return and transfer ductwork will be insulated with 1" fiberglass duct liner unless noted otherwise. Return air will be via a return air plenum. All transfer ducts and return air boots, will have a minimum of two 90-deg elbows for sound attenuation.

Special duct systems materials and coatings will be utilized in shop exhaust areas as required.

Fire dampers, smoke dampers, and combination fire/smoke dampers will be installed in ductwork where ducts penetrate rated assemblies where required by the Building Code. Fire detection devices will be installed in all fan systems when required by the Building Code.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## Electrical Systems Overview

### Power Overview

All electrical service, distribution, and branch circuit equipment will be fully rated for the available faults calculated at each component. Series ratings will not be utilized.

All conductors will be copper with 600 volt type THHN/THWN insulation. Branch circuits within buildings will be installed in EMT or RGS conduits. All conduits will be concealed within walls and above ceilings in office spaces. No more than three circuits will be installed in any raceway. All emergency and home run branch circuits will be installed in conduit.

Circuits run underground will be installed in Schedule 80 PVC conduit where under drive lanes and Schedule 40 PVC everywhere else. Underground conduits shall transition to RGS type conduit for 3' prior to radius sweep up. Concrete encasement will be used for primary and secondary feeders only. Branch wiring for exterior lighting and power receptacles will not require concrete encasement.

### Main Power Distribution

Service to the facility will be at 277/480 Volts, three-phase, four wire, derived from a pad-mounted transformer. Interior dry-type transformers will be utilized to derive 120/208 Volt, three phase, four wire service where required. Primary voltage will be 13,800 Volts by Xcel Energy via primary loop feed to LCCC campus. Primary and Secondary feeders on-site will be run below grade to help preclude tampering and weather-related damage.

electrical

Service entrance equipment will consist of a 2,000 ampere service rated exterior disconnect and interior distribution equipment. The first floor main electrical room will house the main service distribution panel, branch panel distribution boards, and optional standby system main distribution. Service size includes 20 percent future capacity and the distribution section will be configured for the addition of future circuit breakers for future utilization.

### Secondary Power Distribution

Distribution and branch circuit panel boards will be provided with copper bussing, bolt-on type circuit breakers, door-in-door hinged lockable trims and will be provided with a minimum of 20 percent spare capacity and 20 percent spare circuit breakers.

Surge Suppressive devices will be incorporated on all 120/208V Power systems distribution boards and on the Main 277/480V Distribution Section.

Most lighting will be 277V single phase, where 120V lighting is required additional step down transformers and secondary distribution lighting panels will be utilized. 120/208V power will be derived from a step down transformer located in the main electrical room with power branch panel boards located on both floors.

Major mechanical equipment will be fed 480V power from main mechanical electrical distribution system. Mechanical branch panel boards will be located in the penthouse mechanical area to serve mechanical loads. Step down transformers will provide 120/208V power for control panels and mechanical equipment as necessary.

Convenience outlets will be installed as required for operational use. GFI receptacle locations will be installed per NEC. All others are standard specification grade.

### Standby Power

Due to distance of available generator power to the site a new 150KW 277/480V 3-Phase Standby Life Safety rated Natural Gas generator will be utilized for backing up essential lighting, fire alarm, one elevator and building heating pump systems, in accordance with LCCC current design standards.

### Emergency Standby Power Distribution

The generator distribution will consist of two automatic transfer switches one (60A) dedicated for life safety loads and the second (100A) for other Loads (Equipment & Power).

Life safety distribution will include 15KVA step-down (120/208V) transformers for connection of fire alarm system, intercom and voice evacuation systems. Lighting will be fed 277V and is expected in flex tech spaces, lobbies, restrooms, corridors, classrooms, building entrances and exits, exit signs and exterior egress path lighting.

The secondary emergency distribution will provide standby power to the elevator and heating system pumps, DDC system control panels.

### Fire Alarm System

Building will require annunciation for alarm conditions, however full detection will not be required as building is fully sprinkled. Speakers/Strobes will be used throughout for voice notification/evacuation system. Fire Alarm system shall be voice evacuation type. Notifier (Honeywell) is LCCC campus standard.

### Interior Lighting and Controls

Lighting will be high performance, LED luminaires. Exit lighting will be provided via luminaires containing LED lamps. Emergency egress lighting will be served from select luminaires such that egress paths are illuminated to at least one foot-candle. Lighting levels will comply with the latest edition of the IESNA Lighting Handbook.

