

SESSION LE/OT-02

NOVEMBER 3, 2011 | 9:45 AM

Evolution of a Design: Prototypes | Police Stations

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PRAGMATISM**

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CELEBRATING CREATIVE, COST EFFECTIVE, AND FUNCTIONAL DESIGN FOR JUSTICE FACILITIES



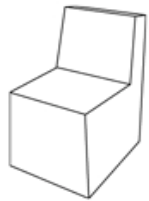


pro•to•type (n.)

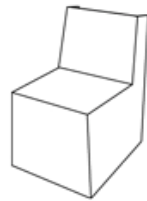
1. An original type, form, or instance serving as a basis or standard for later stages.
2. An original, full-scale, and usually working model of a new product or new version of an existing product.
3. An early, typical example.

ev•o•lu•tion (n.)

1. A gradual process in which something changes into a different and usually more complex or better form.



EVOLUTION







Colorado State Patrol



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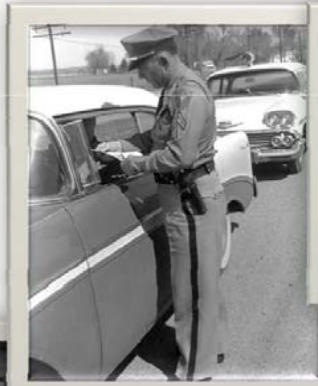


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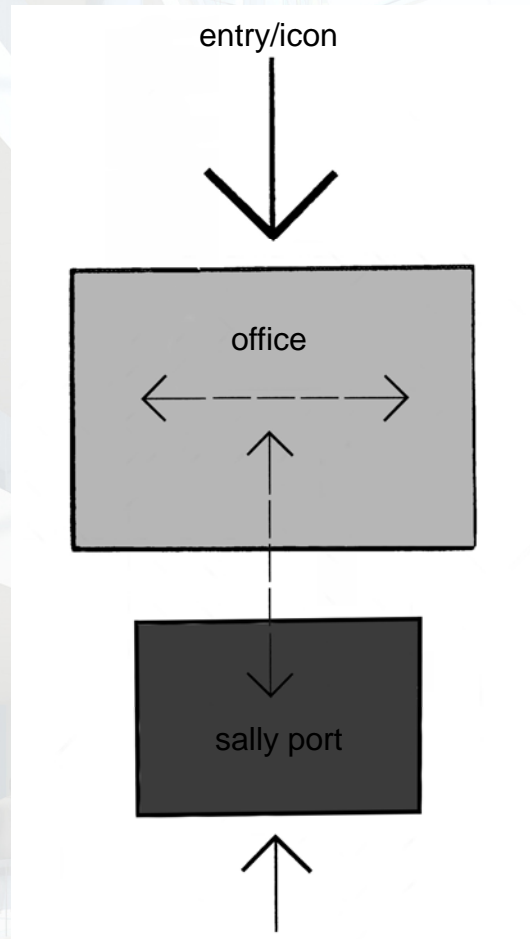
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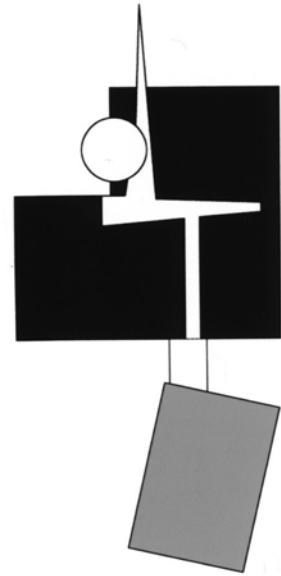
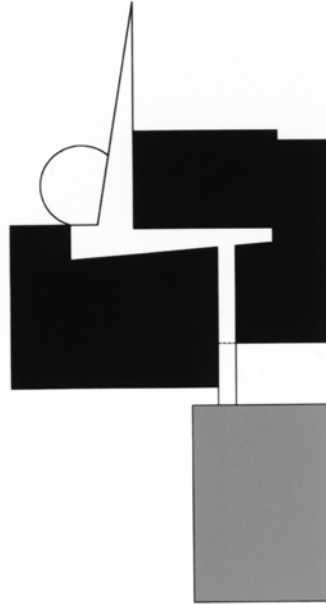
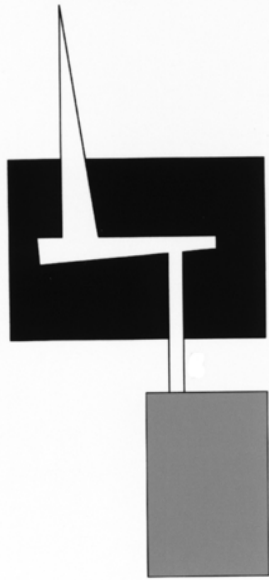
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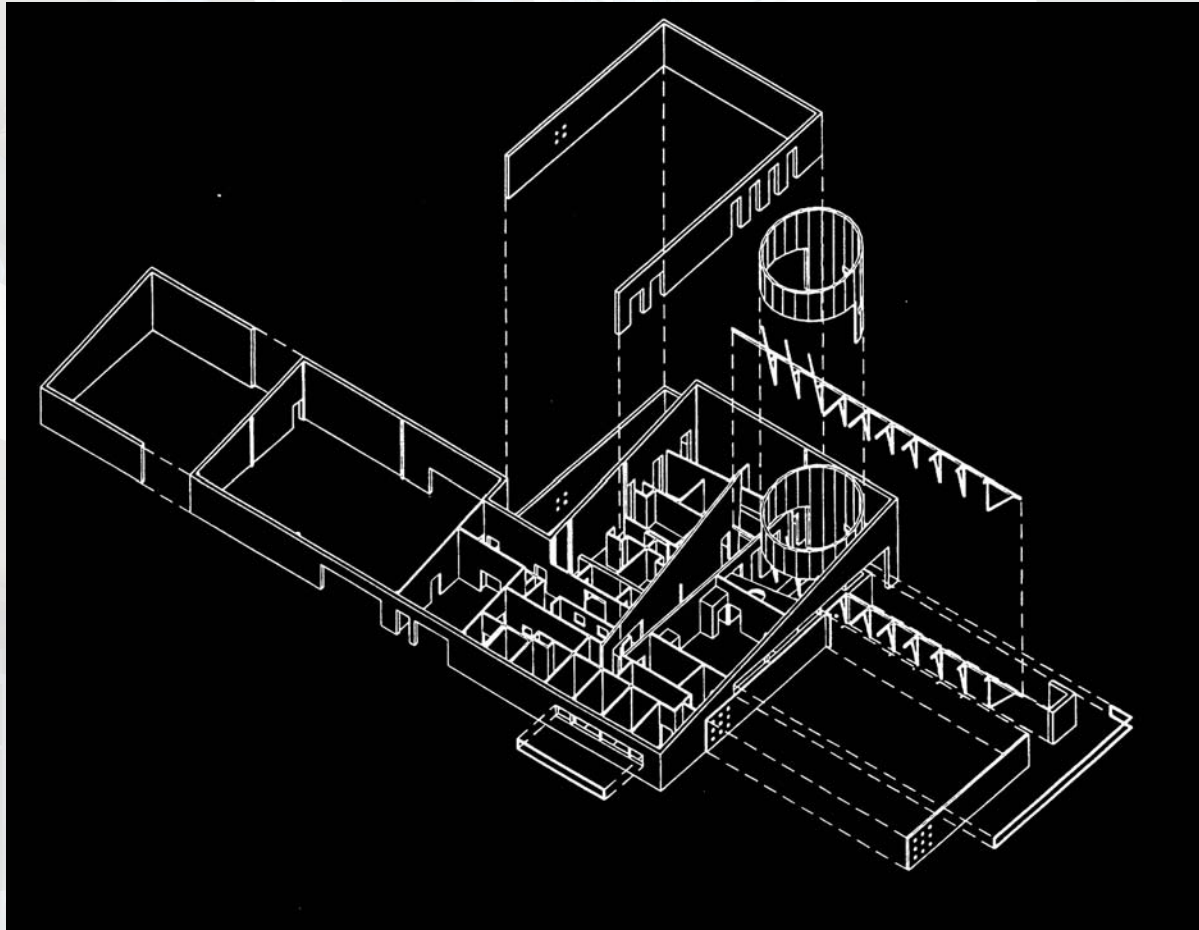


