

Town of Hamilton Beach Project





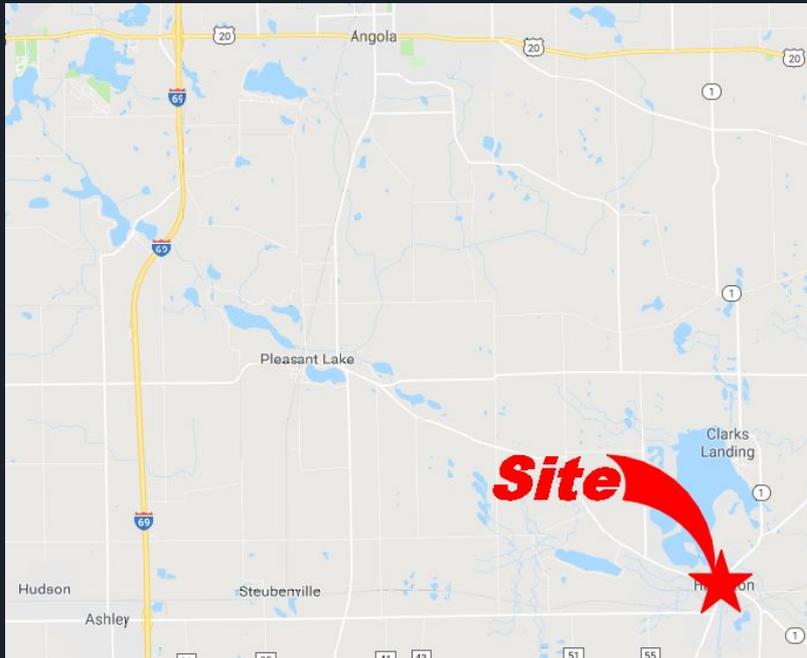
Robert Santos: Project Manager/Hydraulic Engineer

Bader ALSulaiman: Geotechnical Engineer

Yantao Liu: Structural Engineer

Cristhian A. De La Paz Olea: Transportation Engineer

Site Location



Existing Conditions & Improvements

- Improve parking lot organization
- ADA compliant



Existing Conditions & Improvements

- Provide more shade at the beach
- Provide a restroom facility



Existing Conditions & Improvements

- Provide a safe travel path by foot to Capt’N Pete’s Dairy Dock, LLC (Ice Cream Shop)



Existing Conditions & Improvements

- Incorporate sustainable components in the new designs





Development Advantages

- Promote & Target
 - Social growth
 - Economic Growth
 - Environmental Aspects
 - Ease of accessibility
 - Pleasurable Experience

Topographic Survey & Base Map

- 2 Separate Surveys
- Total size: 2 Acres
- Approximate # of Points: 350
- 2017 APEX Consulting & Surveying, INC.



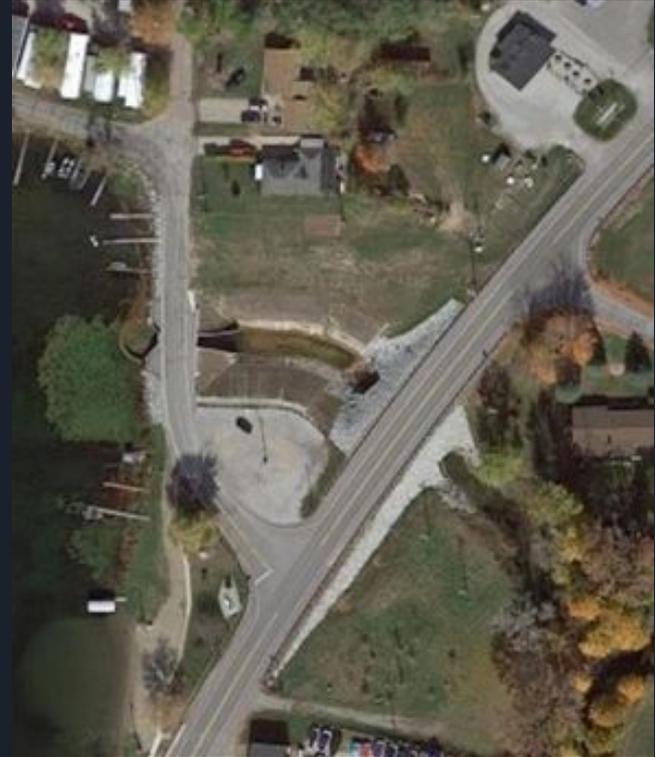
Base Map



Traffic Data Analysis

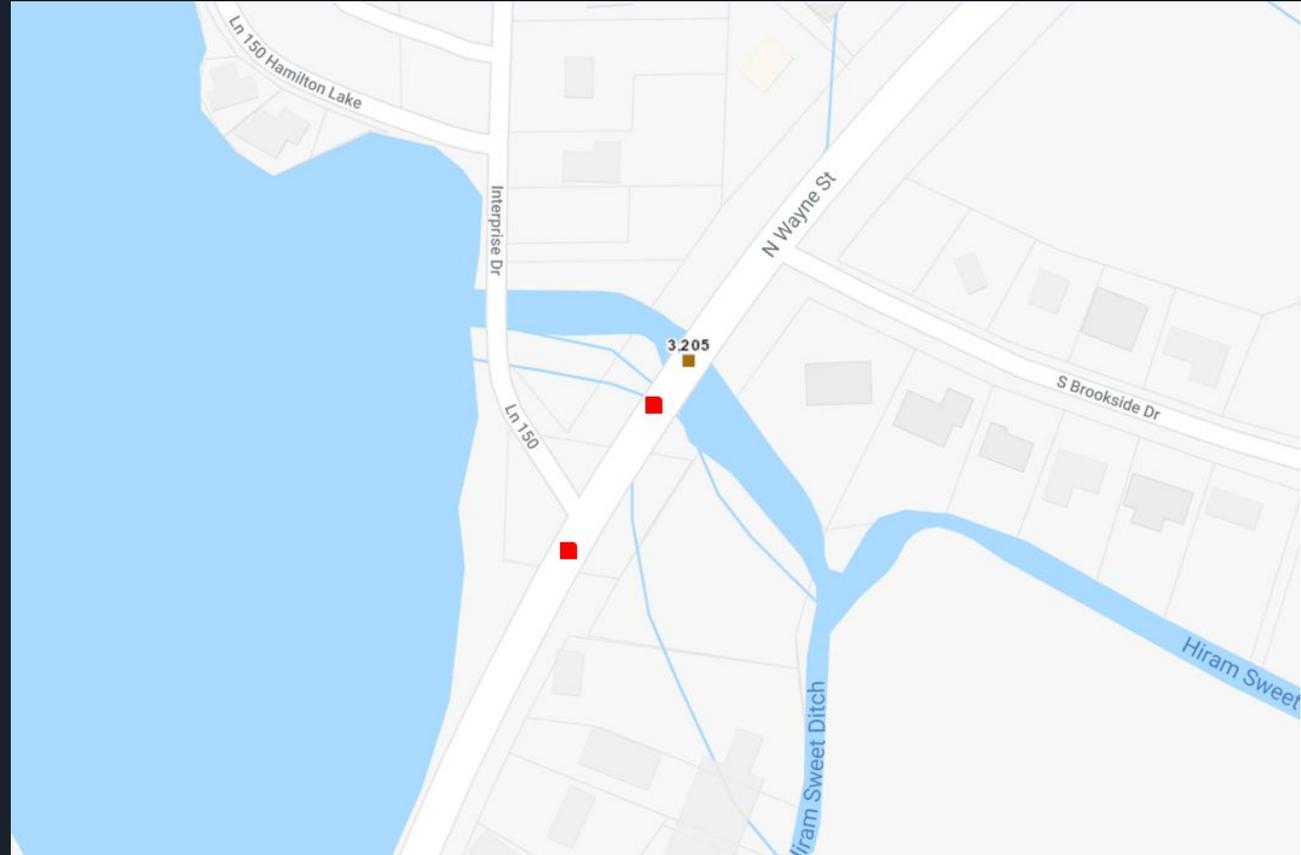
Currently:

- No safe way for children and visitors to safely travel from the beach to Capt’N Pete’s Dairy Dock, LLC
- Major road adjacent to current travel path (Major Collector)
- 40 mph



Data Collection

- Pneumatic Road Tubes
- INDOT (TCDS)



Data

TCDS AADT Section Description

AAADT = Annual Average Daily Traffic

Calculation:

AAADT = VOL x SF x AF (if applicable)

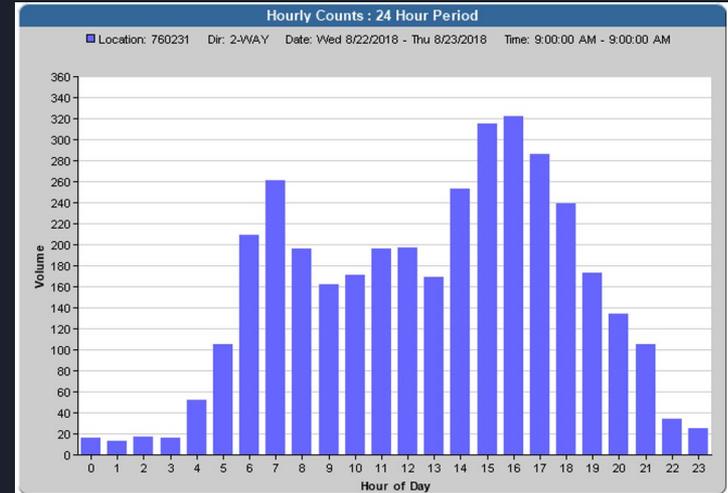
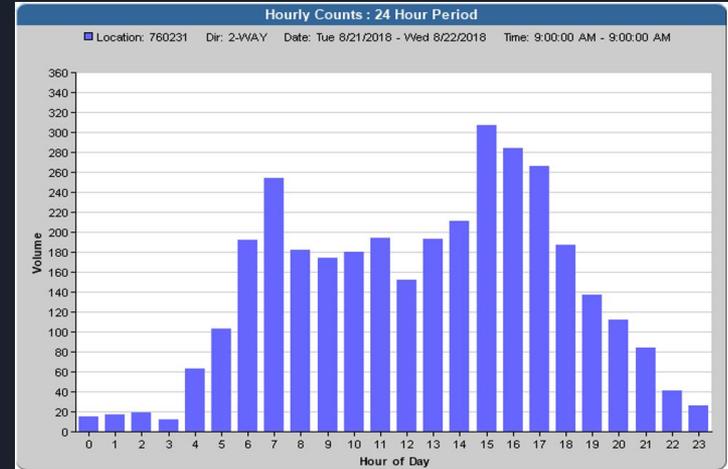
Note: Each count interval is multiplied by the SF (and AF if needed) for that day of the week and month of the year. A 24-hr count may have taken over two different days and thus use two different sets of factors. The sum of the factored intervals equals the AADT.

VOL = 24-hour volume count

SF = applicable month/day combination seasonal factor

AF = applicable axle-correction factor

2018 INDOT Traffic Database System		
Date	Volume Count (# of vehicles)	Average AADT
8/22/2018	3,666	3205
8/21/2018	3,405	



Geotechnical Site Evaluation

- Soil Boring
 - Soil sampling (6 samples along 6 feet)
 - DCP Test

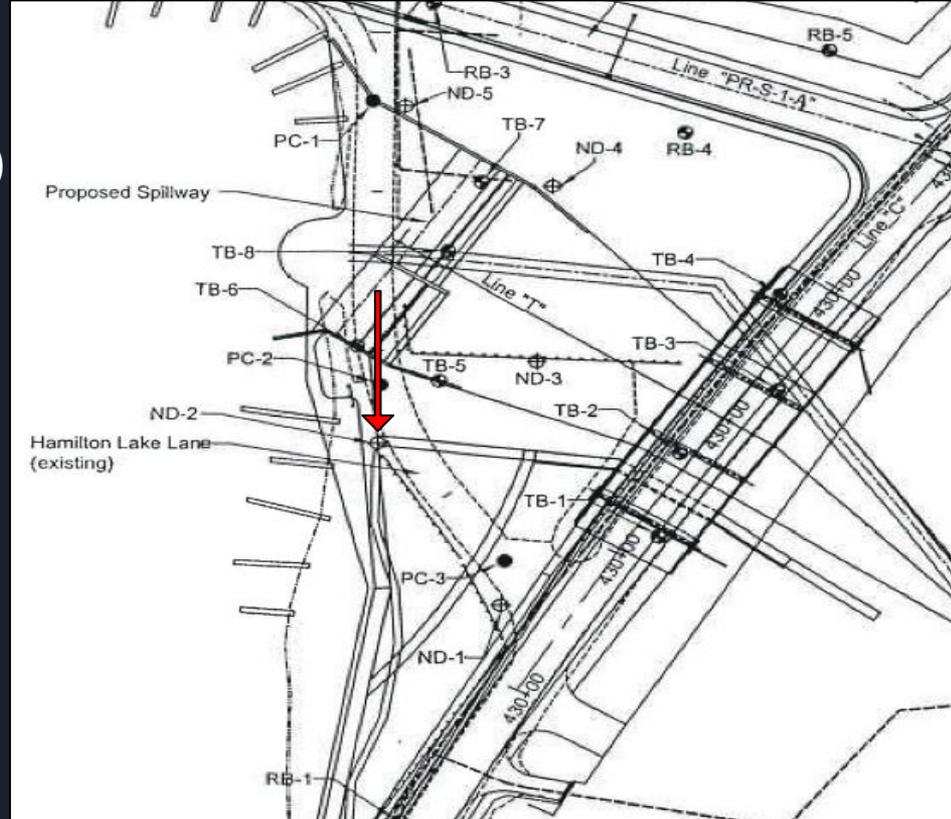
- Soil Test (ASTM Standards)
 - Atterberg Limits (Samples #6)
 - Sieve Analysis (Samples # 1 to 5)



Geotechnical Site Evaluation

- Test Boring logs (By: Town of Hamilton)

SAMPLE		DESCRIPTION/CLASSIFICATION and REMARKS	SOIL PROPERTIES						
No.	Depth ft		q_p tsf	q_u tsf	γ_4 pcf	W %	LL %	PL %	PI %
SS-1	12	SM, SILTY SAND, little gravel, medium dense, brown to black below 3', with fragments of wood from 4-1/2' to 5' (fill)							
SS-2	15								