Occupancy sensors with override switches will be provided in janitor's closets, utility rooms, telecom rooms and restrooms to reduce the amount of time that lights are on when spaces are unoccupied. Systems shall be configured for an optimal combination of infrared and micro phonics or ultrasonic technologies with sensors located for clear views of the spaces being controlled. Individual sensors will not control more than 1,000 square feet of open space. Programmable controls will be utilized in general use areas such as open office areas and corridors. Conference rooms and classrooms with day lighting will utilize automatic dimming controls and occupancy sensors.

### Exterior Lighting and Controls

Lighting design will utilize coordinated, complimentary fixtures with LED light sources around site. Building and Pole mounted luminaires will be of similar family to match in appearance and light quality. Cut-off style fixtures utilizing engineered photometrics will be used throughout and shall be dark sky compliant. Lighting levels will comply with the latest edition of the IESNA Lighting Handbook. Exterior lighting control will be accomplished via a photo sensor and relay lighting control panel such that exterior lighting is on from dusk to dawn with low voltage override control.

### Communications Systems

Telephone will be derived from nearest campus vault with sufficient capacity of 150 pair Copper and terminated into first Floor IDF Demark. Data will be provided via campus fiber network via 30-pair Single-Mode fiber from campus network data center and be routed utilizing existing underground communication ducts and vaults. 4-strand Single-mode Fiber will be used to provide interconnectivity between main IDF room on each Floor and Satellite IDF closets serving the eastern areas.

Each Space will have minimum (1) two-port RJ-45 Data Jack with Voice and Data connectivity and one spare blanked off faceplate for office reconfiguration. Data Cabling shall be installed such that sufficient whip length available to relocate the cabling between the ports as necessary. Voice and Data will utilize CAT6 cabling and TIA-568C Terminations. Faceplates will be labeled with IDF Room where terminated and ports identified to patch panels.

# electrical

Power-over-Ethernet wireless access points will be sufficiently placed around the building interior and at building entrances to provide adequate wireless networking coverage, however post construction wireless survey will need to be completed to verify bandwidth and signal strength.

Cable Routing will utilize cable trays above accessible ceiling and ¾" conduits from back boxes to above accessible ceiling. J-Hooks will be used above offices with accessible ceilings and in areas where cable quantity does not lend to utilization of cable tray.

### Multimedia

Audio and Visual enhancements will be utilized in all special service spaces.

Electrical Systems Design Intent by Room Type and Floor

### Site

*Lighting:*

- 12' Pole mounted LED luminaires around sidewalks.
- 20' Pole mounted LED luminaires around drive lanes.

*Power:*

- General purpose Receptacles on all pole mounted lighting.
- Power to irrigation controller.
- 277/480V 3-Phase Life Safety Rated Standby Natural Gas Generator in weather proof enclosure.
- Incoming copper and fiber connectivity from nearest campus communication vault.

### Office Spaces

*Lighting:*

- Recessed 2x4 LED Volumetric luminaires
- Low voltage wall switch for manual on (dual level switching), and ceiling mounted low voltage occupancy sensor for vacancy detection off after 30 minutes.

*Power:*

- General purpose Receptacles along perimeter walls coordinated with furniture placement.

*Communication:*

- 2 voice-data ports, one blank faceplate, one with wires pulled.

### Storage Rooms

*Lighting:*

- Surface mounted Volumetric wrap around luminaires.
- Lighting Control will be Manual on / Occupancy Sensor Off

*Power:*

- At least one general purpose receptacle at entry door.

### Corridors:

*Lighting:*

- 2x2 recessed LED Volumetric luminaires
- Exit lighting will be used as required.

*Power:*

- General purpose receptacles every 20-25' for custodial purposes.

### Restrooms

*Lighting:*

- Cove lighting and LED down lights will be utilized where possible.
- Lighting Control will be automatic on and off control via low voltage ceiling mounted occupancy sensors.

*Power:*

- GFI Receptacles will be utilized for Custodial convenience.

### Flex Space/Lab

*Lighting:*

- LED 2x4 recessed volumetric luminaire.
- Lighting control will be manual on occupancy sensor off after 30 minutes.

*Power:*

- General purpose and specific equipment receptacles around perimeter walls. Specialty outlets expected throughout in shop areas. Individual pieces of equipment will need to be coordinated with the end users during programming. Overhead power distribution through busway or cord drops is envisioned.

*Communication:*

- Wireless access network coverage
- Wired network data ports along perimeter walls and combination floor boxes possible.