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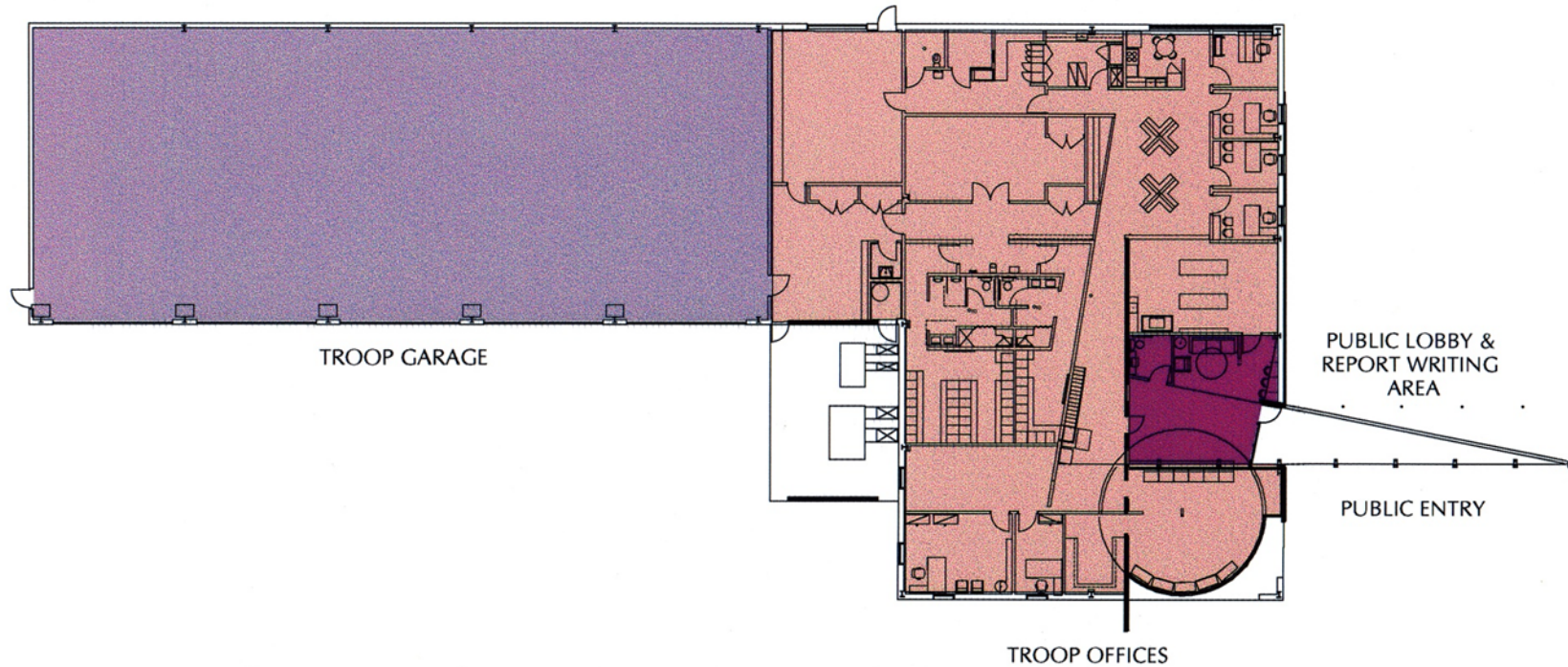
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COLORADO STATE PATROL TROOP 1D
COMMERCE CITY, COLORADO



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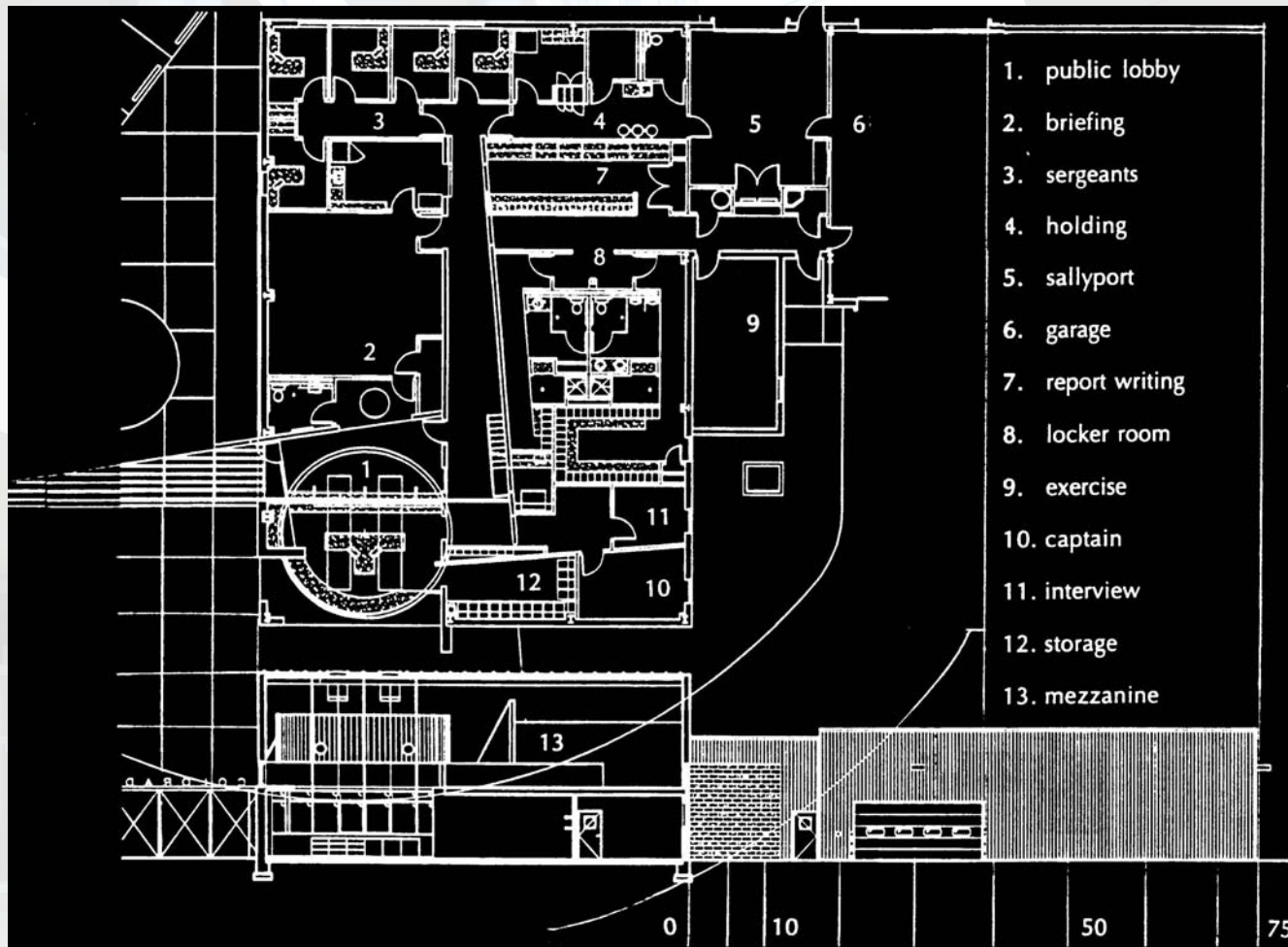


