

# PROPOSED STATION EXPANSION

Manchester Fire Department



December 15, 2020



*Presented by:*

**HHDR**  
CONSULTANTS

*In Association with:*

**IOWA**  
CIVIL & ENVIRONMENTAL  
ENGINEERING





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# Manchester Fire Department

Client



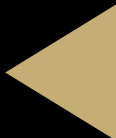
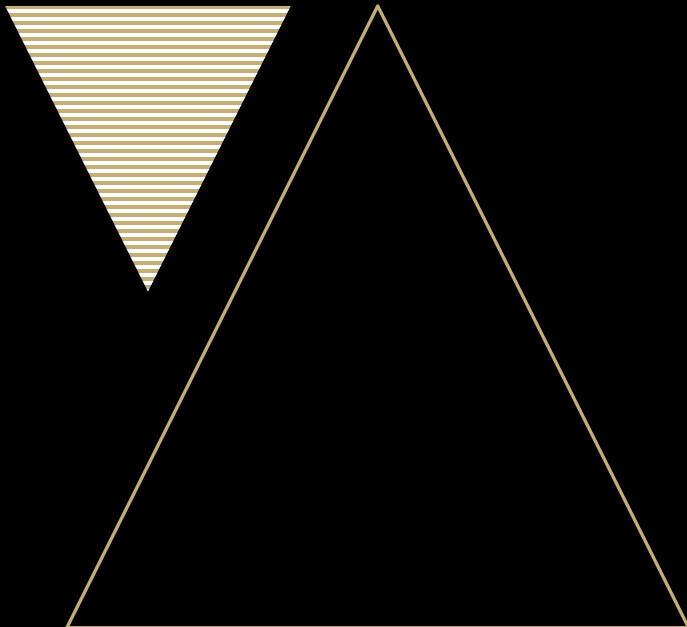
HHDR  
CONSULTANTS

Project Map

Project Scope

Solutions

Cost Estimations



Existing parking lot

Empty lot requires grading and paving

Possible locations for new storage facility

# Project Scope

- ▶ Design a new storage facility
- ▶ Expand parking lot and maximize parking capacity
- ▶ Design site and grading





Existing oak tree on empty lot

# Constraints

- ▶ Existing oak tree
- ▶ Setback limit
- ▶ Generator

# Challenges

- ▶ Meeting storage requirements
- ▶ Maximizing parking
- ▶ Minimizing cost
- ▶ Connecting utilities



View of generator facing north

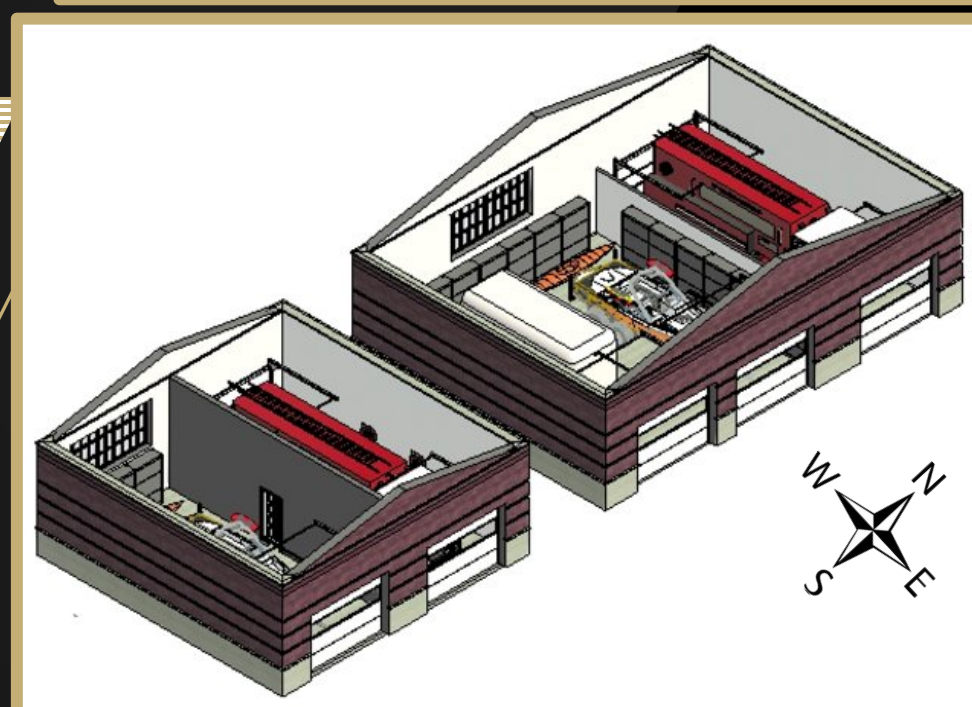
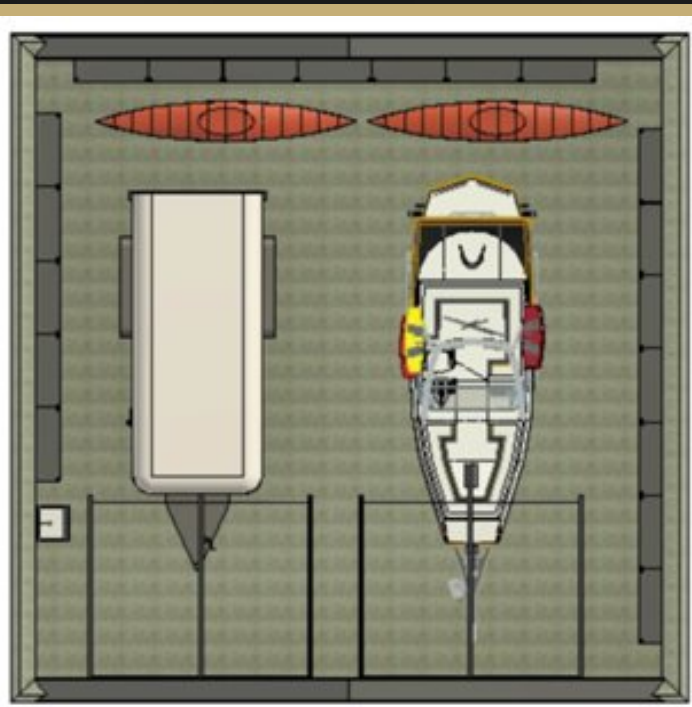
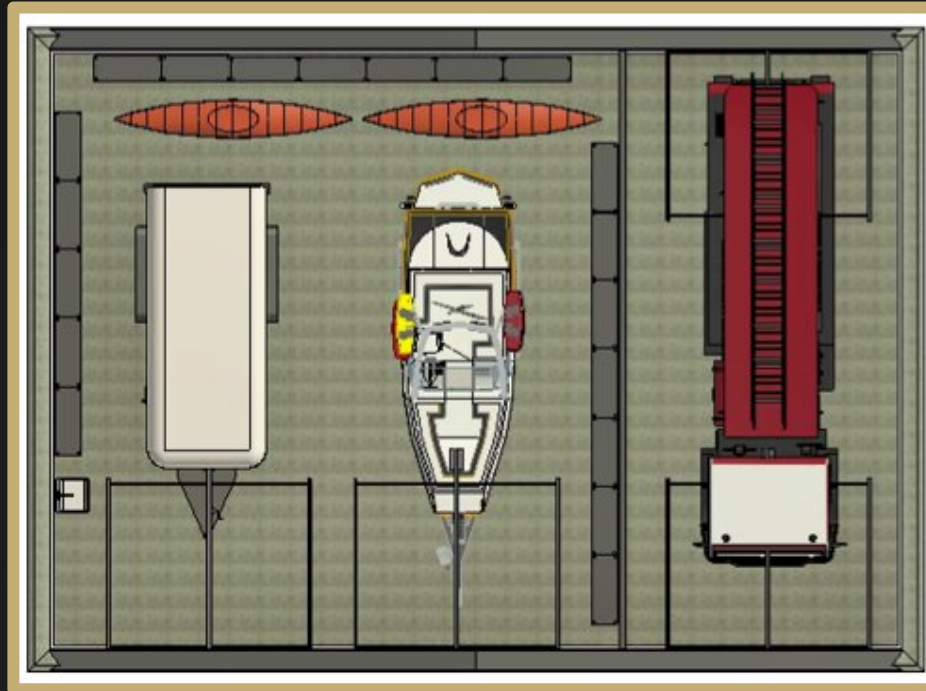