# program

# program

LCCC FLEX-TECH BUILDING
**Space Program** (Program Verification Document)
Revised 11/6/2014

CTA Architects Engineers
1024 Cherokee St. Unit 250
Denver, CO 80204

| Space Summary | Program Totals | | SD Totals | | Notes |
|---|---|---|---|---|---|
| Departments | Total ASF | Total GSF | SD-ASF | SD-GSF | |
| Misc. & Shared Spaces | 6,540 | 7,656 | 7,875 | 8,072 | |
| Diesel Tech | 13,270 | 15,329 | 11,225 | 13,313 | |
| Welding Tech | 9,260 | 10,649 | 8,632 | 9,328 | includes 2,141 of first level lab for future 20 additional welding booths |
| Engineering Tech | 2,920 | 3,358 | 2,262 | 2,594 | |
| Future Growth | 1,567 | 1,801 | 7,050 | 7,226 | added to welding future growth spaces totals 9,191 sf |
| | | | | | |
| **Total ASF / GST** | 33,557 | 38,793 | **34,673** | **40,533** | |
| Communications / LAN Closets (1.0%) | | 388 | | | these spaces not yet identified, may be located in the mechanical penthouse |
| Housekeeping (0.5%) | | 194 | | 120 | 2 janitor rooms, one on each level |
| Building Circulation (7.5%) | | 2,909 | | 5,832 | calculated by remainder |
| Mechanical Allowance (4.5%) | | 1,746 | | 352 | this area doesn't include the 4,485 sf in the third level mechanical penthouse |
| Envelope Allowance (2.5%) | | 970 | | 1,013 | estimated amount |
| | | | | | |
| **Total GSF - Programmed Flex Tech** | | **45,000** | | **47,850** | This total doesn't include the 4,485 sf third level penthouse, or outdoor cover yards |

**comparable figures**

| TOTAL GROSS SQUARE FEET (GSF) | | | NET TO GROSS FACTOR |
|---|---|---|---|
| 1st & 2nd Floor GSF | 37,044 | 47,850 | 1.29: This factor is low and shows a good utilization of the building space |
| 3rd Floor Mechanical Penthouse | | 4,339 | |
| **TOTAL GSF** | **37,044** | **52,189** | **1.41:** The enclosed penthouse increases the factor versus rooftop units |

**EXTERIOR YARDS & COVERED STORAGE**

| | |
|---|---|
| **Diesel & Autobody Yard** (1,500 sf covered) | **10,000** |
| **Welding** (500 sf covered) | **1,500** |
| **Roof Patio Canopy** (Option) | **861** |

LCCC FLEX-TECH BUILDING
**Space Program** (Program Verification Document)
Revised 11/6/2014

CTA Architects Engineers
1024 Cherokee St. Unit 250
Denver, CO 80204

| **Misc. & Shared Spaces** | **Program Verification Totals** | | | **SD Totals** |
|---|---|---|---|---|
| Summary | ASF | Circ. | GSF | SD-ASF |
| General Office Space | 790 | 119 | 909 | 893 |
| Shared Spaces | 5,750 | 998 | 6,748 | 6,982 |
| | | | | |
| **Totals** | **6,540** | 1,116 | 7,656 | **7,875** |

**comparable figures**

| General Office Space | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Faculty Office | 300 | 120 | 2 | 240 | 15% | 276 | 230 | 2 office on the second floor |
| Adjunct Office | 300 | 100 | 2 | 200 | 15% | 230 | 101 | 1 office on the second floor |
| Administrative Assistant Office / Support | 300 | 200 | 1 | 200 | 15% | 230 | 358 | second floor office suite |
| Executive Office | 300 | 150 | 1 | 150 | 15% | 173 | 204 | second floor office suite |
| | | | | | | | | |
| **Subtotals** | | | 6 | **790** | 119 | 909 | **893** | |

**comparable figures**

| Shared Spaced | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Classrooms | 100 | 800 | 2 | 1,600 | 15% | 1,840 | 1,549 | flex class/conference rooms with adjacent project display |
| Student Study Spaces | 100 | 400 | 2 | 800 | 15% | 920 | 1,280 | within wide corridors on both levels |
| Conference Rooms | 100 | 400 | 2 | 800 | 15% | 920 | 170 | 1 small conference room on the second floor |
| Project Display Area | 100 | 1,200 | 1 | 1,200 | 15% | 1,380 | 1,643 | multipurpose area opens to flex classrooms |
| Kitchenette | xxx | | | | | | 161 | adjacent to project display area |
| Faculty Restrooms | xxx | | | | | | 60 | in office suite |
| Men's Toilets | xxx | 250 | 1 | 250 | 25% | 313 | 542 | two sets, adjacent to each lab, one with shower |
| Women's Toilets | xxx | 250 | 1 | 250 | 25% | 313 | 565 | two sets, adjacent to each lab, one with shower |
| Storage | 600 | 150 | 3 | 450 | 25% | 563 | 308 | adjacent to flex classrooms and offices |
| Common Break Area | 600 | 400 | 1 | 400 | 25% | 500 | 704 | second floor for faculty and student use |
| Exterior Roof Patio | xxx | | | | | | | 861 sf alternate over the entry canopy |
| | | | | | | | | |
| **Subtotals** | | | 13 | **5,750** | 998 | 6,748 | **6,982** | |