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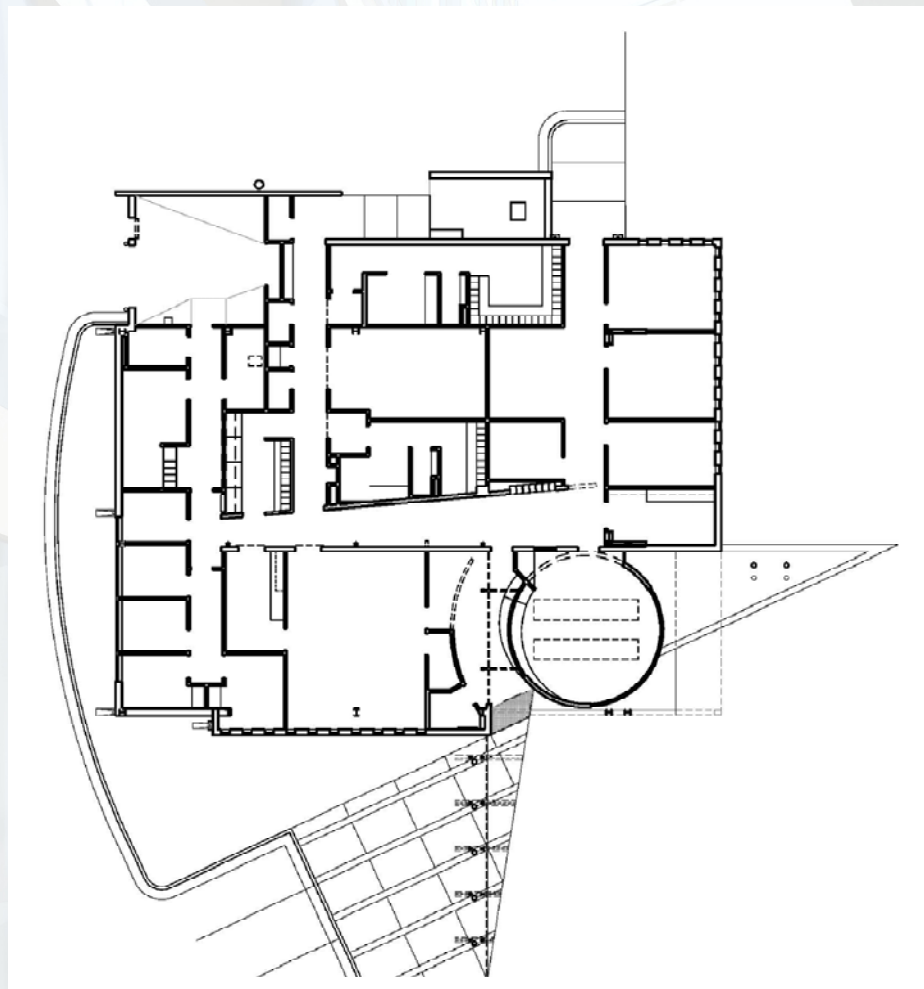


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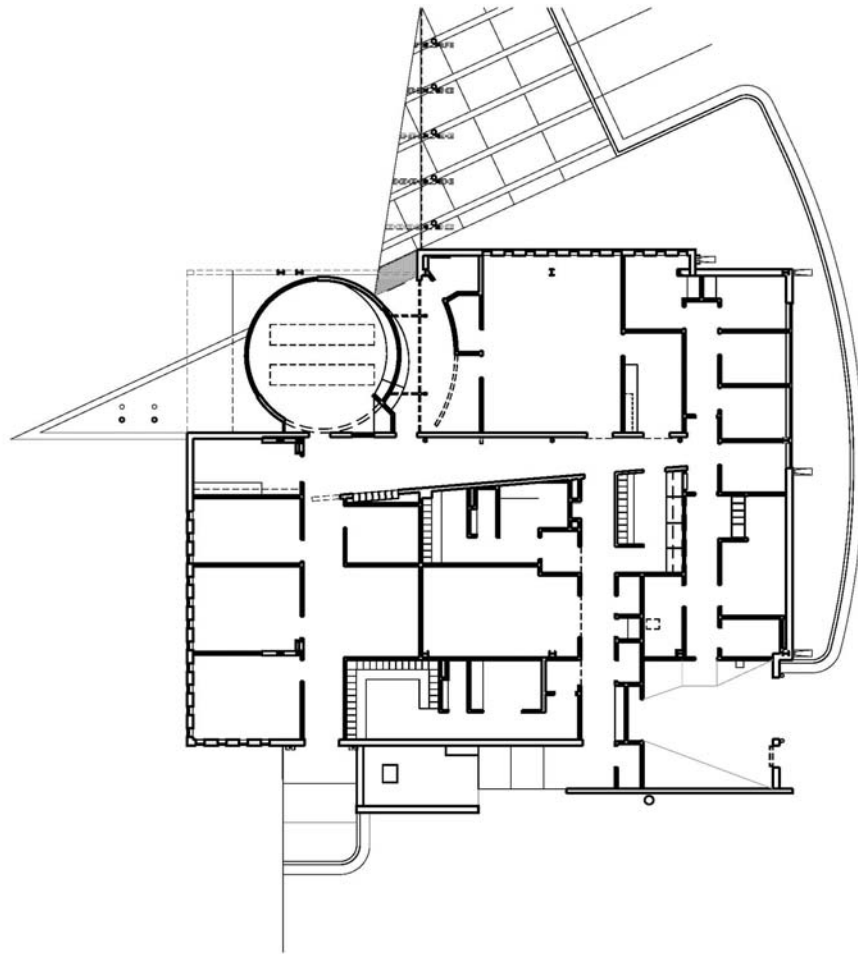