View of generator facing west

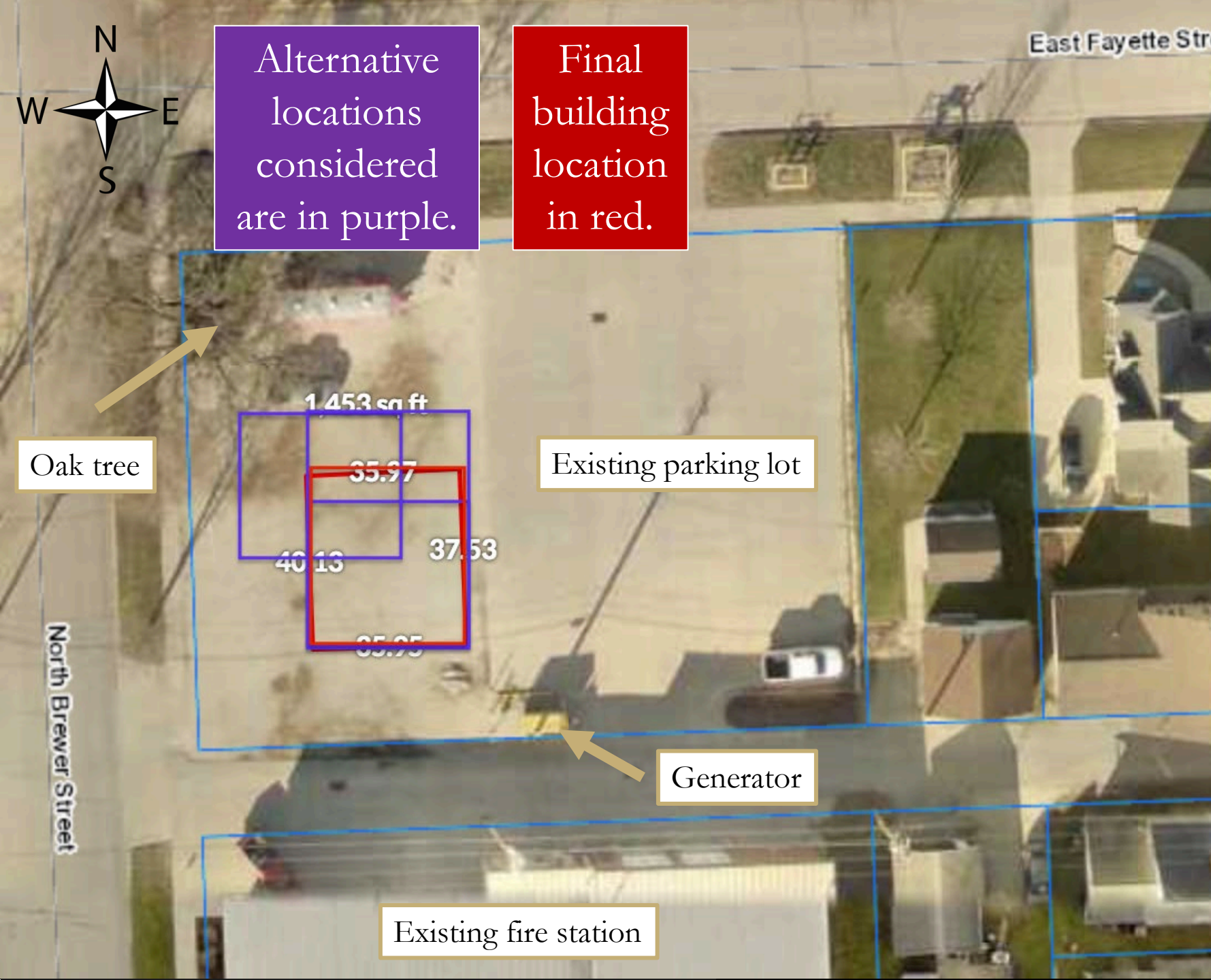
# Alternative Building Designs

36'x49' option  
**with** wash bay

36'x36' option  
**without** wash bay



- ▶ Considered multiple buildings layouts including an option with a wash bay
- ▶ Considered different building locations to maximize parking
- ▶ Final design is a 36'x40' structure



Alternative locations considered are in purple.

Final building location in red.

Oak tree

Existing parking lot

Generator

Existing fire station

# Alternative Storage Building Locations

- Considered different building locations to maximize parking
- Final design is a 36'x40' structure outlined by the red rectangle