**comparable figures**

LCCC FLEX-TECH BUILDING
**Space Program** (Program Verification Document)
Revised 11/6/2014

CTA Architects Engineers
1024 Cherokee St. Unit 250
Denver, CO 80204

| **Diesel Technology** | **Program Verification Totals** | | | **SD Totals** |
|---|---|---|---|---|
| **Summary** | ASF | Circ. | GSF | SD-ASF |
| **Personnel Spaces** | 340 | 119 | 459 | 207 |
| **Support Spaces** | 12,930 | 1,940 | 14,870 | 11,018 |
| | | | | |
| **Totals** | **13,270** | 2,059 | 15,329 | **11,225** |

**comparable figures**

| **Personnel Spaces** | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Faculty Offices | 300 | 120 | 2 | 240 | 15% | 276 | 207 | 2 second floor offices, overlooking the high bay lab |
| Adjunct Offices | 300 | 100 | 1 | 100 | 15% | 115 | | see shared spaces |
| | | | | | | | | |
| **Subtotals** | | | 3 | **340** | 51 | 391 | **207** | |

**comparable figures**

| **Support Spaces** | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Diesel Lab - Vehicle Thru-Bay | 200 | 3,130 | 1 | 3,130 | 15% | 3,600 | 3,819 | 36' wide x 107' long high bay area |
| Hotsy Pressure Wash Room | 200 | 800 | 1 | 800 | 15% | 920 | 957 | at the end of the high thru-bay lab |
| Wet Corridor | 200 | 400 | 1 | 400 | 15% | 460 | 435 | adjacent the hotsy pressure wash room and drive train |
| Hazardous Storage | 200 | 200 | 1 | 200 | 15% | 230 | 200 | adjacent wet corridor with exterior entry |
| Hydraulics | 200 | 800 | 1 | 800 | 15% | 920 | di | moved to the second floor |
| Transmission | 200 | 800 | 1 | 800 | 15% | 920 | 604 | on the first floor open to the high bay lab |
| Tool Room w/ Integral Office | 200 | 800 | 1 | 800 | 15% | 920 | 698 | adjacent to the lab entry on the first floor |
| Electrical & HVAC Lab | 200 | 800 | 1 | 800 | 15% | 920 | 724 | moved to the second floor |
| Drive Train + Differential Lab | 200 | 800 | 1 | 800 | 15% | 920 | 615 | on the first floor adjacent and open to the high bay lab |
| Brakes | 200 | 800 | 1 | 800 | 15% | 920 | 604 | on the first floor open to the high bay lab |
| Engine Clean Room | 200 | 1,600 | 1 | 1,600 | 15% | 1,840 | 1,411 | combined with the engine rebuild classroom |
| Engine Rebuild Classroom | 100 | 800 | 1 | 800 | 15% | 920 | | combined with the engine clean room |
| Display Area | 200 | | | | 15% | | | see shared space |
| Library / Computer Lab | 200 | 800 | 1 | 800 | 15% | 920 | 763 | on second floor adjacent offices |
| Restrooms / Shower | xxx | 150 | 2 | 300 | 15% | 345 | | see shared space on first floor |
| Breaks Rooms | 600 | | | | 15% | 0 | | see shared space on second floor |
| Compressor | xxx | 100 | 1 | 100 | 15% | 115 | 94 | accessed from exterior and enclosed |
| Lockers | xxx | | | | | | 94 | along corridor at lab entry |
| Exterior Storage Yard | | 6,000 | | | | | | 60 x 100 exterior |
| | | | | | | | | |
| **Subtotals** | | | 16 | **12,930** | 1,940 | 14,870 | **11,018** | |

**comparable figures**

LCCC FLEX-TECH BUILDING
**Space Program** (Program Verification Document)
Revised 11/6/2014

CTA Architects Engineers
1024 Cherokee St. Unit 250
Denver, CO 80204

| **Welding Technology** | **Program Verification Totals** | | | **SD Totals** |
|---|---|---|---|---|
| **Summary** | ASF | Circ. | GSF | **SD-ASF** |
| **Personnel Spaces** | 360 | 54 | 414 | 207 |
| **Support Spaces** | 8,900 | 1,335 | 10,235 | 8,425 |
| | | | | |
| **Totals** | **9,260** | 1,389 | 10,649 | **8,632** |