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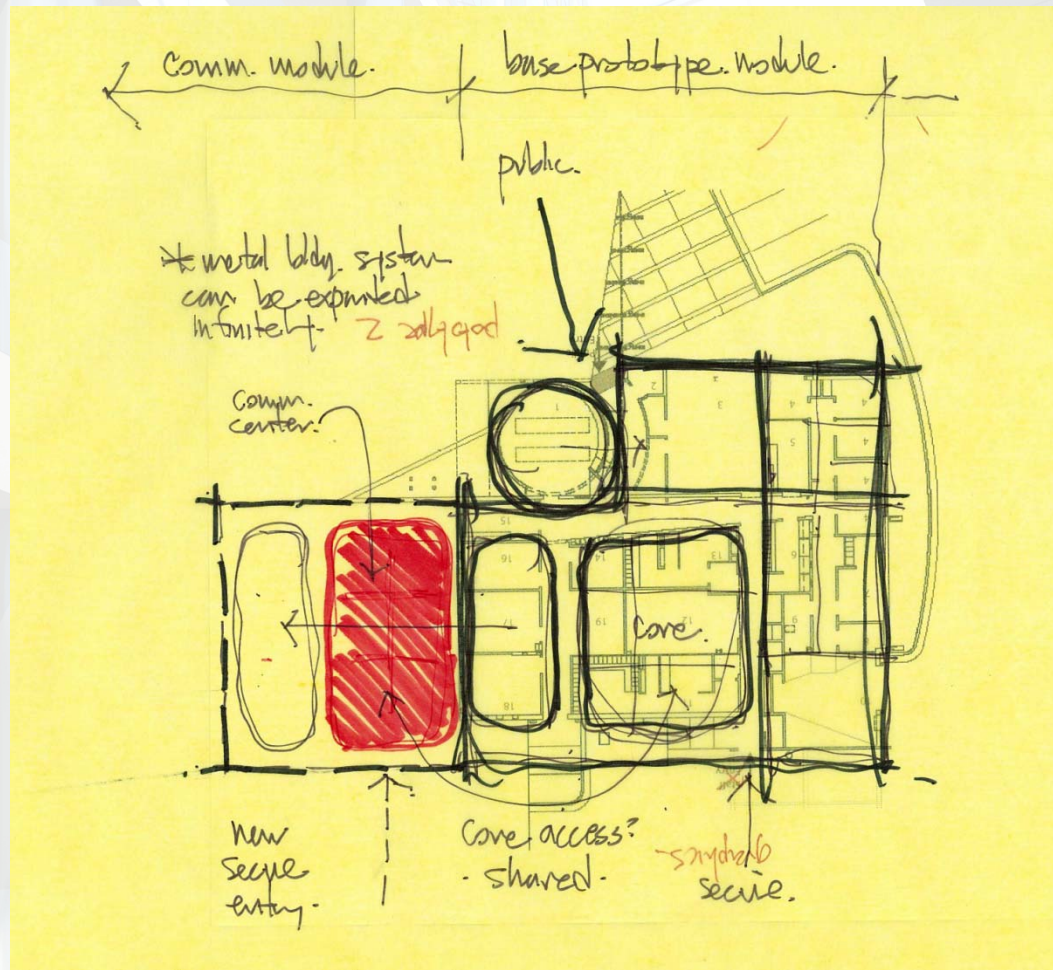
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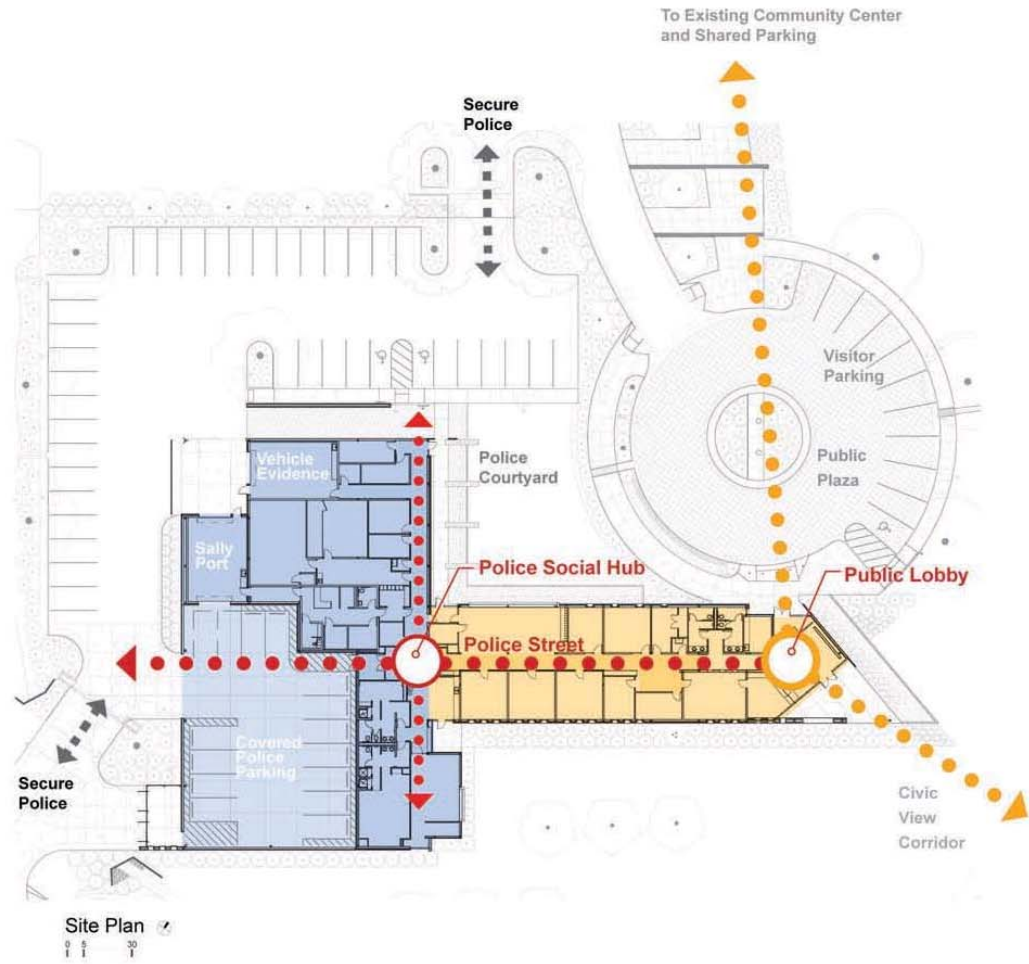


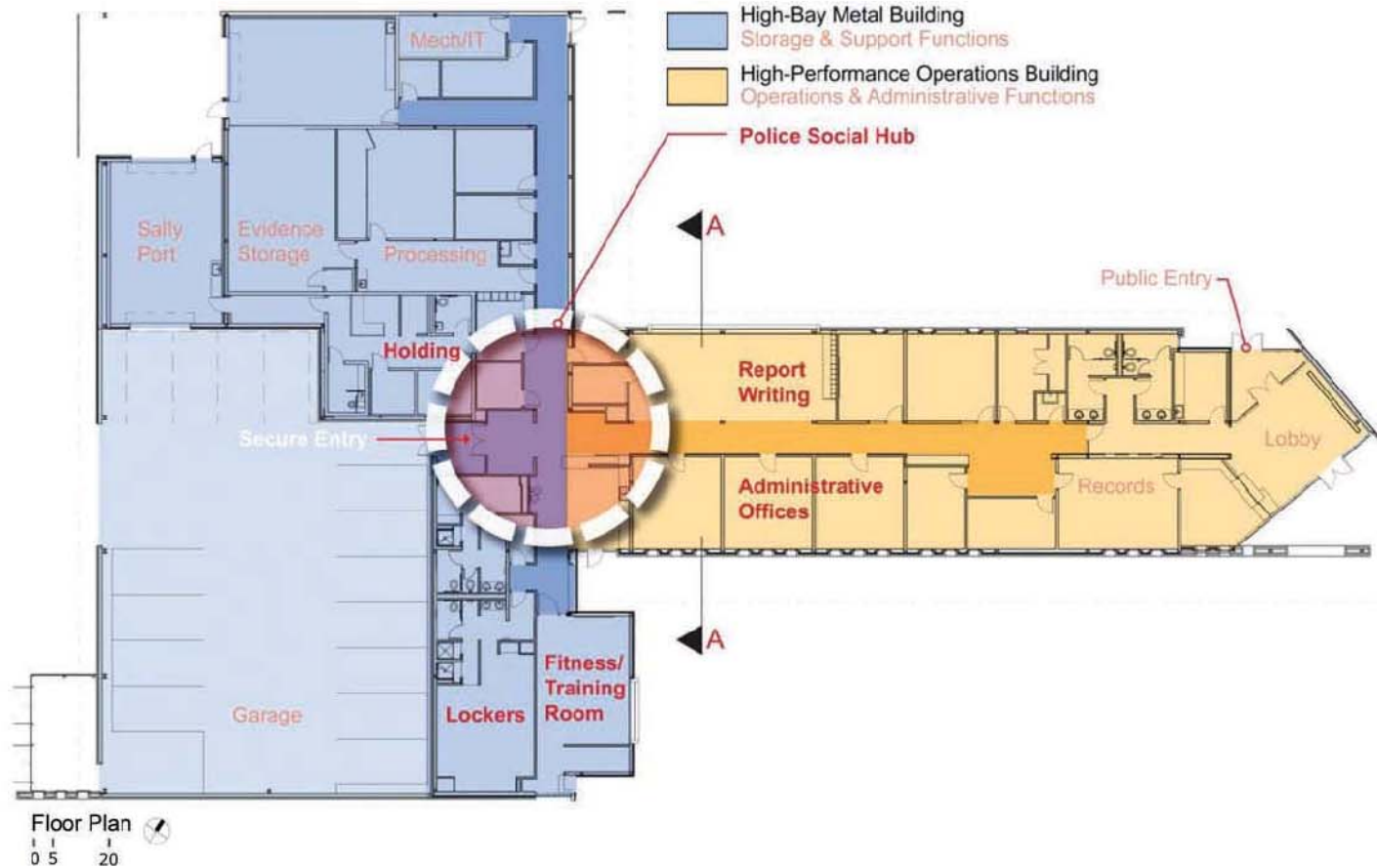
Windsor Police Department

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Program

- Spaces are organized about an interior Police Street and an intersecting secondary corridor.
- 'Police Street' activates the station's operational functions and encourages interaction among sworn personnel, staff, and administrators.
- The secondary corridor services support spaces.
- The intersection of the two corridors is the police social hub, providing direct access to the covered parking, break room, locker rooms and report-writing room.