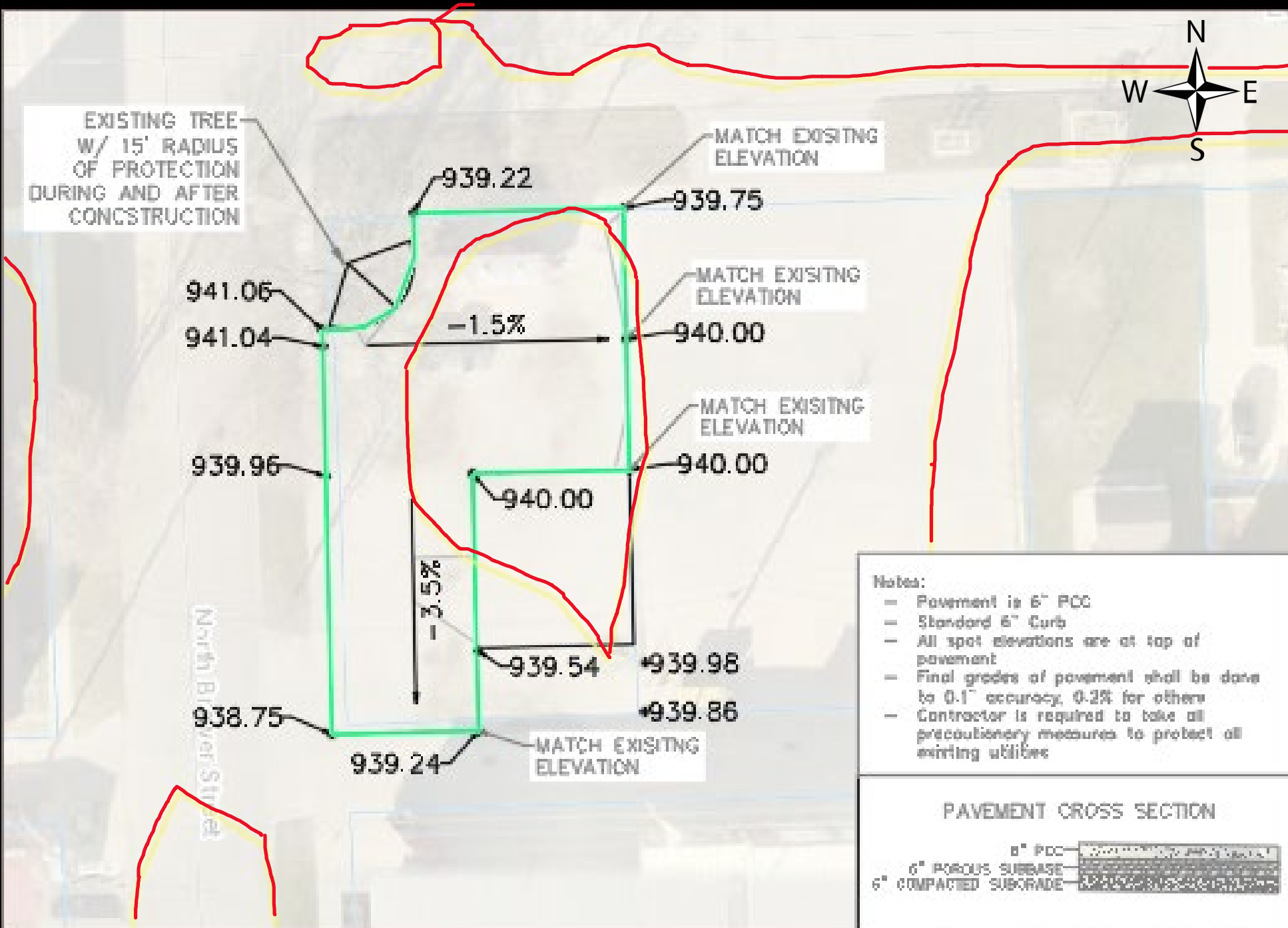


# Site Design

- ▶ Parking surfacing
- ▶ Parking layout
- ▶ Utilities



# Parking Surface



- ▶ New surface matches up to existing parking surface and alley elevations
- ▶ Designed with Civil 3D

# Parking Layout

EXISTING TREE  
W/ 15' RADIUS  
OF PROTECTION

PARKING:  
WASHBAY  
NOT INCLUDED  
-14 STALLS  
-2 ADA ACCESSIBLE

INDICATES  
SWEEP PATH

North Brewer

POTENTIAL WASHBAY  
LOCATION

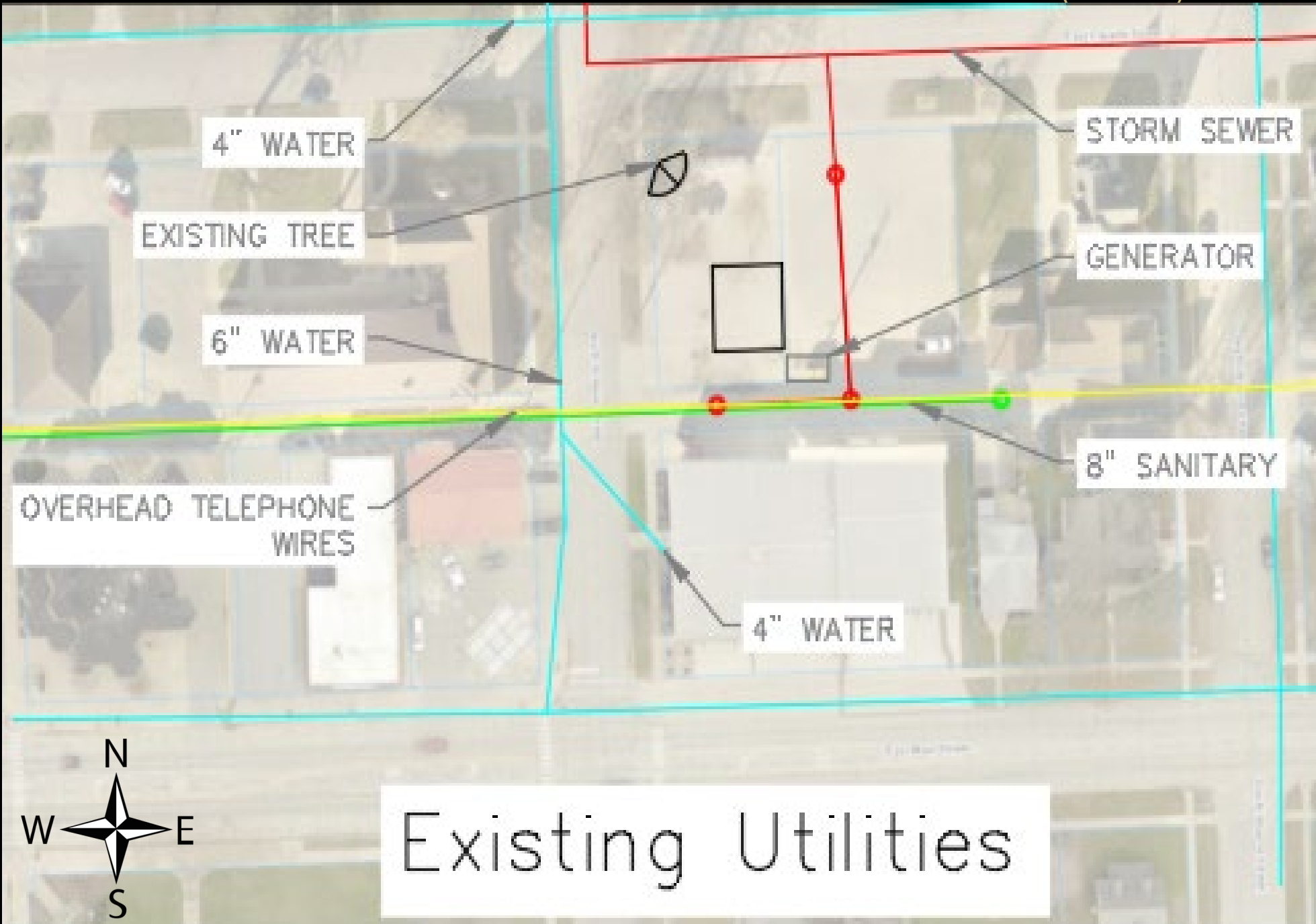
PARKING:  
WASHBAY INCLUDED  
-13 STALLS  
-2 ADA ACCESSIBLE

North Brewer Street

- ▶ Without wash bay:
  - ▶ 28 total stalls, 14 new
  - ▶ 2 ADA accessible
- ▶ With wash bay:
  - ▶ 27 total stalls, 13 new
  - ▶ 2 ADA accessible
- ▶ Designed in Civil 3D