**comparable figures**

| Personnel Spaces | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Faculty Offices | 300 | 120 | 3 | 360 | 15% | 414 | 207 | 2 second floor offices overlooking the high bay lab |
| | | | | | | | | |
| **Subtotals** | | | 3 | **360** | 54 | 414 | **207** | |

**comparable figures**

| **Support Spaces** | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | SD (ASF) | Notes |
|---|---|---|---|---|---|---|---|---|
| Welding Booth | 200 | 80 | 20 | 1,600 | 15% | 1,840 | 2,449 | space for 20 initial welding booths |
| Welding Booth (Future) | 200 | 80 | 20 | 1,600 | 15% | 1,840 | 2,141 | future growth capacity for 20 more welding booths |
| Cutting Room | 200 | 400 | 1 | 400 | 15% | 460 | | combined with the plasma cutter area |
| Grinding Room | 200 | 400 | 1 | 400 | 15% | 460 | 302 | adjacent the cutting area |
| Bottle Storage - High Pressure Gas | 200 | 75 | 1 | 75 | 15% | 86 | 95 | accessed from exterior and enclosed |
| Bottle Storage Area - Flammable Gas | 200 | 75 | 1 | 75 | 15% | 86 | 95 | accessed from exterior and enclosed |
| Interior Material Storage Area | 200 | 400 | 1 | 400 | 15% | 460 | | not specifically identified in the high bay area |
| Receiving Area | 200 | 800 | 1 | 800 | 15% | 920 | 487 | area adjacent to bay door |
| Tool Room | 200 | 400 | 1 | 400 | 15% | 460 | 268 | located adjacent the welding shop entry |
| Quench Tank Area | 200 | 100 | 2 | 200 | 15% | 230 | | in large equipment area |
| Large Equipment Area | 200 | 1400 | 1 | 1,400 | 15% | 1,610 | 1,055 | adjacent the welding booth area, includes quench tank |
| Compressor Room | 200 | 100 | 1 | 100 | 15% | 115 | 95 | accessed from exterior and enclosed |
| Plasma Cutter Area | 200 | 400 | 1 | 400 | 15% | 460 | 579 | adjacent the large equipment area |
| Toilet - Single User | xxx | 35 | | | 15% | | | use shared facility toilets |
| Handwashing Station | xxx | 100 | 1 | 100 | 15% | 115 | | locate in lab by entry |
| Janitorial Alcove | xxx | 30 | | | 15% | | | just brooms, no dedicated room |
| Locker Area | xxx | 150 | 1 | 150 | 15% | 173 | 96 | at lab entry by toool room |
| Simulator Area | 200 | 150 | | | 15% | | | not required for this program |
| Classroom | 100 | 800 | 1 | 800 | 15% | 920 | 763 | 20 students - w/ 18" seminar table seating |
| Exterior Material Storage Area | xxx | 1,500 | | | 15% | | | 30' x 50' exterior, partially covered |
| | | | | | | | | |
| **Subtotals** | | | 55 | **8,900** | 1,335 | 10,235 | **8,425** | |

**comparable figures**

LCCC FLEX-TECH BUILDING
**Space Program** (Program Verification Document)
Revised 11/6/2014

CTA Architects Engineers
1024 Cherokee St. Unit 250
Denver, CO 80204

| **Engineering Technology** | **Program Verification Totals** | | | **SD Totals** |
|---|---|---|---|---|
| **Summary** | ASF | Circ. | GSF | SD-ASF |
| **Personnel Spaces** | 120 | 18 | 138 | 207 |
| **Support Spaces** | 2,800 | 420 | 3,220 | 2,055 |
| | | | | |
| **Totals** | **2,920** | 438 | 3,358 | **2,262** |

**comparable figures**

| Personnel Spaces | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Faculty Offices | 300 | 120 | 1 | 120 | 15% | 138 | 106 | second floor overlooking the high bay lab |
| Faculty Offices | 300 | 100 | 1 | 100 | 15% | 115 | 101 | second floor |
| | | | | | | | | |
| **Subtotals** | | | 2 | **120** | 18 | 138 | **207** | |