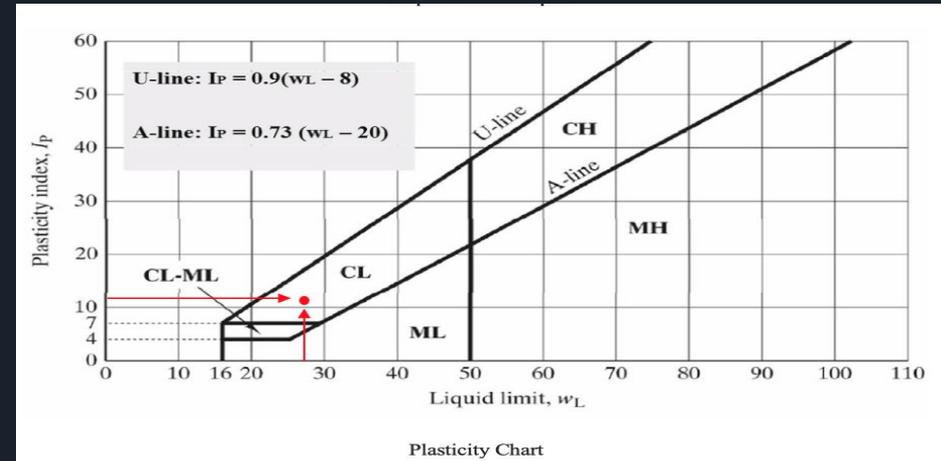
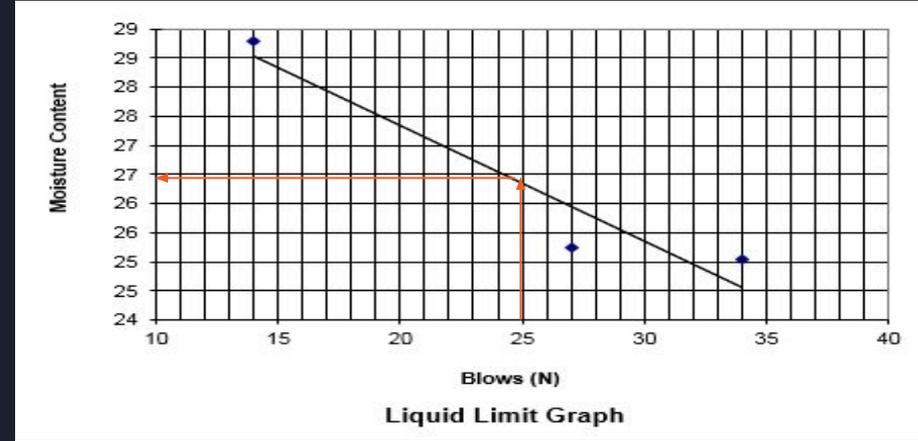
Geotechnical Site Evaluation

- Atterberg Limits Test (Sample #6)
 - Liquid Limit (27%)
 - Plastic Limit (16%)
 - Plasticity Index

$$PI = (LL - PL) = (27\% - 16\%) = 11\%$$

Tin Number	Wt. of Tin (empty)	Wt. of Tin + Wet Soil	Wt. of Tin + Dry Soil	Moisture Content (%)	Number of Blows (N)
16	19.01	39.85	35.65	25.2	27
719	18.95	38.18	34.33	25.0	34
1010	13.84	40.1	34.23	28.8	14

Tin Number	Wt. of Tin (empty)	Wt. of Tin + Wet Soil	Wt. of Tin + Dry Soil	Plastic Limit*
701	14.42	29.23	27.15	16.3



Geotechnical Site Evaluation

- Sieve Analysis Test (Samples # 1,2,3,4,5)
 - 150 g of Soil
 - Sieves:
#4,#10,#20,#40#,#60,#140,#200

Sieve Number	Wt. of Sieve (empty)	Wt. of Sieve + Soil	Wt. of Soil Retained	Cummul. Percent Retained	Cummul. Percent Finer
4	611.4	623.63	12.23	8.23	91.77
10	530.25	553.98	23.73	24.21	75.79
20	497.62	524.41	26.79	42.24	57.76
40	406	425.2	19.2	55.17	44.83
60	429.38	448.18	18.8	67.82	32.18
140	416.2	435.5	19.3	80.81	19.19
200	505.9	513.09	7.19	90.48	9.52
pan	436.15	457.46	21.31	100	0.00

total: 148.55

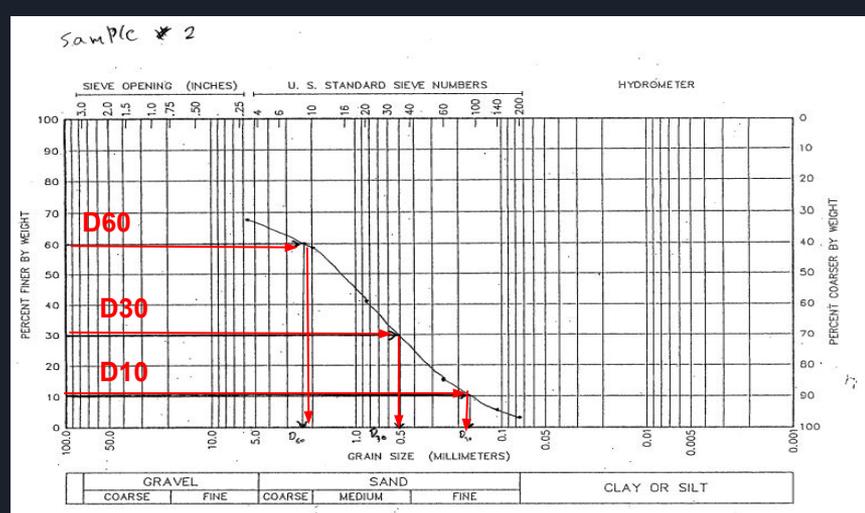
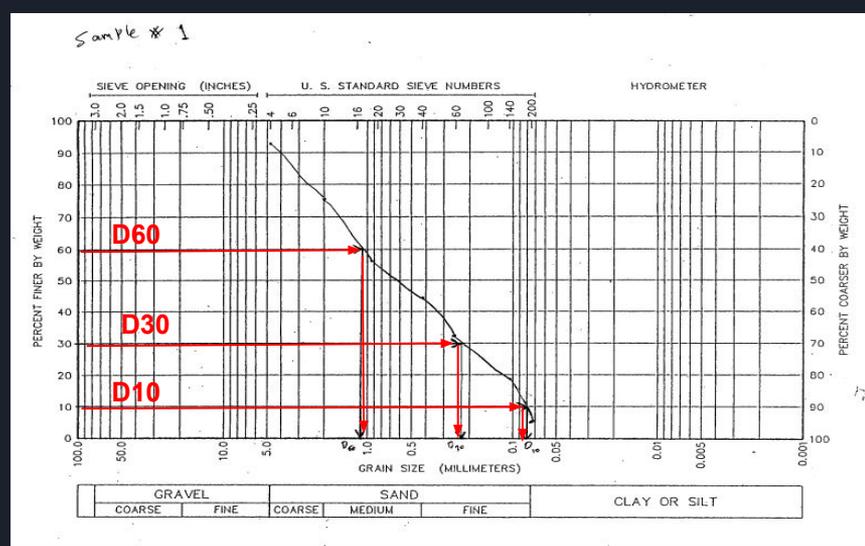
Sieve Analysis Test Results (Sample #1)