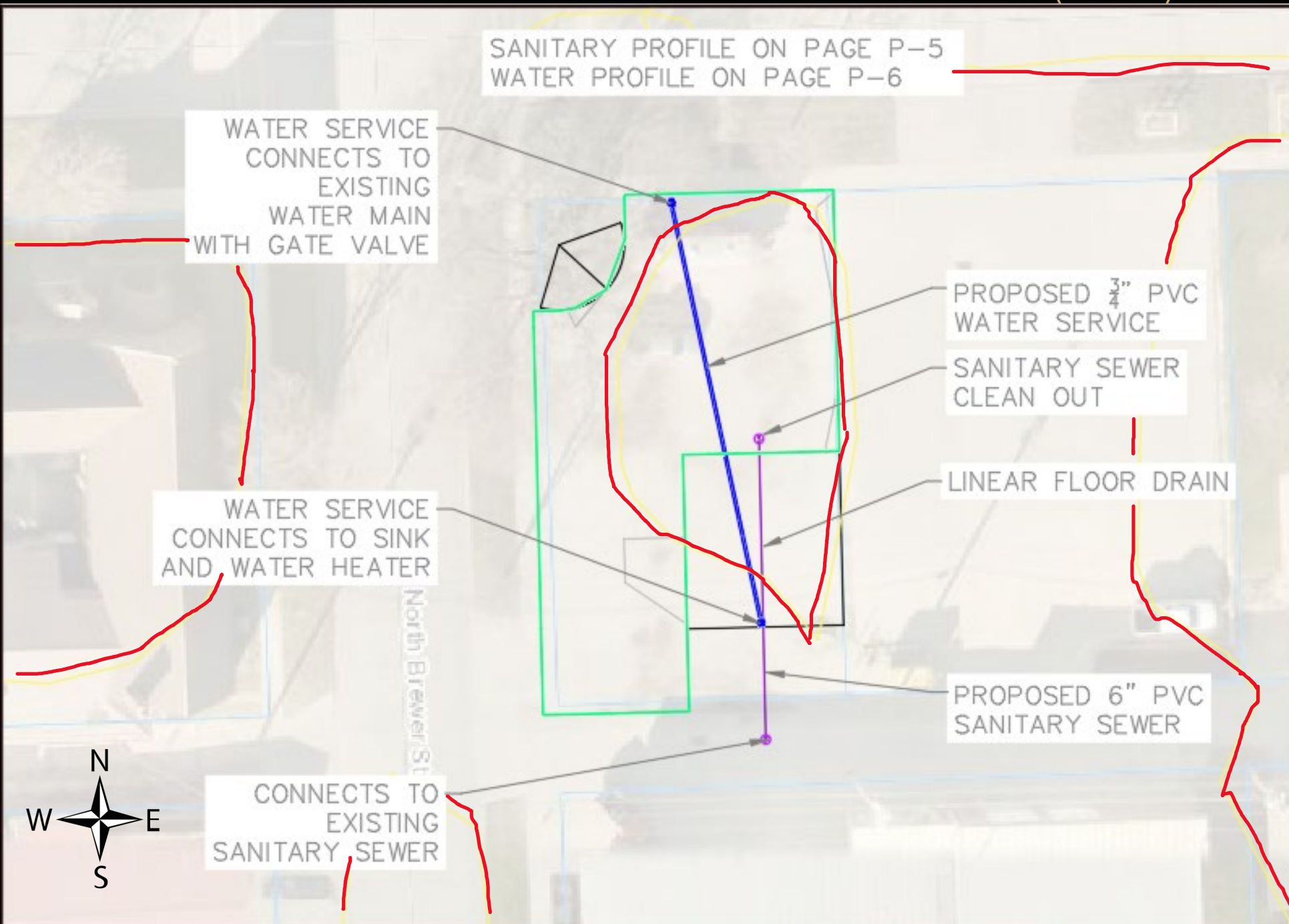


# Existing Utilities



- ▶ Existing utilities must be connected to new storage facility
- ▶ Designed using Civil 3D

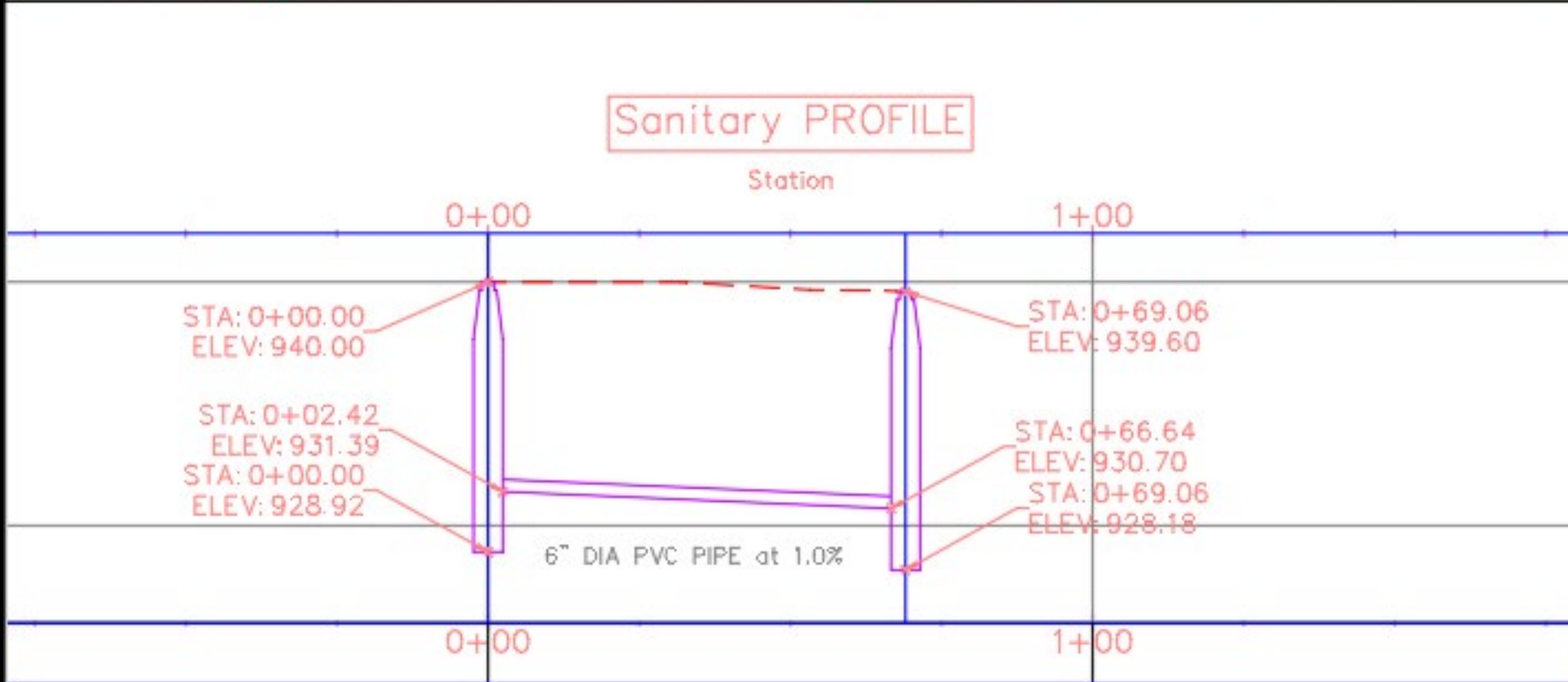
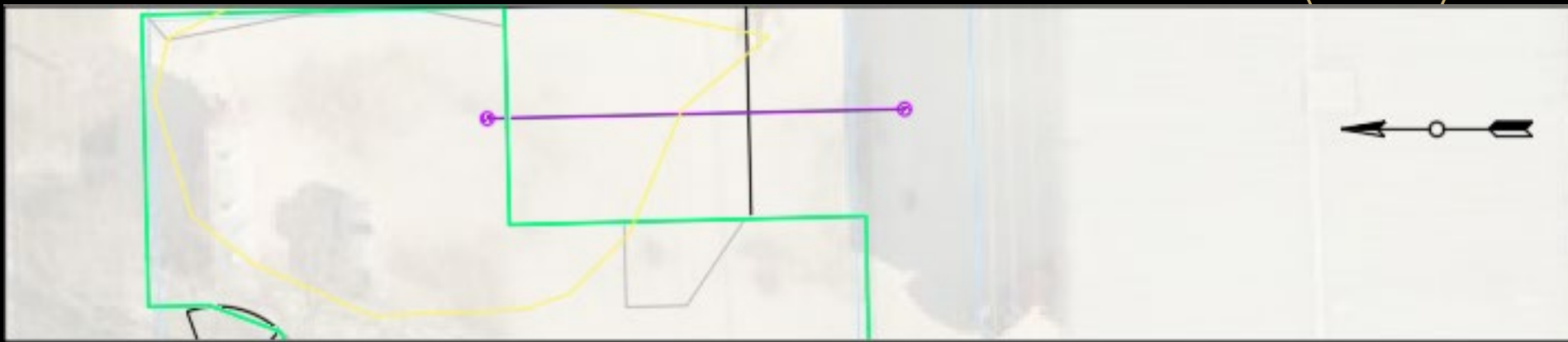
# Propose Utilities