**comparable figures**

| Support Spaces | Space Code | Prop. ASF | Qnty. | Total ASF | Circ. | GSF | **SD (ASF)** | **Notes** |
|---|---|---|---|---|---|---|---|---|
| Computer Lab | 200 | 800 | 1 | 800 | 15% | 920 | 769 | second floor w/ adjacent side storage |
| Drafting Lab | 200 | 800 | 1 | 800 | 15% | 920 | 769 | second floor w/ adjacent side storage |
| Printer & Equipment Lab | 200 | 800 | 1 | 800 | 15% | 920 | 321 | second floor ajacent offices and classrooms |
| Supply & Project Storage | 200 | 400 | 1 | 400 | 15% | 460 | 196 | adjacent classrooms |
| | | | | | | | | |
| **Subtotals** | | | **4** | **2,800** | 420 | 3,220 | **2,055** | |

**comparable figures**

# cost estimate

LARAMIE COUNTY COMMUNITY COLLEGE | FLEX-TECH

# New Flex-Tech Facility

Prepared by CTA Architects Engineers

Revised: 11/6/14

estimate

| Project Name: | **Laramie County Community College - Flex-Tech Center - Cheyenne, WY** | Project Number | LCCC_FLEX |
|---|---|---|---|
| Project Description:<br>48,047 sf facility Design, bid, build delivery.<br>2-story steel and concrete tilt-up structure with third floor mechanical penthouse (priced separately). | | Building Area | 48047 |
| | | Bid ENR Index | 5442 |
| | | Adj. ENR Index | 5542 |

| Division | Division Title | Division Cost | $/SqFt | % | Adj. Cost | $/SqFt |
|---|---|---|---|---|---|---|
| 01 | **General Requirements** | $1,008,987.00 | $21.00 | 9.60% | $1,027,528 | $21.39 |
| 02 | **Existing Conditions** | $0.00 | $0.00 | 0.00% | $0 | $0.00 |
| 03 | **Concrete** | $1,249,222.00 | $26.00 | 11.88% | $1,272,177 | $26.48 |
| 04 | **Masonry** | $192,188.00 | $4.00 | 1.83% | $195,720 | $4.07 |
| 05 | **Metals** | $1,297,269.00 | $27.00 | 12.34% | $1,321,107 | $27.50 |
| 06 | **Wood, Plastics, and Composites** | $48,047.00 | $1.00 | 0.46% | $48,930 | $1.02 |
| 07 | **Thermal and Moisture Protection** | $480,470.00 | $10.00 | 4.57% | $489,299 | $10.18 |
| 08 | **Openings** | $288,282.00 | $6.00 | 2.74% | $293,579 | $6.11 |
| 09 | **Finishes** | $720,705.00 | $15.00 | 6.86% | $733,948 | $15.28 |
| 10 | **Specialties** | $60,058.75 | $1.25 | 0.57% | $61,162 | $1.27 |
| 11 | **Equipment** | $136,933.95 | $2.85 | 1.30% | $139,450 | $2.90 |
| 12 | **Furnishings** | $64,863.45 | $1.35 | 0.62% | $66,055 | $1.37 |
| 13 | **Special Construction** | $79,277.55 | $1.65 | 0.75% | $80,734 | $1.68 |
| 14 | **Conveying Equipment** | $75,148.00 | $0.80 | 0.71% | $76,529 | $1.59 |
| 21 | **Fire Suppression** | $52,851.70 | $1.10 | 0.50% | $53,8231 | $1.12 |
| 22 | **Plumbing** | $384,376.00 | $8.00 | 3.66% | $391,439 | $8.15 |
| 23 | **Heating Ventilating and Air Conditioning** | $1,921,880.00 | $40.00 | 18.28% | $1,957,196 | $40.74 |
| 26 | **Electrical** | $1,729,692.00 | $36.00 | 16.46% | $1,761,476 | $36.66 |
| 98 | **Contractor OH&P** | $720,705.00 | $15.00 | 6.86% | $733,948 | $15.28 |
| | **Project Total** | **$10,510,956** | **$218.00** | **100.00%** | **$10,704,102** | **$222.78** |