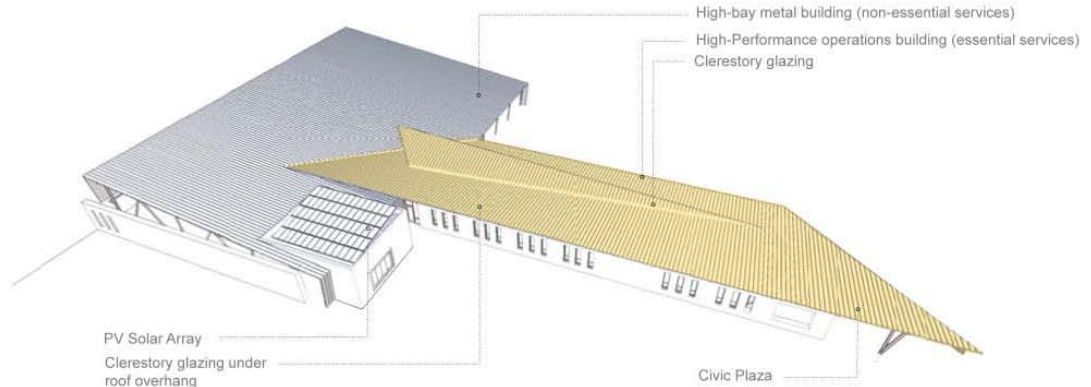
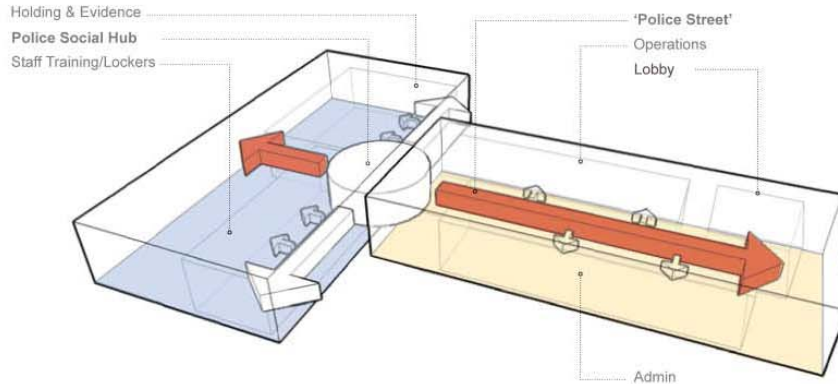
Efficiency

1. The station recognizes two major efficiency efforts
The building orientation takes advantage of the solar efficiencies with the use of clerestory glazing and significant roof overhang for shading. Active P.V. solar panels provide additional power for the facility.
2. The HVAC system uses geothermal energy from the site to supply under-floor VAV units that efficiently distribute conditioned air throughout the building. Operable windows provide an additional passive system to bring fresh air into the facility.

Form

The station is separated into two connected forms:

- The storage, support and garage functions are contained within a high bay metal building which speaks to the agrarian and rural site vernaculars.
- Admin, operations and public spaces, etc are located in the higher-performance wing of the building, where clerestory windows, a sloping roof and a continuous dormer activate the occupied spaces and major circulation.





The design of the new police facility compliments the aesthetic of the existing community center.



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Exposed to public view on all sides, the building expresses a consistent rational language



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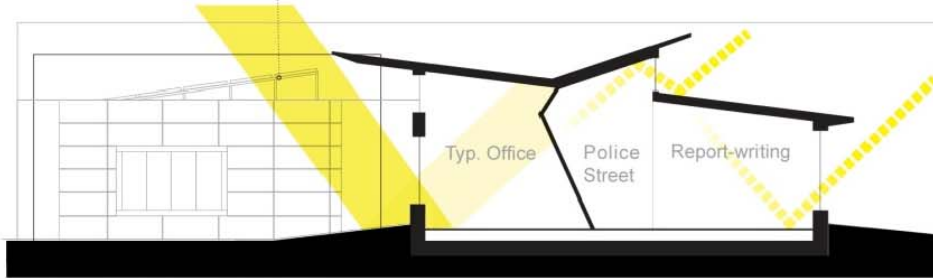
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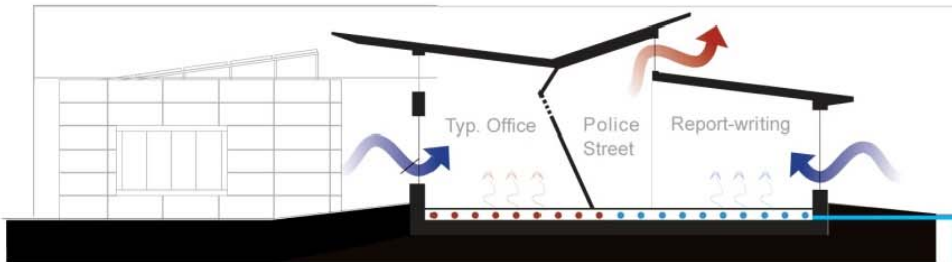
Photo Voltaic Array beyond



- Diffused northern light
- Direct southern light

Section A - Solar & Daylighting

0 5 15



- Passive ventilation
- Passive cooling
- Geothermal temperature control system in raised access floor.
- Geothermal Wells