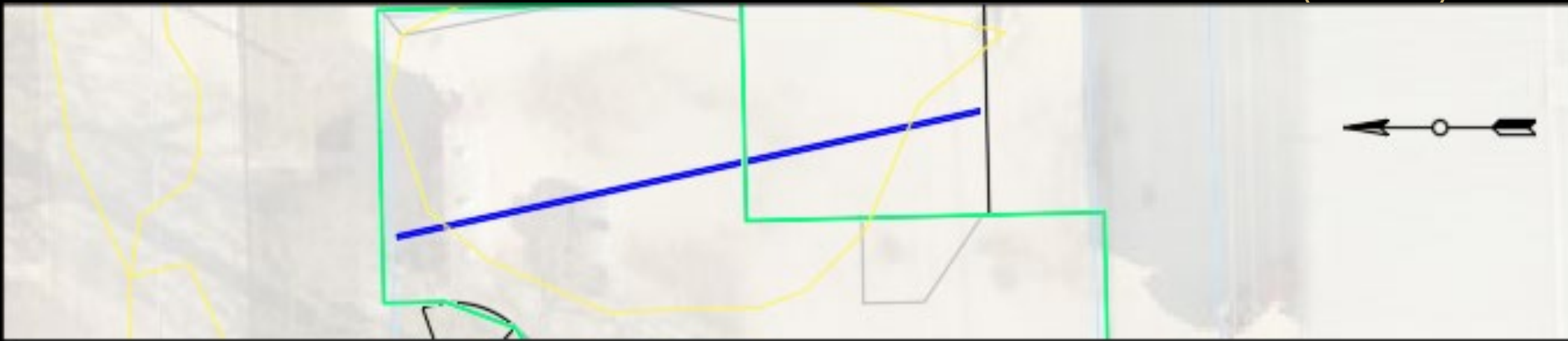
- ▶ Water service by  $\frac{3}{4}$ " PVC pipe
- ▶ Sanitary sewer:
  - ▶ 6" PVC pipe
  - ▶ Clean out
  - ▶ Linear floor drain
- ▶ Designed in Civil 3D

# Sanitary Plan and Profile

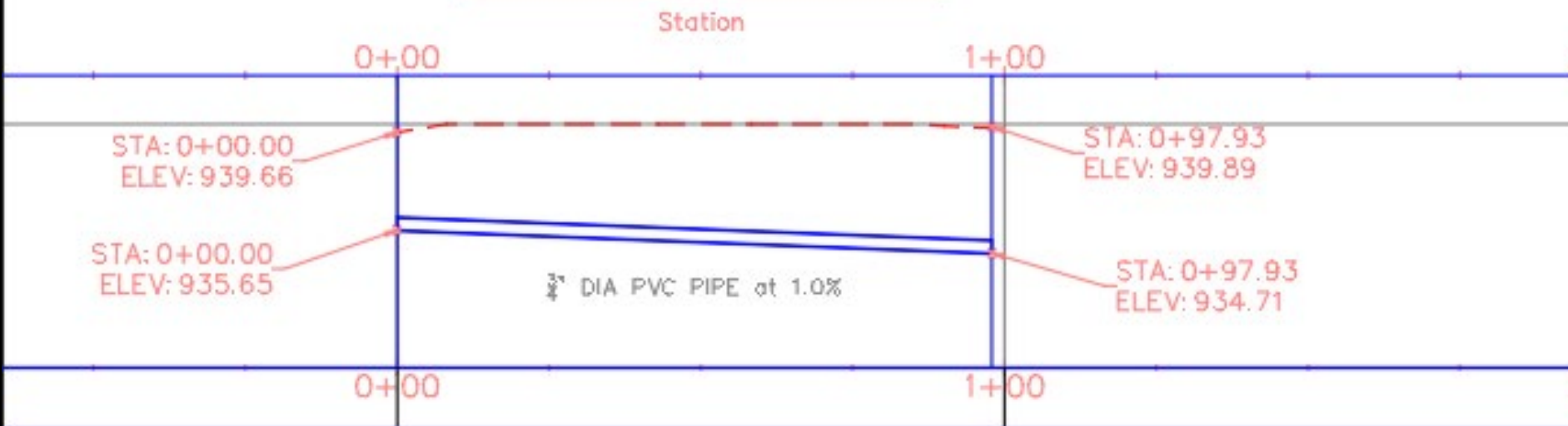
- Elevations of 6" sanitary alignment
- Designed using Civil 3D



# Water Service Plan and Profile



## Water Service PROFILE



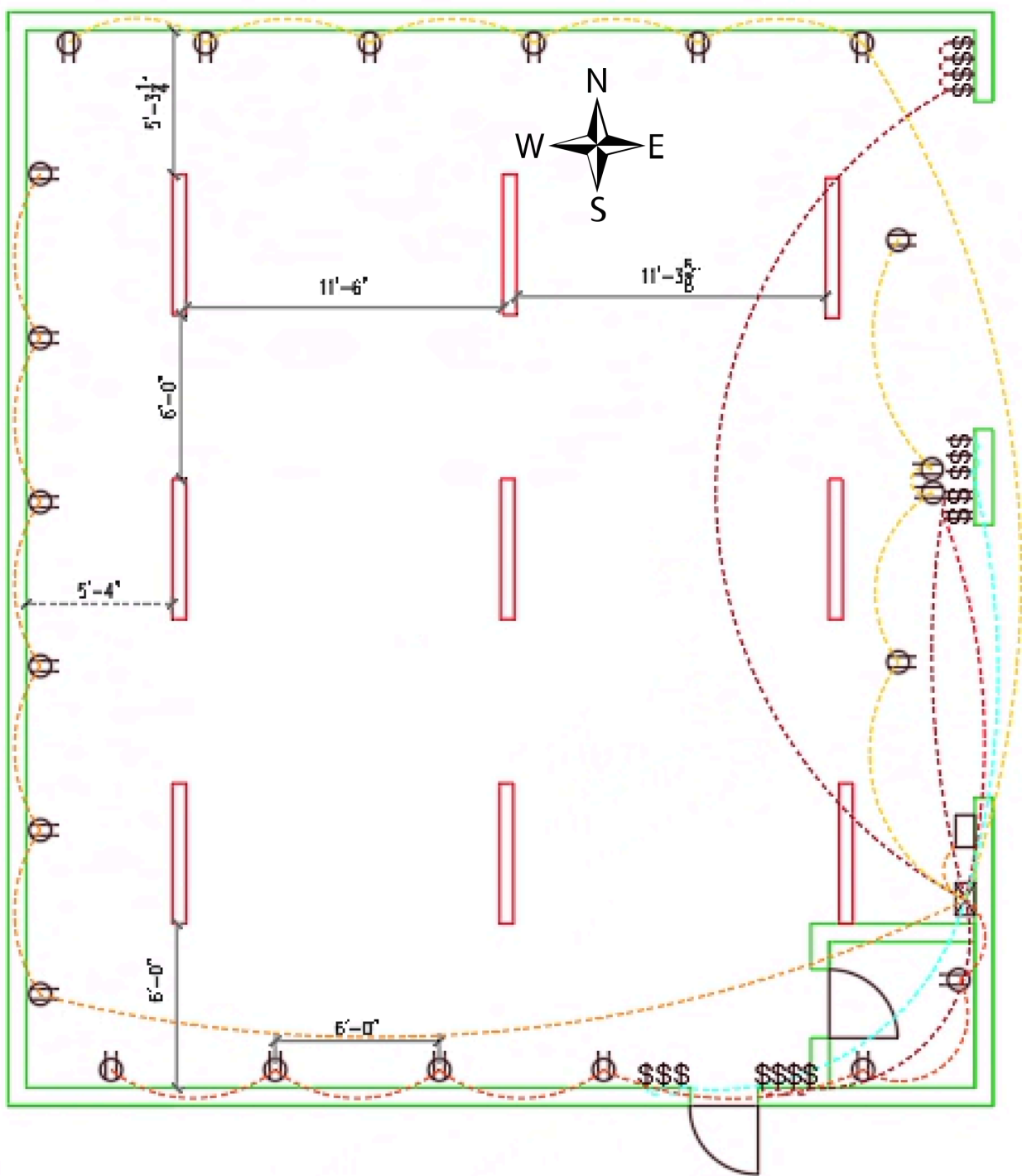
- ▶ Elevations of 3/4" water service alignment
- ▶ Designed using Civil 3D