LARAMIE COUNTY COMMUNITY COLLEGE | FLEX-TECH

# New Flex-Tech Facility

Prepared by CTA Architects Engineers

Revised: 11/6/14

budget

| CONSTRUCTION EXPENSES | | | | | | | Budget | SD Estimate |
|---|---|---|---|---|---|---|---|---|
| 1 | Site - Development (1.38 acres) | 60,000 | sf | @ | $5.00 | /sf | $300,000 | $300,000 |
| 2 | Site - Utility Infrastructure | (move water, direct bury services) | | | | | $150,000 | $150,000 |
| 3 | Site - Landscaping | 20,000 | sf | @ | $3.25 | /sf | $65,000 | $65,000 |
| 4 | Site - Parking & Roadway (3.5 acres) | *($770K cost in separate budget) | | | | | $- | $- |
| 5 | Site - Fenced Yard (11,500 sf) & Canopy (3,000 sf) | *($130K cost in separate budget) | | | | | $- | $- |
| 6 | Site - Mall Extension (20,000 sf) | *(100K cost in separate budget) | | | | | $- | $- |
| 7 | Building - First & Second Floor Levels | 47,850 | sf | @ | $222.78 | /sf | $10,274,000 | $10,660,023 |
| 8 | Building - Mechanical Penthouse | 4,339 | sf | @ | $55.00 | /sf | $- | $238,645 |
| 9 | Special Systems (in project expenses below) | (costs in project expenses) | | | | | $- | $- |
| **SUBTOTAL CONSTRUCTION COST** | | | | | | | $10,789,000 | $11,413,668 |
| | Construction Contingency | 5.00% | | | | | $539,450 | $570,683 |
| **TOTAL CONSTRUCTION COST** | | **53,824** | **sf** | **@** | **$229** | **/sf** | **$11,328,450** | **$11,984,351** |

| PROJECT EXPENSES | | | | | | | Budget | SD Estimate |
|---|---|---|---|---|---|---|---|---|
| A | Architectural & Engineering Fees | | | | | | $775,026 | $775,026 |
| B | Reimbursibles | | | | | | $30,000 | $30,000 |
| C | Add Services (Spec. Systems, Furn., Acoustics) | | | | | | $141,079 | $141,079 |
| D | Site Survey | | | | | | $5,000 | $5,000 |
| E | Construction Testing | | | | | | $25,685 | $25,685 |
| F | Geotech Soils Report | | | | | | $10,000 | $10,000 |
| G | Utility Connection & Development Fees | | | | | | $35,690 | $35,690 |
| H | Permit & Fees (City, County, State) | | | | | | $50,078 | $50,078 |
| I | Administrative Costs | | | | | | $10,274 | $10,274 |
| J | Art in Public Places | | | | | | $100,000 | $100,000 |
| K | Finance/Taxes/Insurance | | | | | | $125,000 | $125,000 |
| L | Voice/Data Systems | | | | | | $198,475 | $198,475 |
| M | AV/IT Equipment | | | | | | $287,205 | $287,205 |
| N | Moving Expenses | | | | | | $50,000 | $50,000 |
| O | Furniture & Equipment Procurement | | | | | | $831,818 | $831,818 |
| P | Site Project Costs (Design, Testing, Contingency) | *($160K cost in separate budget) | | | | | | |
| **SUBTOTAL PROJECT EXPENSES** | | | | | | | **$2,675,330** | **$2,675,330** |
| | | | | | | | | |
| | Project Contingency | | | | 5.1% | | $142,636 | $142,636 |
| **TOTAL PROJECT COST** | | | | | **19.0%** | | **$2,817,966** | **$2,817,966** |

| | **TOTAL CONSTRUCTION & PROJECT COSTS | 52,189 | sf | @ | $279 | /sf | $14,146,416 | $14,802,317 |
|---|---|---|---|---|---|---|---|---|

*Additional project amount needed to develop the surrounding 3.5 acreas of site, yards, parking and roads: $1,160,000