Sieve Number	Wt. of Sieve (empty)	Wt. of Sieve + Soil	Wt. of Soil Retained	Cummul. Percent Retained	Cummul. Percent Finer
4	611.68	643.2	31.52	21.22	78.78
10	530.32	559.08	28.76	40.58	59.42
20	497.62	523.85	26.23	58.24	41.76
40	406	425.8	19.8	71.57	28.43
60	429.3	449.51	20.21	85.17	14.83
140	416.14	429.89	13.75	94.43	5.57
200	505.85	508.47	2.62	96.19	3.81
pan	436.26	441.8	5.54	100	0.00

total: 148.43

Sieve Analysis Test Results (Sample #2)

- Sieve Analysis Test (Samples # 1,2,3,4,5)
 - Grain Size Distribution



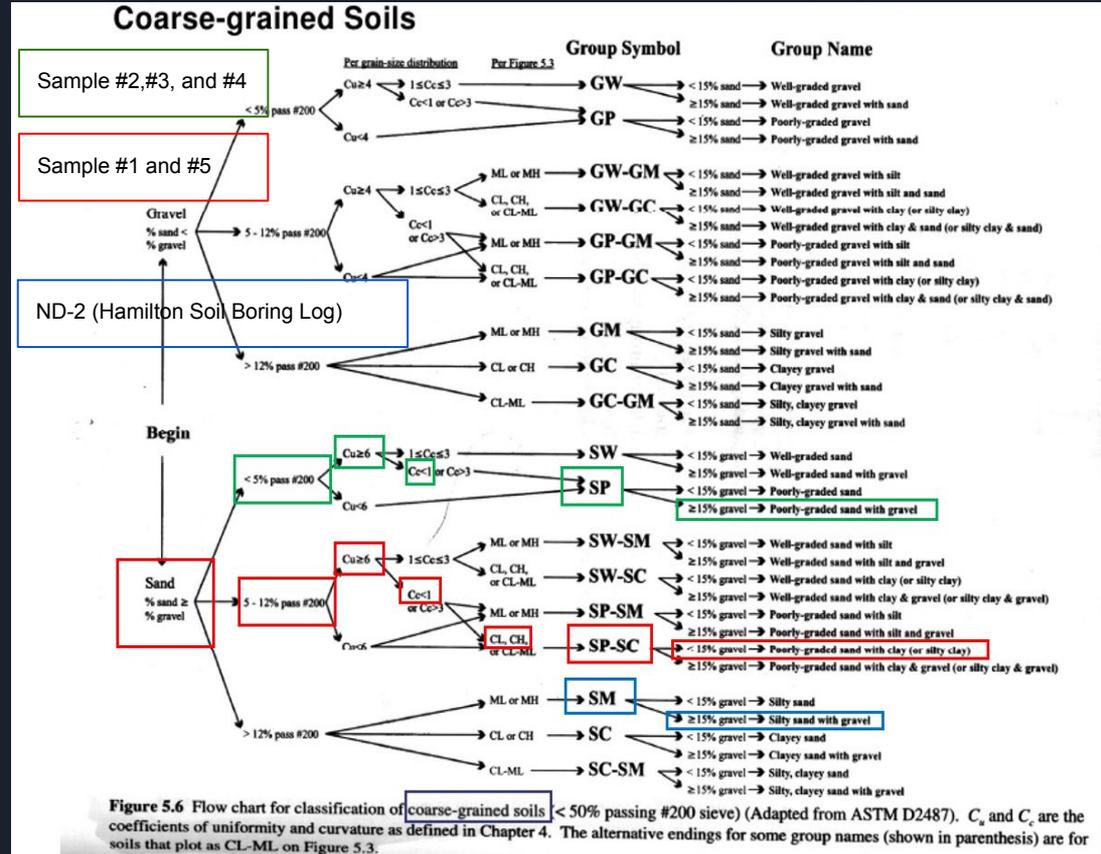
Geotechnical Site Evaluation

- Sieve Analysis Test (Samples # 1,2,3,4,5)
 - USCS (Classification Flow Chart)

$$CU = \frac{D_{60}}{D_{10}} \quad CC = \frac{D_{30}^2}{D_{10} \times D_{60}}$$

Sample #	Grain size (mm)			Coef. of Uniformity	Coef. of Curvature
	D10	D30	D60	Cu	Cc
1	0.08	0.22	1.10	13.75	0.550
2	0.18	0.50	2.20	12.22	0.631
3	0.29	0.65	2.20	7.59	0.662
4	0.28	0.70	2.20	7.86	0.795
5	0.13	0.29	0.70	5.38	0.924

Coefficients of Uniformity and Curvature



Geotechnical Site Evaluation

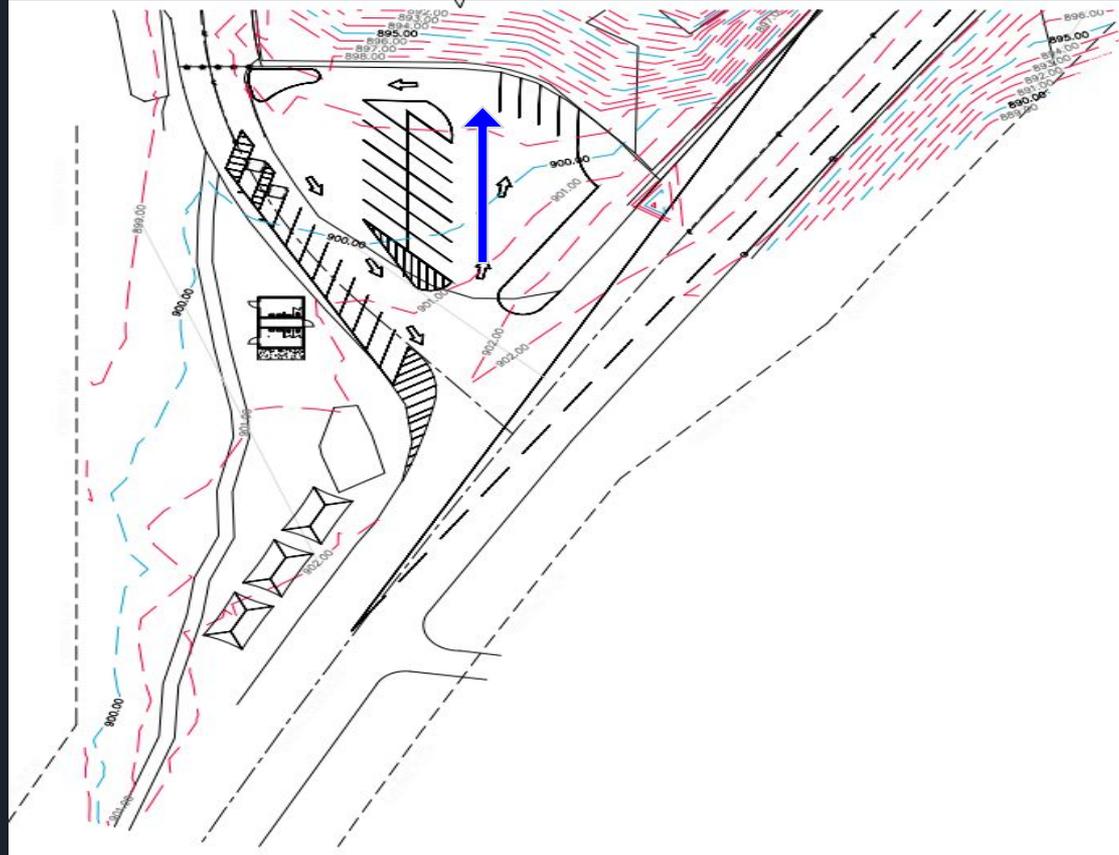
- Soil Classification:
 - #1: SP-SC, Poorly-graded sand with clay.
 - #2: SP, Poorly-graded sand with gravel.
 - #3: SP, Poorly-graded sand with gravel.
 - #4: SP, Poorly-graded sand with gravel.
 - #5: SP-SC, Poorly-graded sand with silty clay.
 - #6: CL, Sandy lean clay with gravel.