# Heating & Electrical Design

- ▶ Duct work design
- ▶ Receptacle positioning
- ▶ Light fixture layout



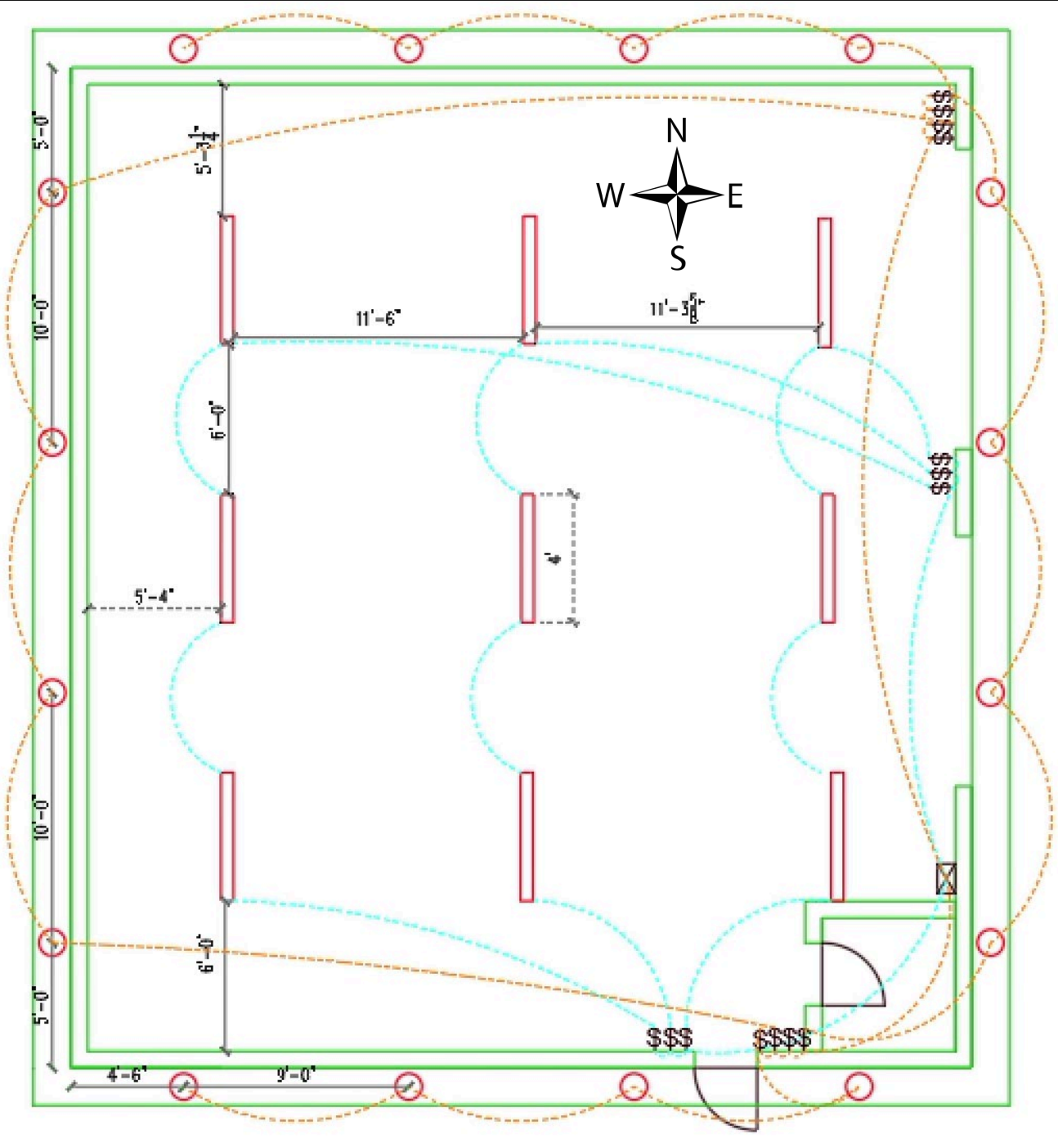




# Electrical Layout

- ▶ (22) 15-amp receptacles
- ▶ (10) 15-amp circuit breakers
- ▶ (9) LED tube light fixtures