Section A - Heating/Cooling

0 5 15



Dynamic geometry help to activate the Police Street



Police Street & Social Hub encourage chance encounters



A community icon in a rural Colorado town

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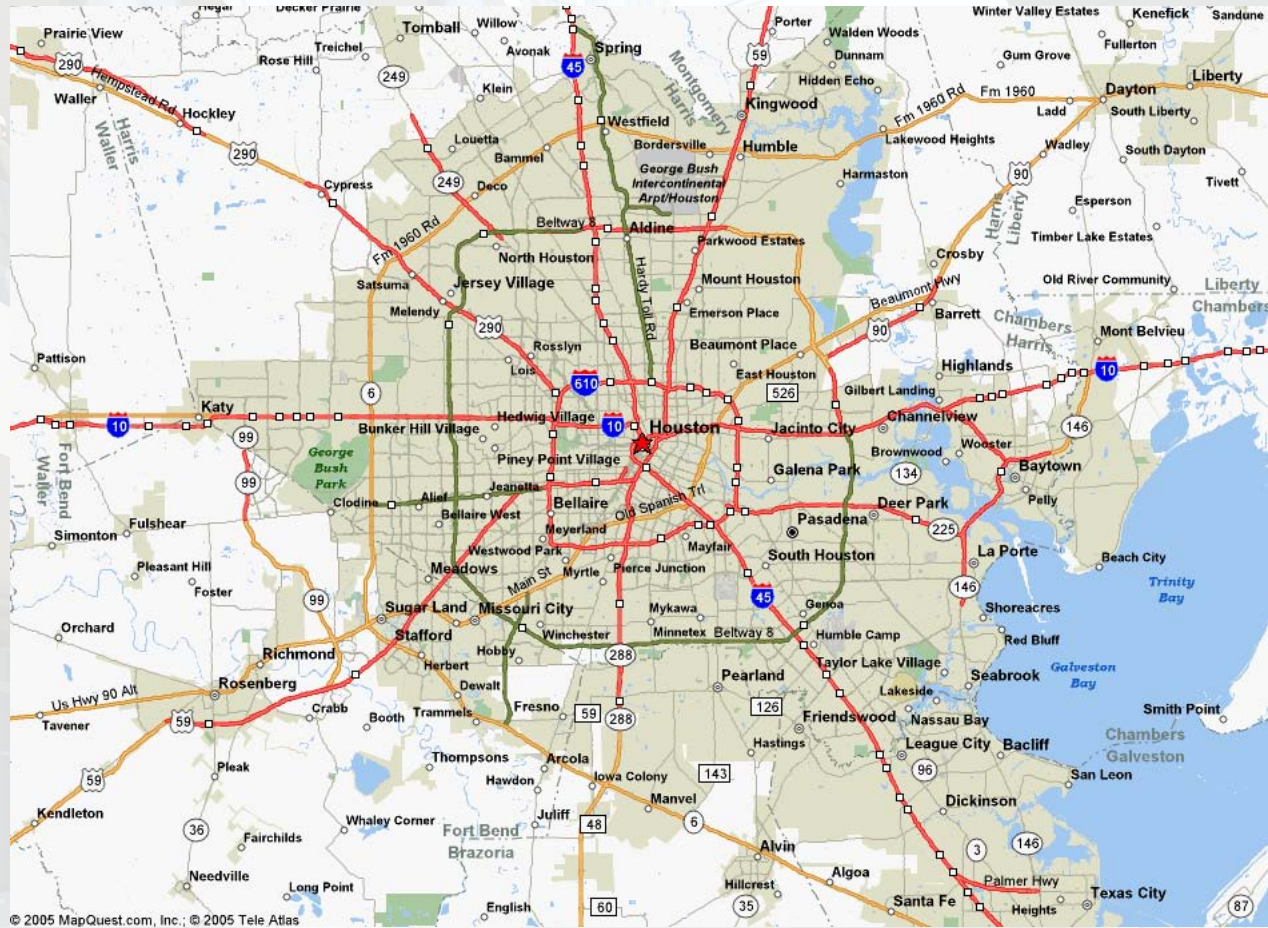
Houston Police Department – Fondren Station

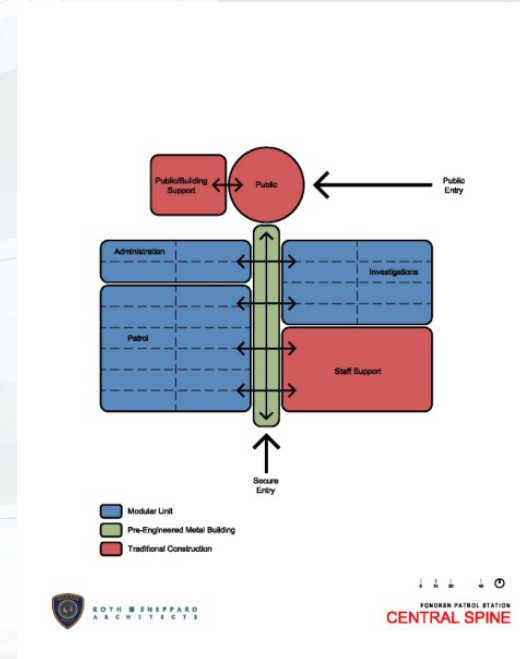
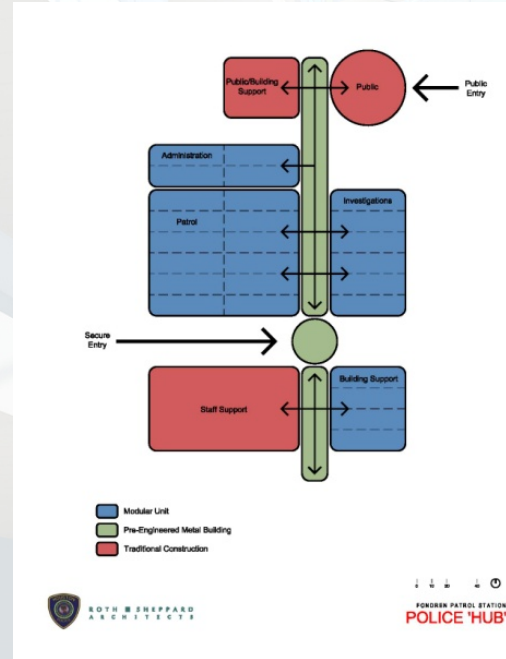
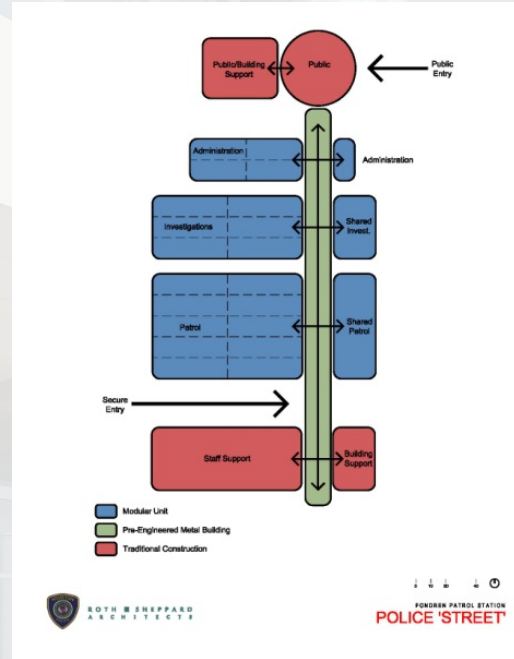
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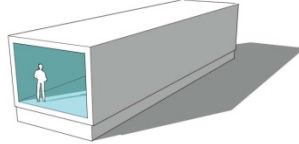


TYPICAL MODULAR UNIT

- Standard Ceiling Height 8'-0"
- Ceiling height can be as high as 10'-0"
- Max height 16'-0"
- Can meet construction types I, II, III, IV as well as all local fire codes & fire insurance requirements

LEED

- LEED Certification is available
- Reduced construction waste
- Reduced energy and water for embodied weathering
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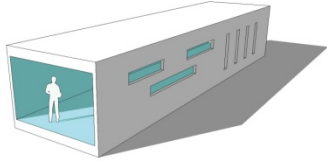
- 5 Average cost for a standard modular unit is \$200K - \$300K, but could be as high as \$400K depending on floor and column values.
(prices for concrete base and steel)



MODULAR BUILDING SYSTEMS 01

WINDOWS

- Standard window sizes vary, but the most common size is 2' x 4'
- Glass types available
- Insulated or double-paneled
- Single or multiple glazing units, with lower loading
- Custom window coverings
- What are all the window size options available?
- What are the wall options for large window openings?
- Windows are horizontal, can they be placed vertically in the wall? Can they overlap each other?



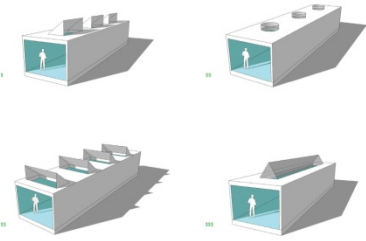
- 5 Additional standard windows are a relatively minor cost increase



MODULAR BUILDING SYSTEMS 02

ROOF & SKYLIGHT OPTIONS

- Skylights can be integrated into the framing
- Size and quantity are dependent on framing
- Skylights can be integrated into the framing
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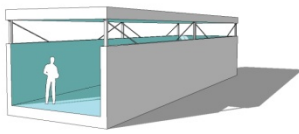
- 5 Skylights are an upgrade to the base unit cost



MODULAR BUILDING SYSTEMS 07

CLERESTORY OPTION B

- Clerestory windows can be added on all sides
- Additional steel bracing may be required
- Clerestory for window internal areas where public view is to be minimized
- Additional lateral bracing required
- How to lateral bracing addressed with secondary structural? Can they be accommodated in the primary structure? If not, can lateral bracing be integrated in the secondary?
- Will lateral bracing be used for roof, clerestory, or elevation?
- If there are multiple of a steel frame, can connect connections be used to focus on bracing?