**The current project estimate is over the current budget: 4.43% or (655,901)

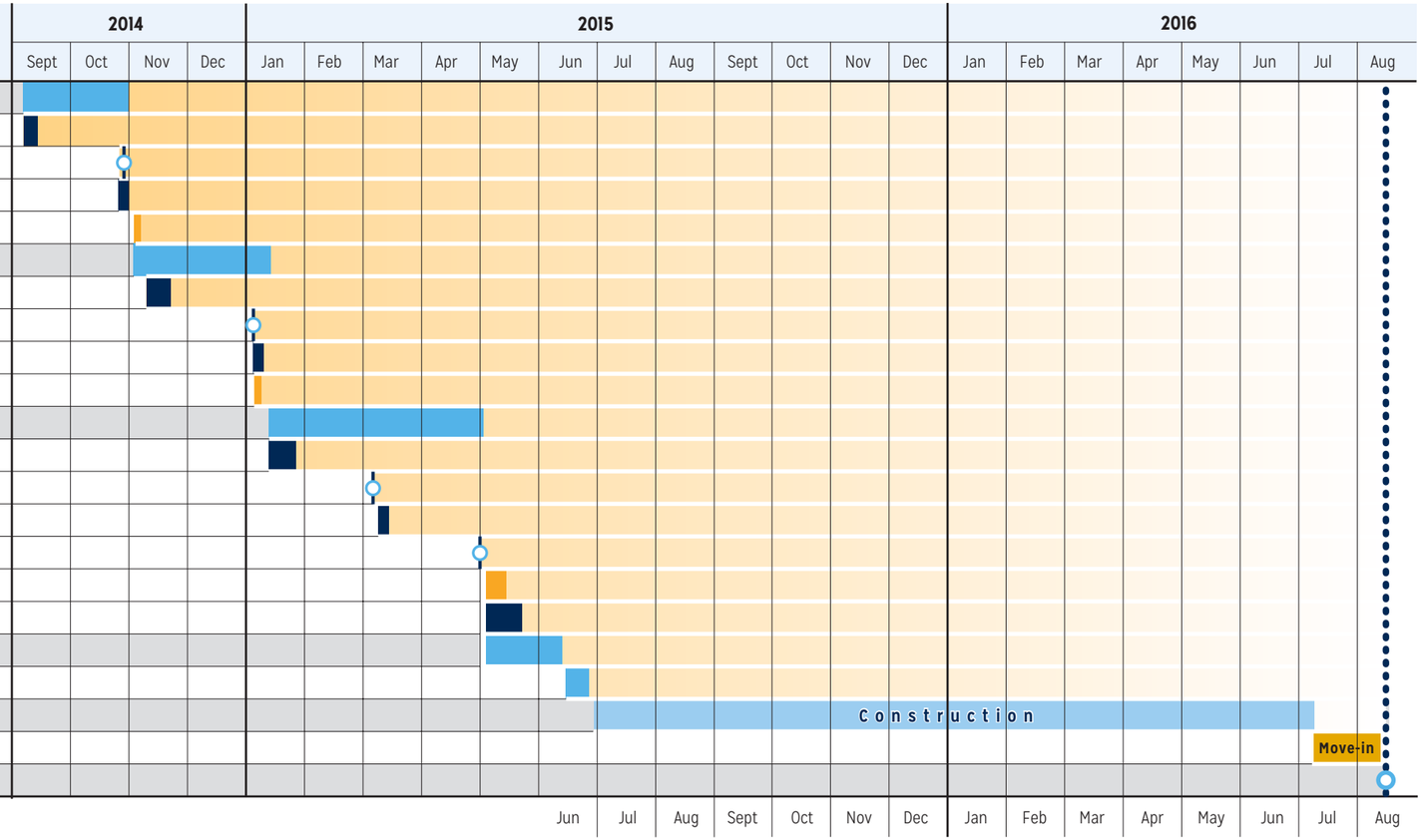
# schedule

# Design Schedule | Target Dates

LCCC Flex-Tech Classroom Building

Revised 10/24/14

| | Duration (Days) | Start Date | Finish Date |
|---|---|---|---|
| **Schematic Design (SD)** | 40 | 9/8/14 | 10/31/14 |
| - Concept Validation Charette (week of) | 5 | 9/8/14 | 9/12/14 |
| **- SD Package Delivered** | 0 | 10/30/14 | 10/30/14 |
| - SD Presentation (week of) | 5 | 10/27/14 | 10/31/14 |
| - LCCC/State Review - SD | 5 | 11/3/14 | 11/7/14 |
| **Design Development (DD)** | 51 | 11/3/14 | 1/12/15 |
| - Incorporate SD Comments | 10 | 11/10/14 | 11/21/14 |
| **- DD Package Delivered** | 0 | 1/5/15 | 1/5/15 |
| - DD Presentation (week of) | 5 | 1/5/15 | 1/9/15 |
| - LCCC/State Review - DD | 5 | 1/5/15 | 1/9/15 |
| **Construction Documents (CD)** | 79 | 1/13/15 | 5/1/15 |
| - Incorporate DD Comments | 10 | 1/13/15 | 1/26/15 |
| **- 50% CD Package Delivered** | 0 | 3/6/15 | 3/6/15 |
| - 50% CD LCCC/State Review | 5 | 3/9/15 | 3/13/15 |
| **- 100% CD Package Delivered** | 0 | 5/1/15 | 5/1/15 |
| - 100% CD LCCC/State Review | 10 | 5/4/15 | 5/15/15 |
| - State FP&ES Review | 15 | 5/4/15 | 5/22/15 |
| **Bidding** | 30 | 5/4/15 | 6/12/15 |
| **Negotiation** | 10 | 6/15/15 | 6/26/15 |
| **Construction** | 270 | 6/29/15 | 7/8/16 |
| **LCCC Move-in** | 25 | 7/11/16 | 8/12/16 |
| **First Day of Classes** | 0 | 8/15/16 | 8/15/16 |




schedule