# Lighting Layout

- ▶ (9) LED tube light fixtures
- ▶ (16) 12.5" LED dusk-to-dawn soffit lights

# Structural Design

- ▶ Roof
- ▶ Walls
- ▶ Foundation

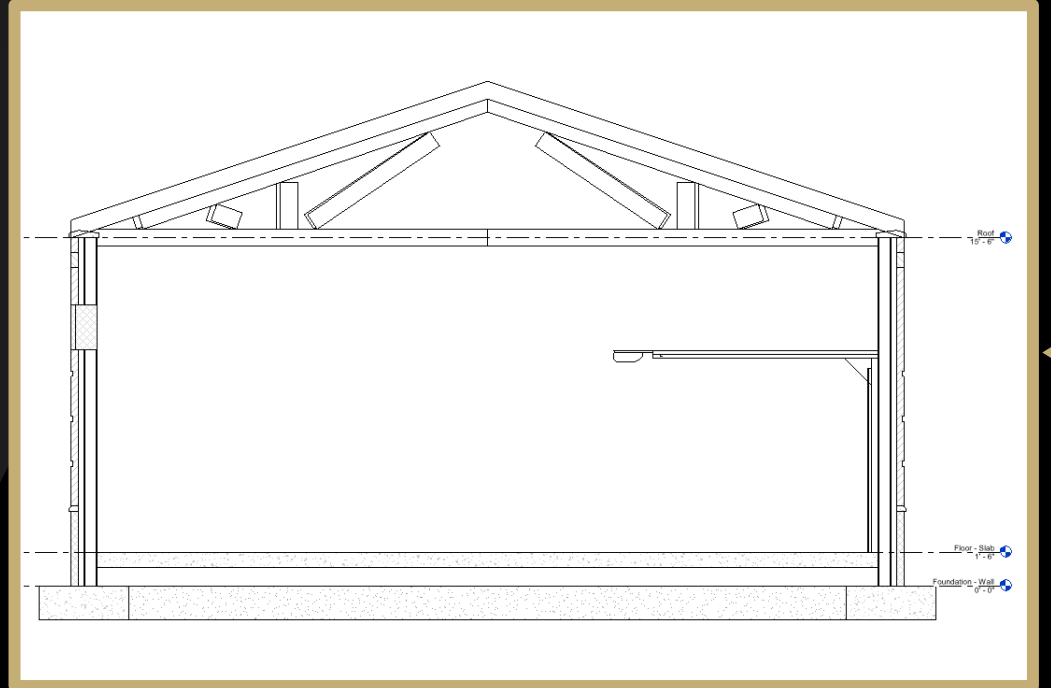


# Roof Design

36' Double fan wooden trusses

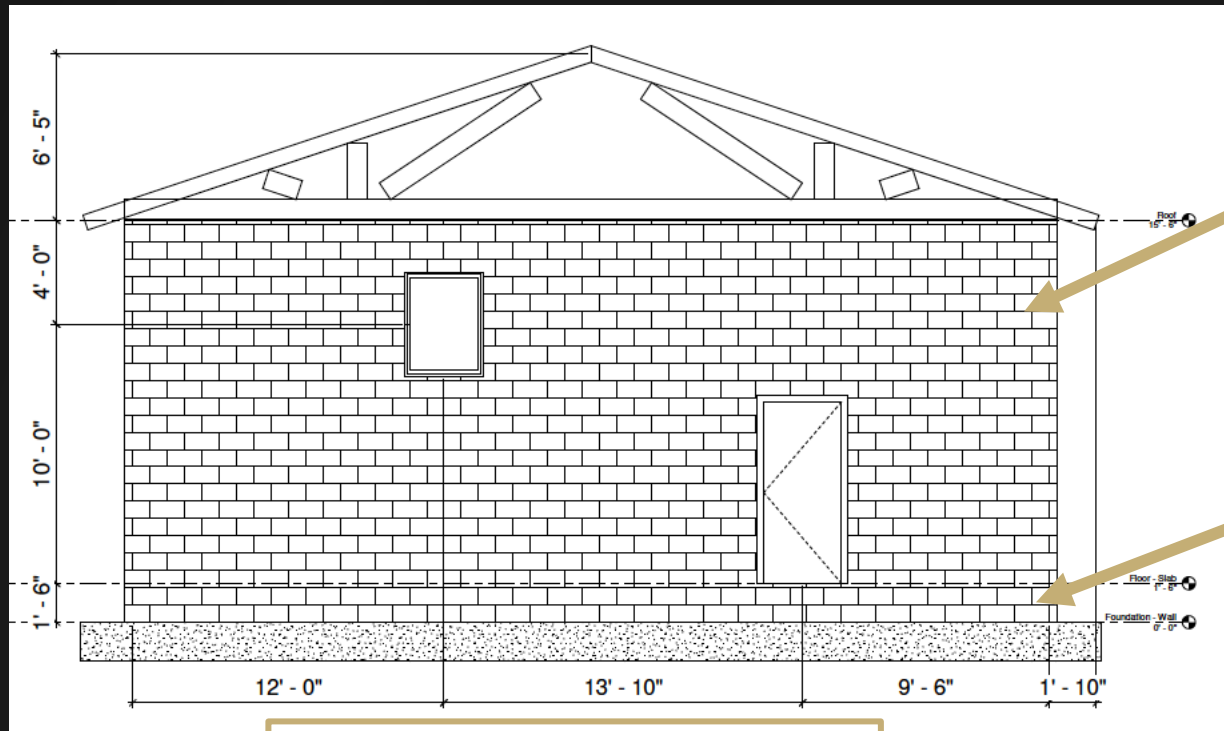


Steel roof panels with integrated insulation



East-West building cross section shows hip and gable roof at a 4:12 pitch

# Wall Design

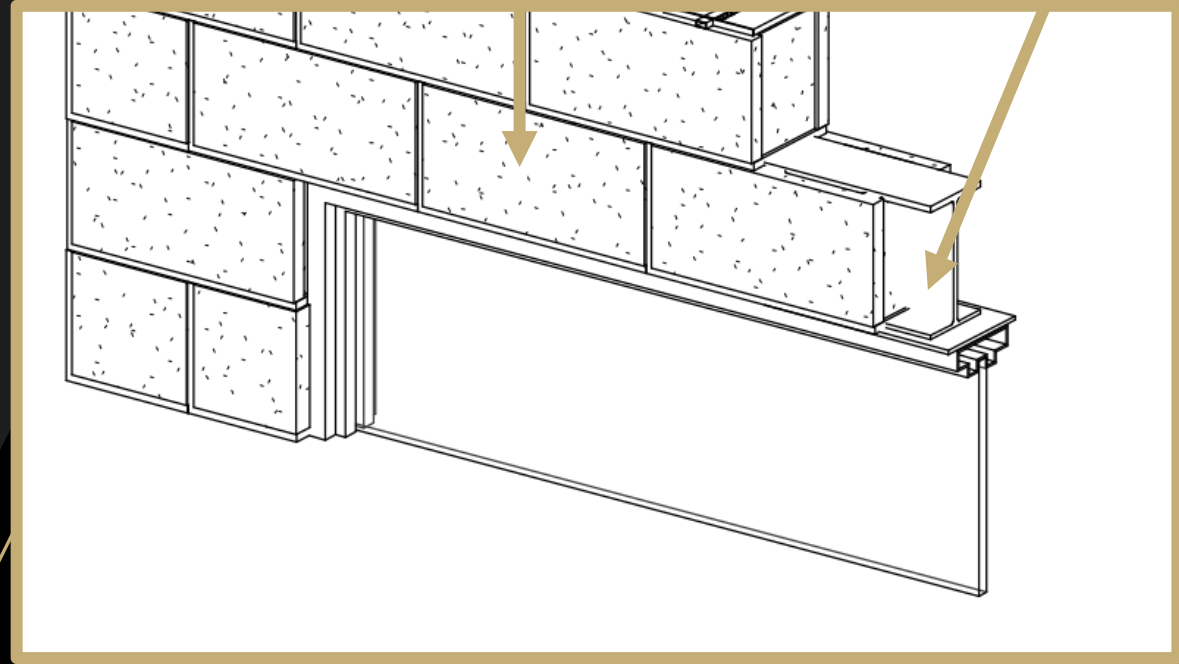


South wall elevation

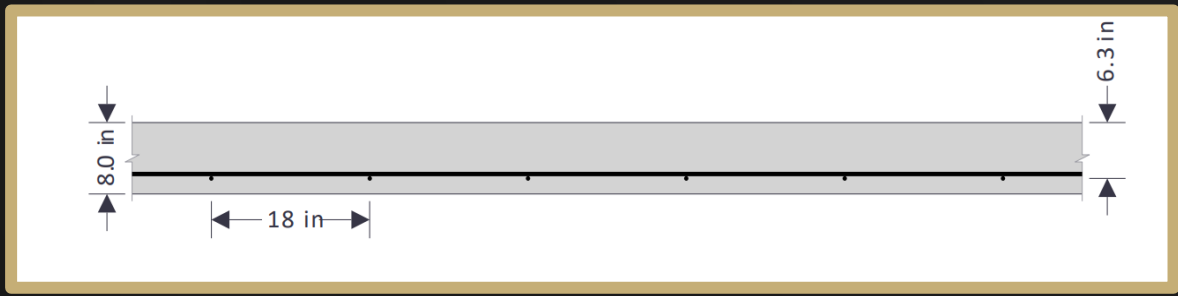
Brick facade

8"x8"x16" CMU block walls

Prefabricated steel lintels



Lintel in CMU wall detail

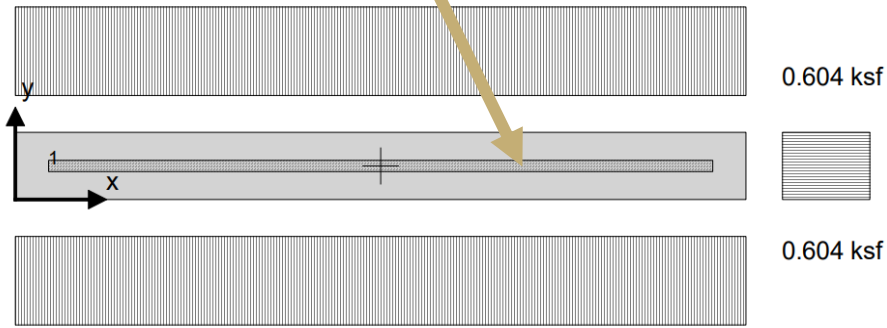


Grade 60 #4 horizontal and vertical rebar provide flexural and shear resistance

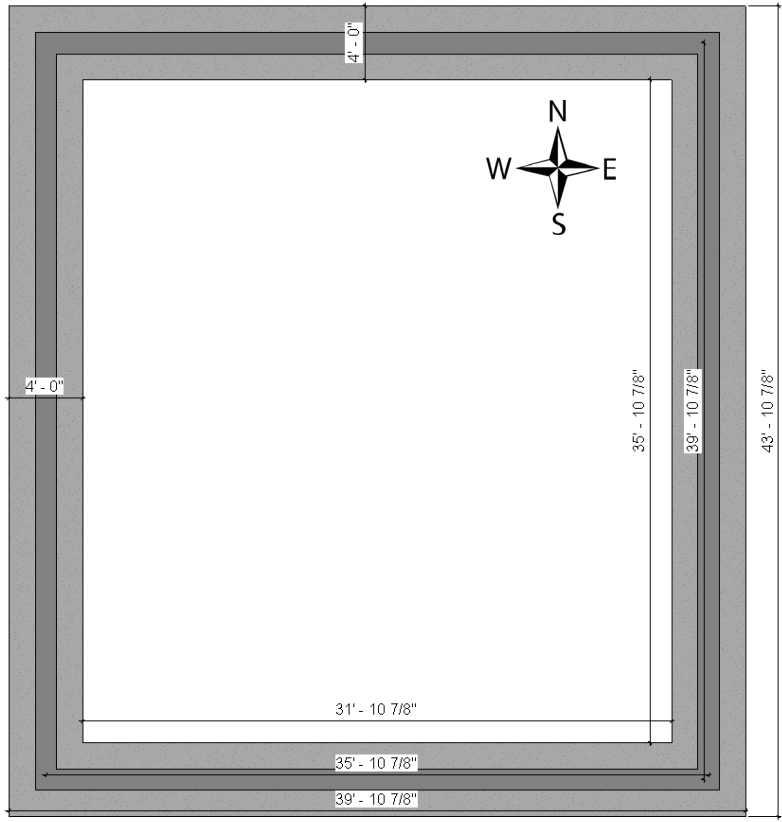
# Foundation and Footings

- ▶ Sloped 8" concrete slab-on-grade floor
- ▶ Continuous cast-in place 1.5' thick concrete footings

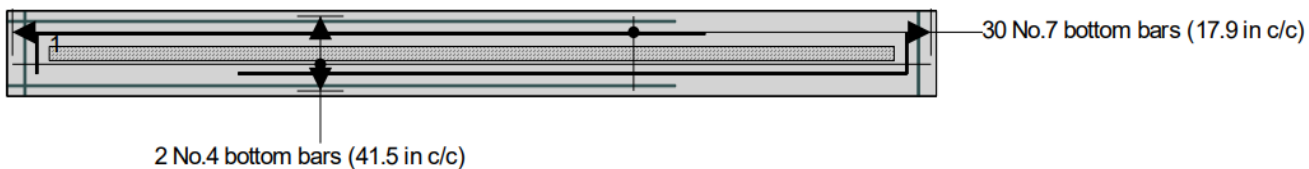
8" CMU wall



Bearing pressure on soil adjacent to footing

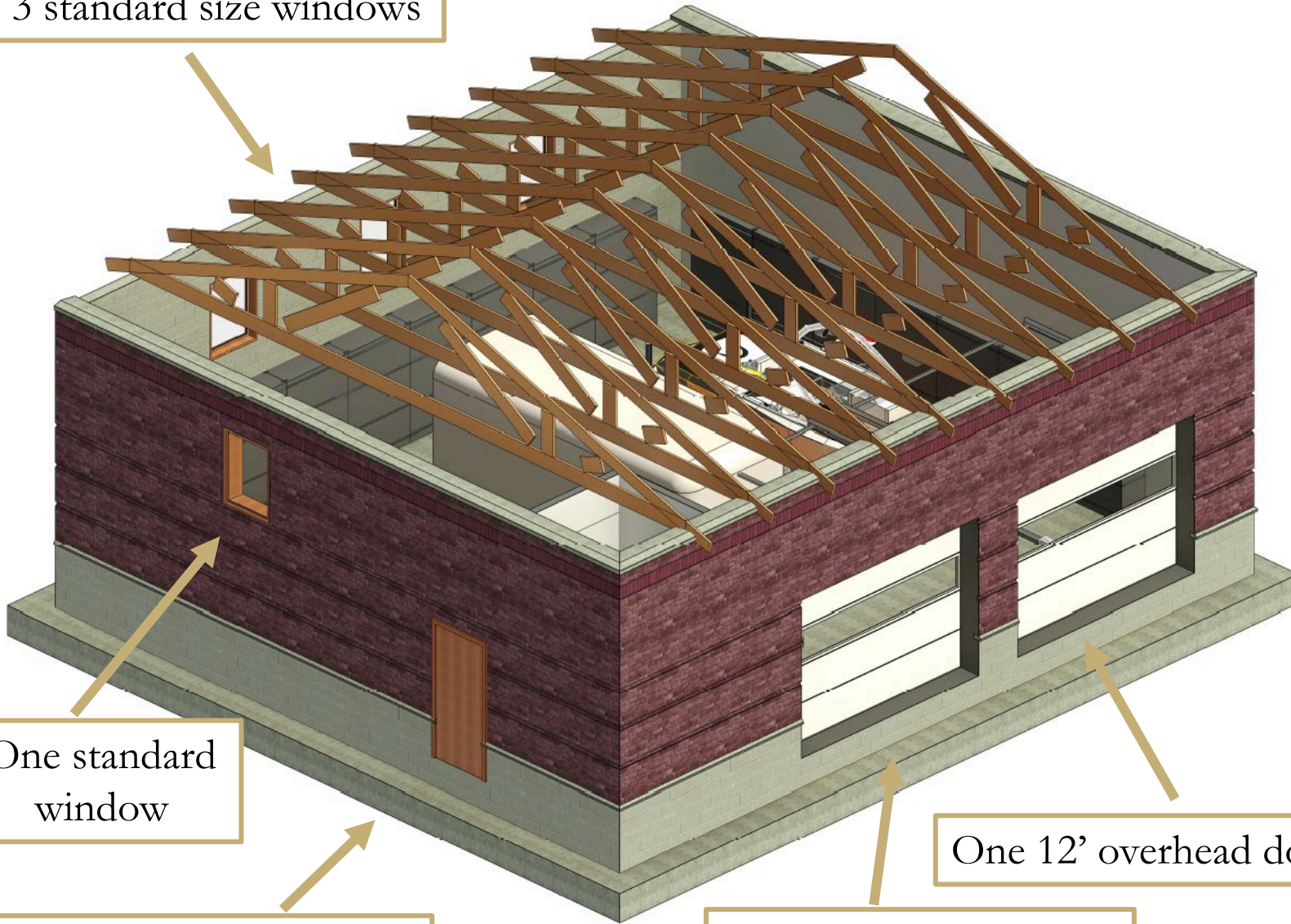


Foundation Framing Plan