HAND AUGER PROBE LOG							
Project: Hamilton County Beach Relmpromvment				Probe #: B-1			
Client: Brent Shull				Date: 9/1/2018			
Inspector: LADS Engineering, LCC				Location: Hamilton Lake Beach - Wayne St, Hamilton, IN 46703			
Ground Water Elevation: 4 ft							
Depth (ft)	Soil Description	PL %	LL %	MC %	PI %	DCP (N)	Relative Compactness
1	SP-SC, Poorly-graded sand with clay			6.2		4	Very loose
2	SP, Poorly-graded sand with gravel			5.3		5	Loose
3	SP, Poorly-graded sand with gravel			6.9		16	Medium Dense
4	SP, Poorly-graded sand with gravel			9.3		7	Loose
5	SP-SC, Poorly-graded sand with silty clay			12.7		7	Loose
6	CL, Sandy lean clay with gravel	16	27	21.8	11	13	Stiff

Hydrological Study



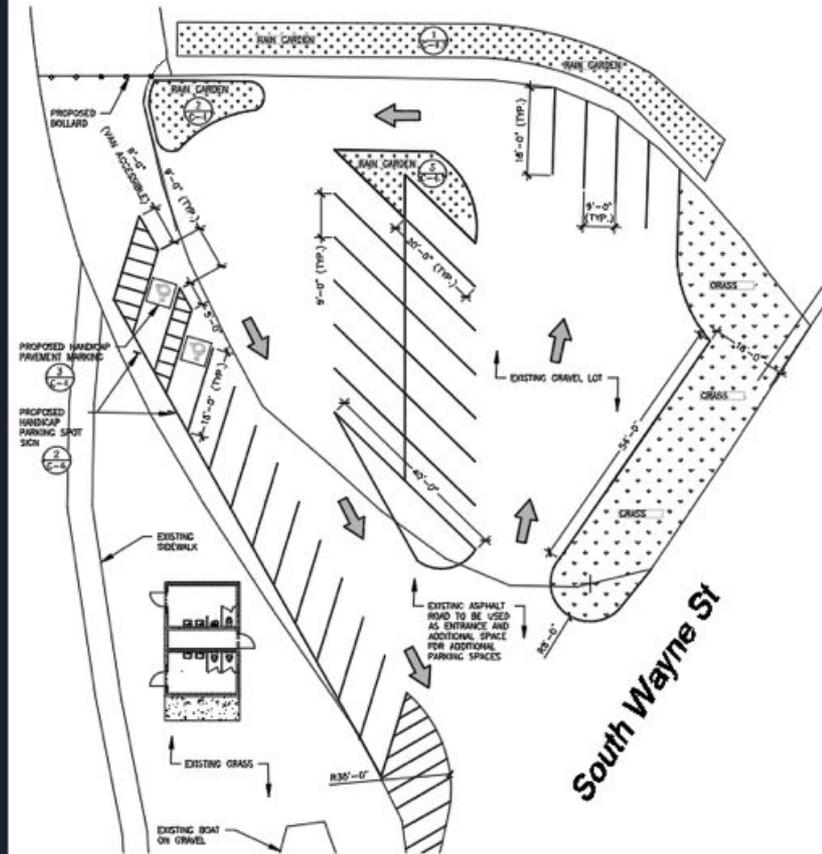
Hydrological Study



Current Parking Lot

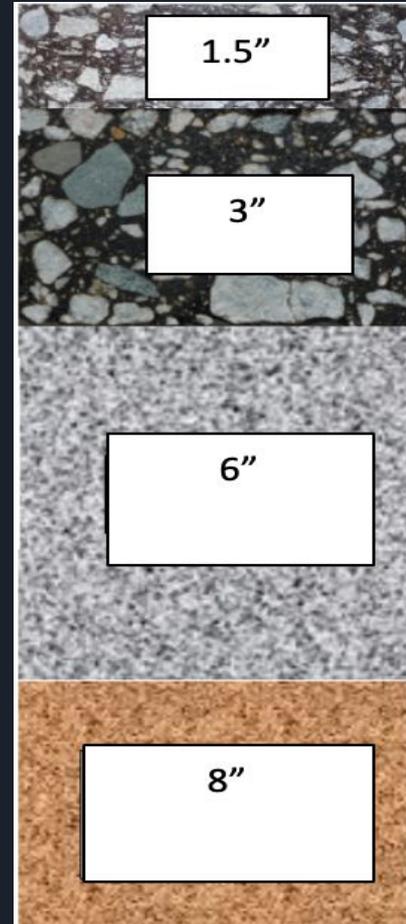


Parking Lot Proposed Geometric Design



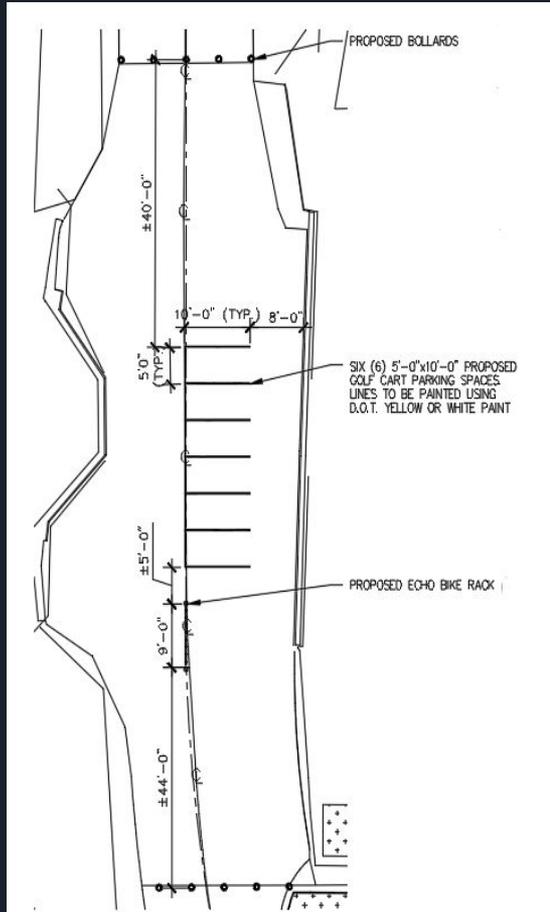
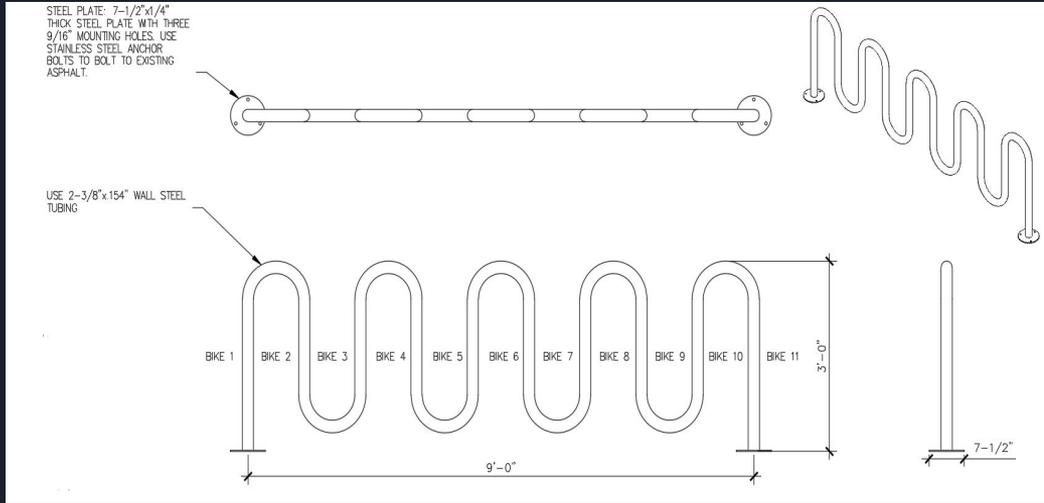