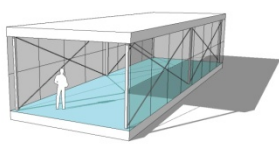
- 5 Depends on framing requirements & extent of glazing



MODULAR BUILDING SYSTEMS 04

CURTAIN WALL

- Plans to adding curtain wall can be integrated into a secondary structural frame
- Curtain wall can be added to any corner wall
- Units are integrated with existing framing which is structural steel
- Full-height windows are full-height
- Unobstructed views with maximum daylight
- Lateral bracing would be required between intermediate columns



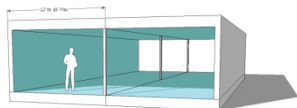
- 5 Cost increase for full-height glazing and lateral bracing
- 5 Increased mechanical capacity



MODULAR BUILDING SYSTEMS 05

TYPICAL MODULAR CONNECTION

- Clear span limits depend on use of steel or steel members
 - Modular truss lines in floors, walls and ceilings can be virtually minimized
 - Flooring can be continuous across multiple units
 - Maximum area for open plan workstation configuration and flexibility
 - Opportunities for borrowed light
 - Potential intermediate columns
 - Semi-visible truss lines
7. At unit scale level, is there only one column at the ends or will multiple columns be required for an intersecting at one point?



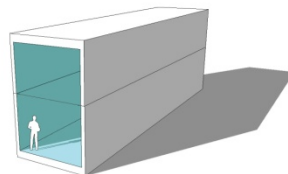
9 Maximizing open plan space versus individual



MODULAR BUILDING SYSTEMS 09

DOUBLE HEIGHT SPACE A

- Double-height volumes can be achieved with additional framing
 - Clear heights up to 20'-0" are available
 - Opportunity for secondary daylighting at interior spaces
 - Screen roofing mechanical equipment
7. What is the extent of lateral bracing needed at the ends of a two-story volume, if any? Is the design for the components included in the overall unit design?
8. Are intermediate bracing required? How are the units shipped? What is the extent of the temporary bracing? What is the cost impact?



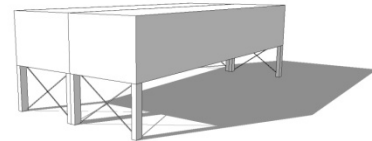
55 Added cost of up-sizing of farming members



MODULAR BUILDING SYSTEMS 10

RAISED STRUCTURE

- Modules can be raised above parking
 - Units can be set on a structural frame or slab
 - Allows for covered petrol vehicle parking
 - Reduced heat-island effect from parking areas
 - Reduce stormwater detention capacity
 - Addition of vertical circulation
 - Structural frame by others
- 7 What is the highest fire rating that can be achieved at the floor assembly?
- 8 Can lights be installed on the underside as part of the modular unit? Or is this work provided by others?
- 9 What is the added cost to install modular units on



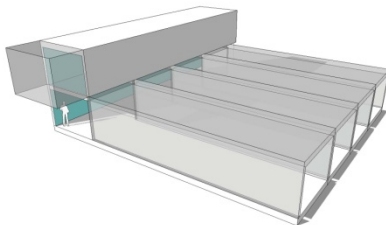
105 Added cost of structural frame



FORGREN PATROL STATION
MODULAR BUILDING SYSTEMS 13

DOUBLE HEIGHT SPACE B

- Upper level units can be self perpendicular to achieve higher volumes for circulation areas
 - Opportunity for clerestory daylighting at circulation zones
 - Screen rooftop mechanical equipment
 - Opportunity to incorporate passive ventilation in circulation zones
 - Added volume of space to be conditioned
 - HVAC, plumbing and electrical system distribution will require re-design
- 7 Can upper level units be conditioned off the lower level units?
- 7 How is the framing configured in the overlap of the units? Where will columns and beams be required? How is lateral bracing configured?
- 7 Will a double-height volume be created, similar in detail patterns (if provided) as part of the overall design?



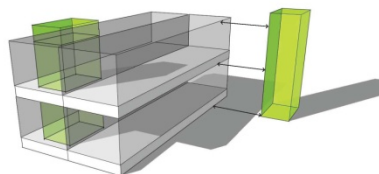
55 Added cost of upgrading of farming members



FONDREN PATROL STATION
MODULAR BUILDING SYSTEMS 11

TWO-STORY MODULES

- Units can be stacked for multiple levels via cores
- Vertical circulation can be located inside or outside the modular units depending on dimension limitations
- Elevator shafts can be built inside the units, but not others. The elevator components are provided by others
- Interior or exterior stairs can be included with the unit design
- Reduce site building footprint
- Reduce exposed roof (reduced heat gain)
- Vertical circulation cost
- Vertical circulation is added



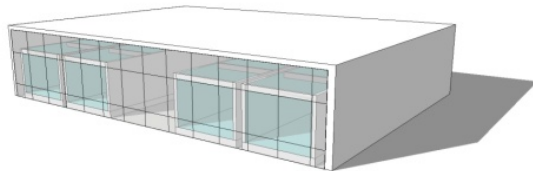
Two-story modules add cost for additional



FONDREN PATROL STATION
MODULAR BUILDING SYSTEMS 12

HYBRID A - PRE ENGINEERED & MODULAR

- Modular "village" can be configured under a large shell structure
- Open circulation between units
- Simplified modular construction - no thermal or moisture considerations
- Can remove modular roofs at work areas to allow for openings into larger shell volume
- Singular shell building, possibly pre-engineered
- Shell structure, if pre-engineered, available through TSMAS
- More volume to condition for mechanical systems
- Building within a building
- 1 Can units be towed into larger shell structure?
- 2 Can they be set in place prior to roof framing installation?



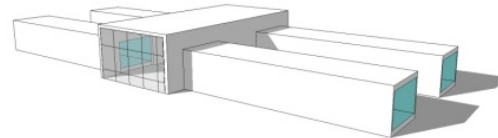
15 Cost of shell structure and modules



FOUNDSER PATROL STATION
MODULAR BUILDING SYSTEMS 14
28 APRIL 2008

HYBRID B - PRE ENGINEERED & MODULAR

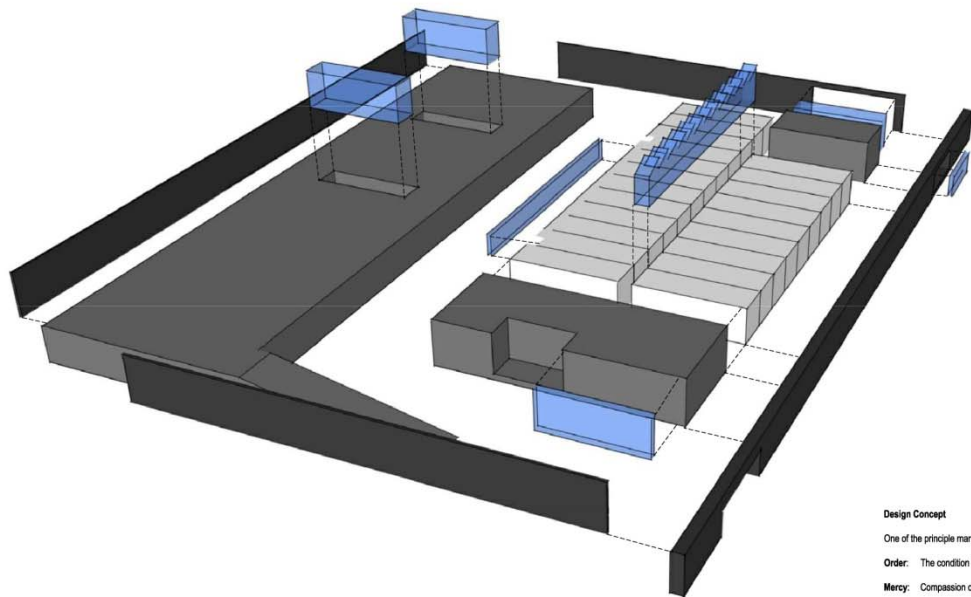
- Modular components can be "plugged" into a pre-engineered structure
- Allow for later circulation spaces
- Singular shell building, possibly pre-engineered
- If pre-engineered, available through TSMAS
- More volume to condition for mechanical systems
- 1 Confirm who is responsible for building envelope closure at the interface between modular units and other construction?