Top-down perspective of rebar placement in continuous footing

3 standard size windows



One standard window

One standard entry door

One 12' overhead door

One 10' overhead door

## Other Details and Interior Finishes

- ▶ One 6'x6' utility closet in southeast corner
- ▶ Fiber reinforced plastic will line interior walls
- ▶ Concrete floors



# Construction Cost Estimate



Project	Category	Cost
Structural Design	Walls	\$36,700
	Windows and Doors	\$8,500
	Foundation and Drain	\$6,425
	Roof	\$4,200
	<b>Total Structural Costs</b>	<b>\$55,800</b>
Site Design	6" Pavement	\$23,000
	Utilities	\$2,075
	Grading	\$1,625
	<b>Total Site Costs</b>	<b>\$26,700</b>
Interior Structural Costs	Electrical	\$6,525
	Interior Finishes	\$5,525
	Heating	\$1,325
	<b>Total Interior Costs</b>	<b>\$13,400</b>
Construction Cost		\$98,000
<b>Construction Cost with O&amp;P (2020)</b>		<b>\$140,500</b>



# Construction Cost Estimate



Category	Cost
Construction Cost with O&P (2020)	\$140,500
Contingency	\$14,100
Engineering and Administration	\$28,100
<b>Total Project Cost</b>	<b>\$183,000</b>



Questions?