Parking Lot Pavement

Pavement Type	Thickness (in)
HMA Surface	1.5
HMA Intermediate	3
No. 53 Aggregate	6
No. 2 Aggregate	8



Parking Lot Additional Features

BIKE RACK



GOLF CART PARKING

Sidewalk Location

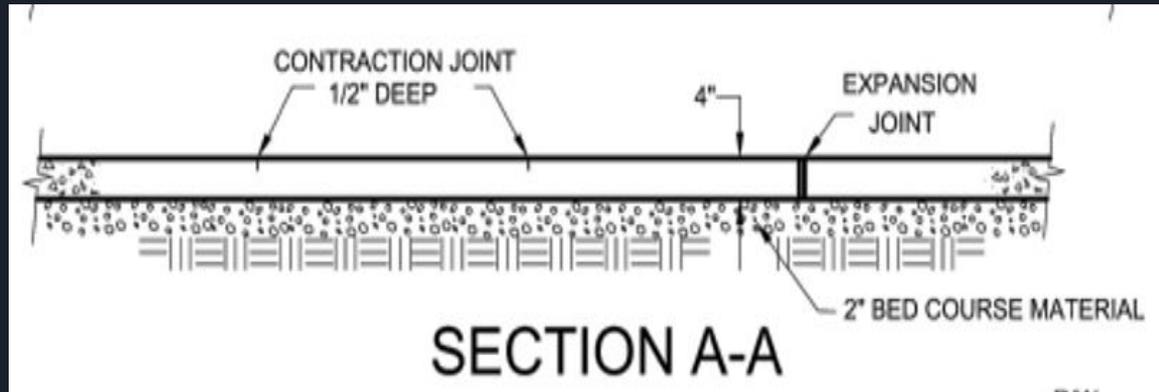
- Pedestrian Sidewalk from the beach to Capt'N Pete's Dairy Dock



Sidewalk Location

Sidewalk Design

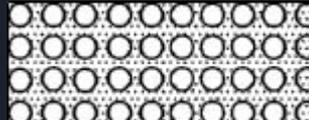
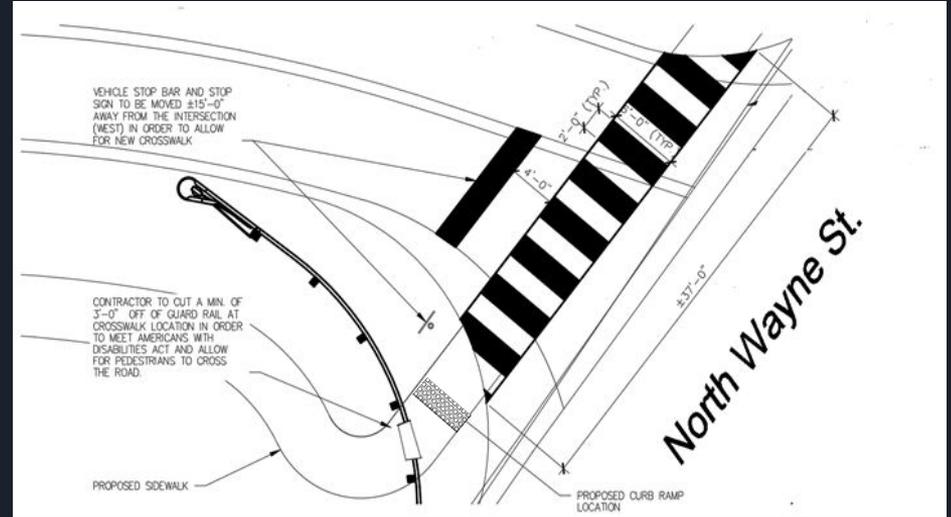
- Designed to meet ADA Requirements
 - 5 feet wide
 - 4 inches thick
 - Expansion Joint: Every 50'
 - Saw Cuts (Contraction Joint) : every 5 feet
 - 2 inches #53 crushed stone Base



Sidewalk Cross-Section (City of Fort Wayne Design Manual)

Sidewalk Design

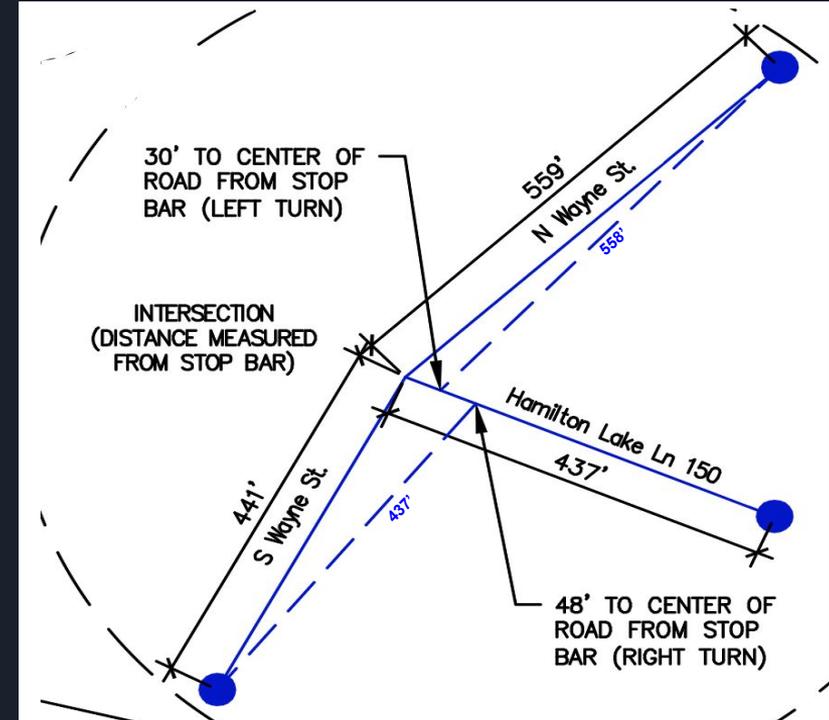
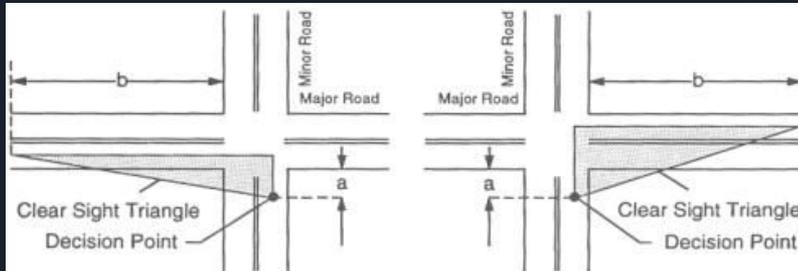
- Location of Stop Bar
 - 4 feet west of crosswalk
 - 15 feet west of the intersection
- Guardrail cut
 - 3 feet
- Detectable Warning Surface
 - 4 feet by 2 feet
 - Red color