15 Cost of shell structure and modules



FOUNDSER PATROL STATION
MODULAR BUILDING SYSTEMS 15
28 APRIL 2008



'ORDER THROUGH LAW, JUSTICE WITH MERCY'

Design Concept

One of the principle mantras for the HPO is 'order through law, justice with mercy.'

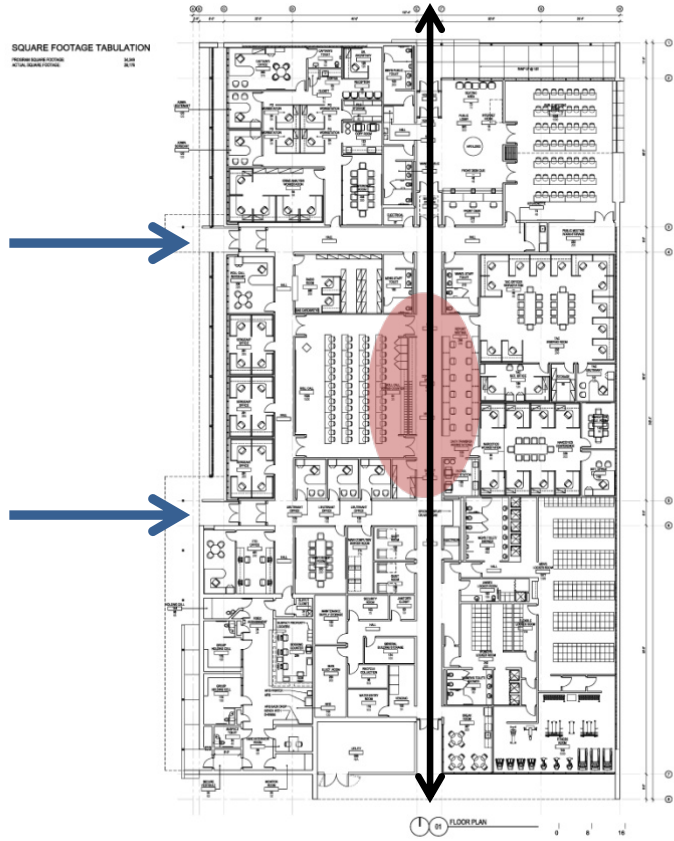
Order: The condition in which every part, unit, etc. is in its right place; tidiness, sequence, succession.

Mercy: Compassion or forbearance shown to enemies or offender's in ones power.

From this mantra, the building concept is defined. The simple, rational building geometries speak to the notion of order through the expression of the building module, and the modular sub-components, in a clean, modern language. This ordered approach is also a direct contextual response to the chaotic, haphazard suburban conditions around the site. The notion of mercy is recalled at respite zones for both the public and secure Police areas of the building.

The public side where 'order' is established, is represented by the solidity and rhythm of the concrete wall which acts as a protective barrier on the street. Mercy/respite areas occur at the public entry and lobby where the solid, protective barrier is relieved by a light and transparent glass curtain wall. Through the lobby, the Police 'street' beyond acts as the interior respite zone. At the Police secure entry court, the ordered solidity of the protective barrier is completely broken down by the linear window wall to reveal the internal functions of the Patrol component, the hub of the interior organization. This central respite zone links the building to the secure parking garage and creates a sense of entry for Police personnel.

The majority of the remaining facades consist of a scrim wall which continues the notion of order through the rhythm of the vertical components. The scrim continues around to form the parking garage walls and also acts as the primary security line for the site. The full extent of the structured parking is still to be determined by the City of Houston and the Houston Police Department.



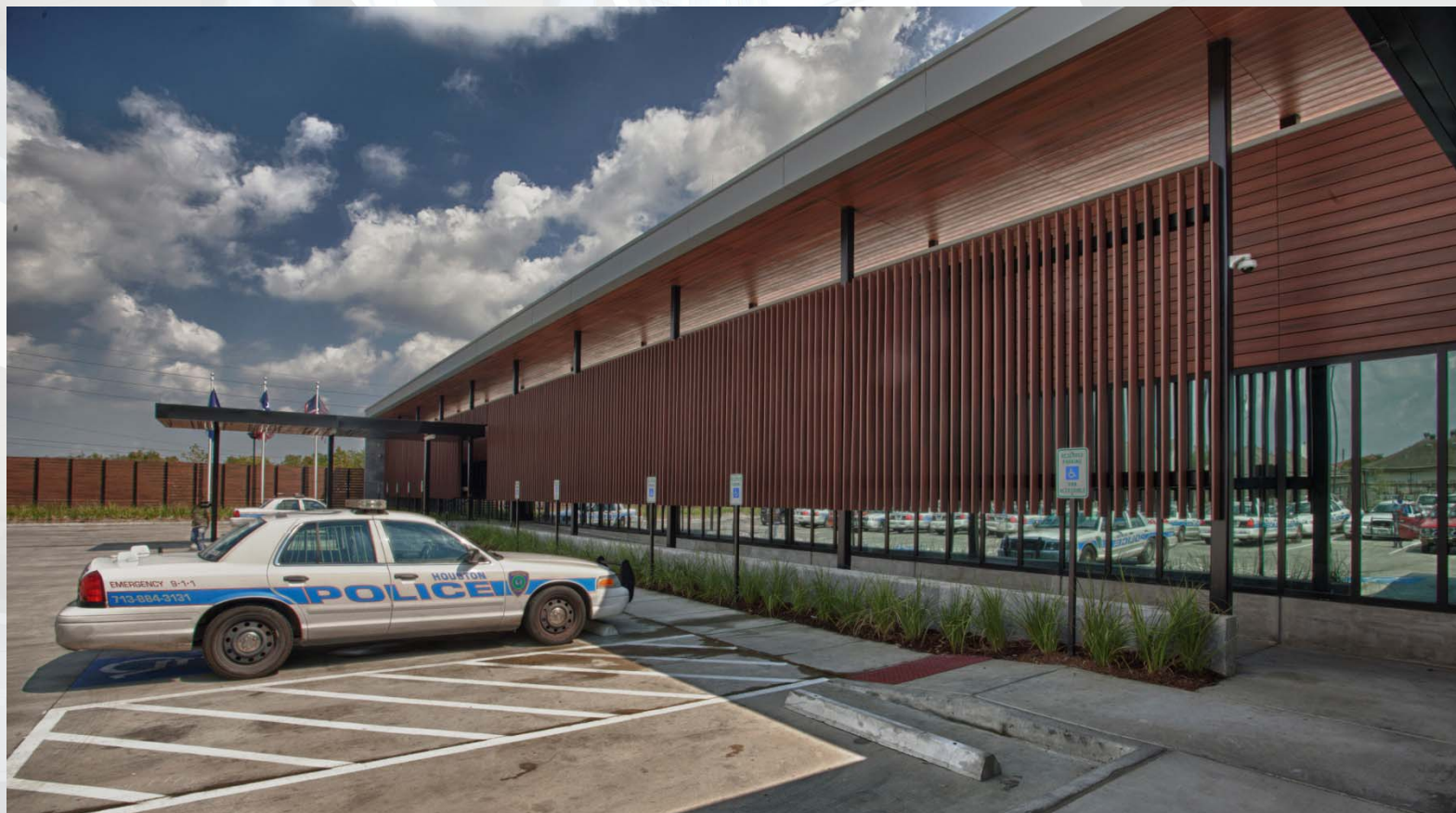


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