Sidewalk Design

- Clear Sight Triangle of Intersection Sight Distance
 - $ISD = 1.47(t_g)(V_{major})$

Case	t_g	V_{major} (mph)	ISD (ft)
Turn left from the stop bar (B1)	9.5	40	558
Turn right from the stop bar (B2)	8.5	35	437
Crossing the major road (B3)	8.5	35	437

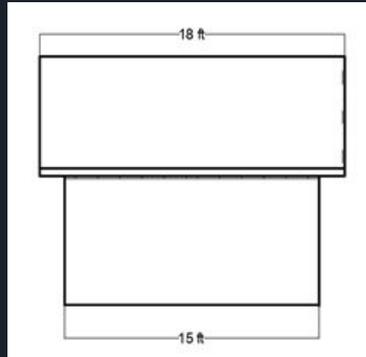
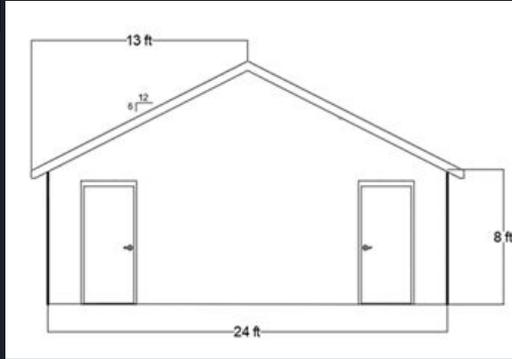


Restroom & Shower Facility



- Location
- Dimensions
- Plan View
- Load Determination
- Information of Restroom
- Truss and Column
- Type of Wood

- Information of Restroom and shower



Structural type: Gable

Pitch of Roof: 6:12

Type of wall: Stud wall (6")

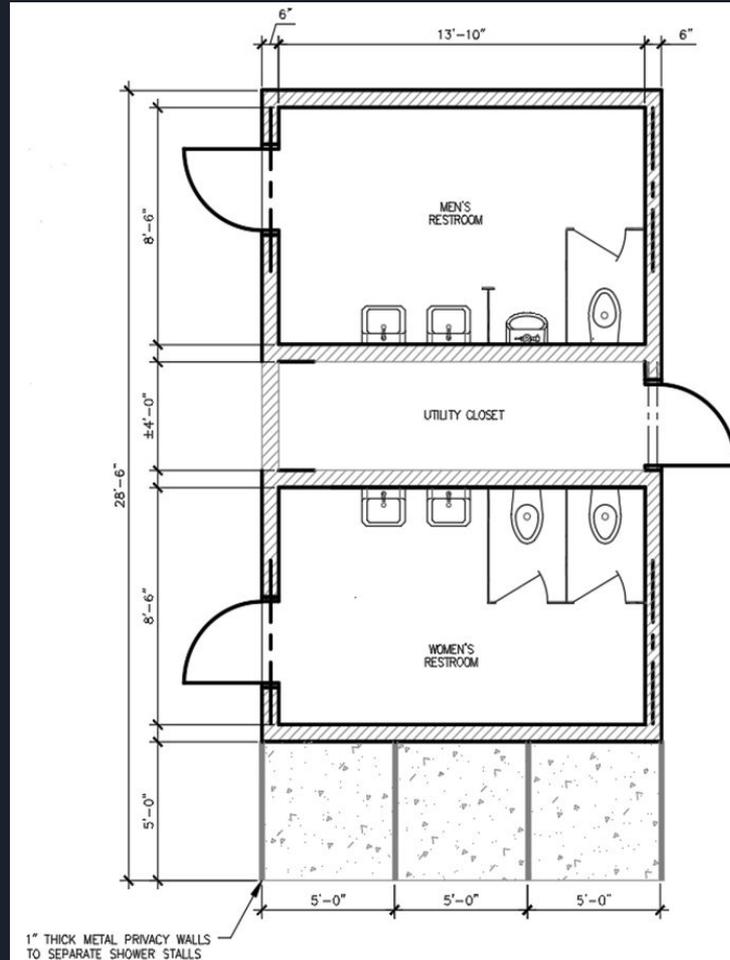
Length :15ft

Width : 24 ft

Height: 8 ft

Shower Location :Exterior

Plan View



•Location of the Restroom & Shower





Load Determination

- Determined Using ASCE 7-10 Minimum Design Loads for Buildings & Other Structures

Load Type	Load (psf)
Dead Load Due to Self Weight	14.9
Snow Load	14
Live Load	20

- Truss and Column



- Designed according to National Design Specification for Wood

Trusses:

2 2x6

2 3x6 — 4x6 lumber

Columns:

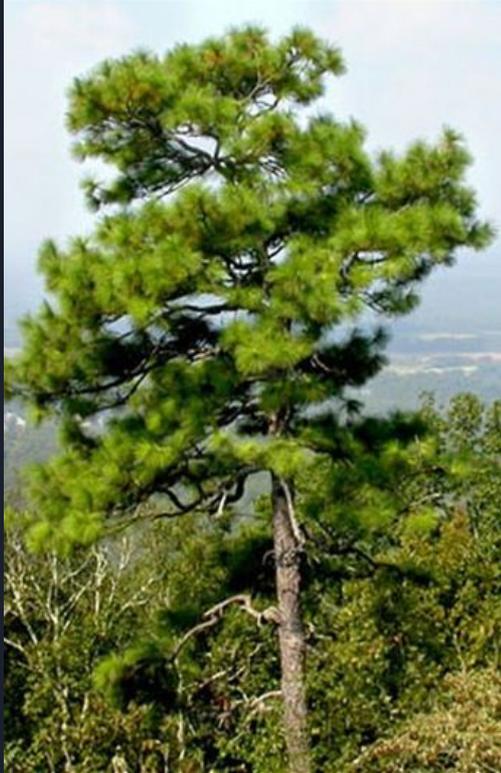
4 3x3

4 3x4 } 4x4 lumber

Ridge Beam:

(1) 4x6

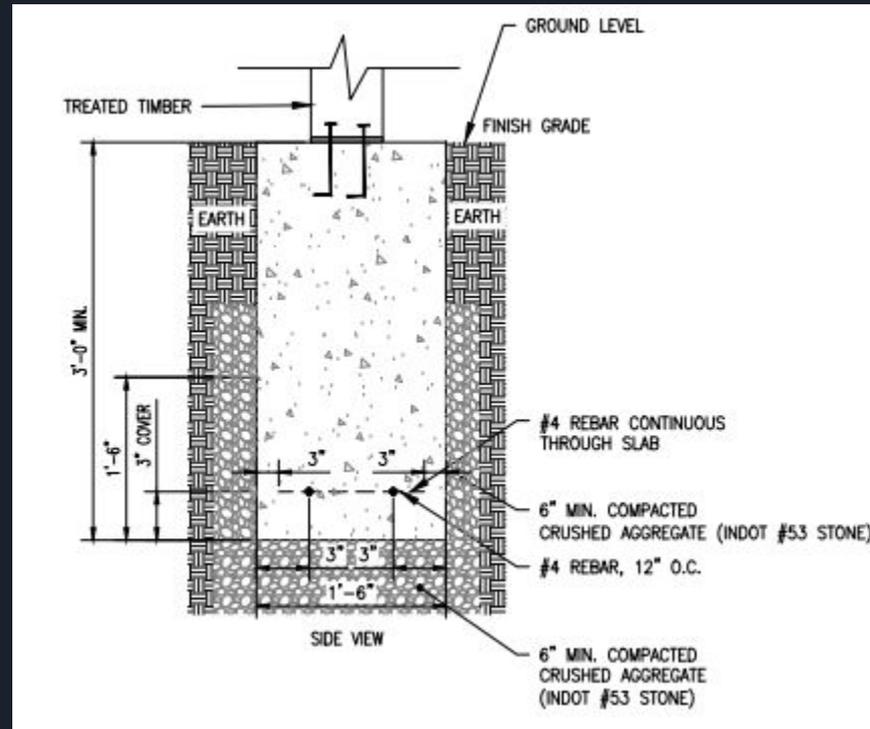
Lumber Type



- Southern Pine

- Cost Effective
- Readily Available

Restroom/Shower Facility Foundation Design





Shade Structure

Requirements:

- Fire Resistant
- Removable fabric
- Provide adequate shelter



Shade Structure

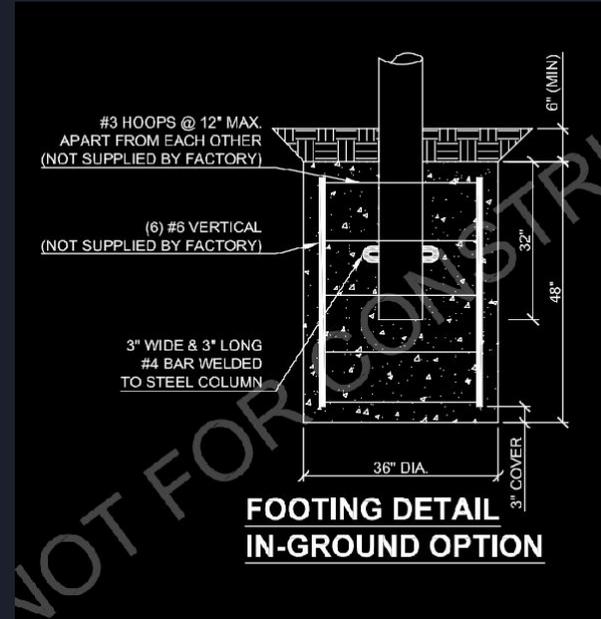
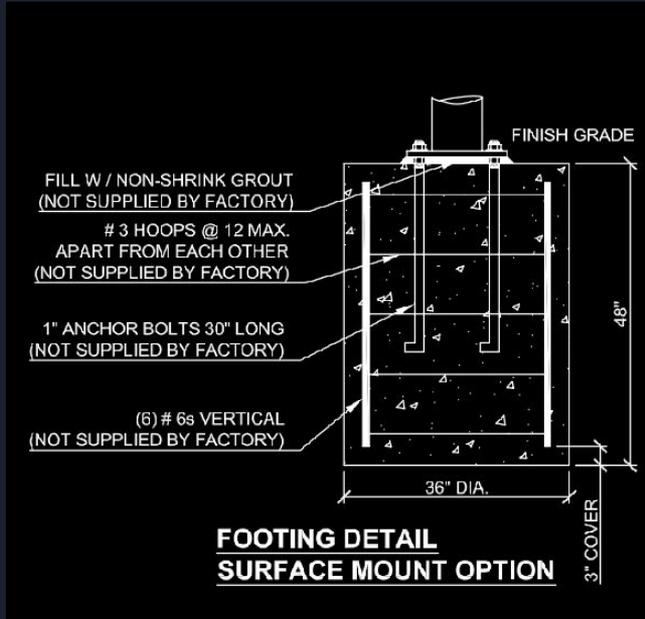
Design Constraints:

Wind Load

Foundation (Freeze & Thaw)

Size

Foundation Details

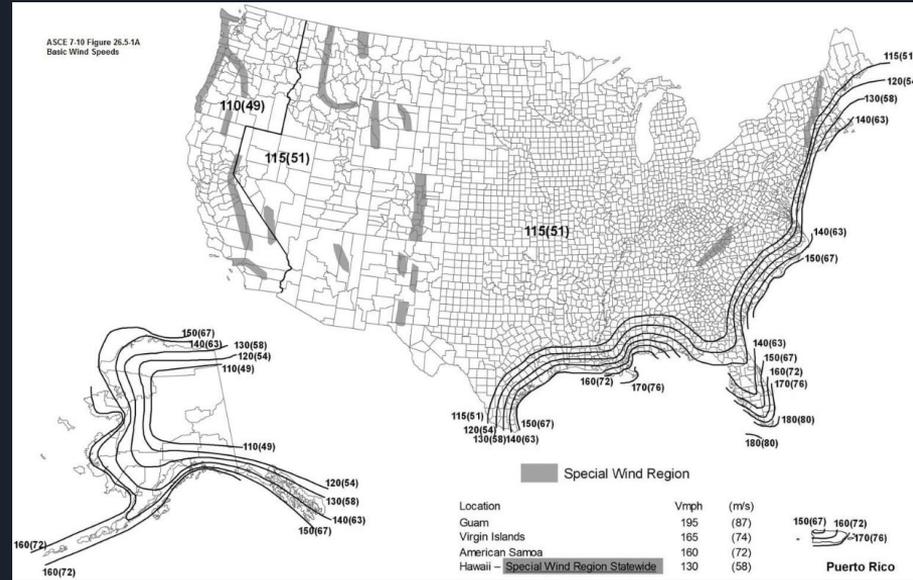


ACI 7-10 Wind Load

Table 1.5-1 Risk Category of Buildings and Other Structures for Flood, Wind, Snow, Earthquake, and Ice Loads

Use or Occupancy of Buildings and Structures	Risk Category
Buildings and other structures that represent a low risk to human life in the event of failure	I
All buildings and other structures except those listed in Risk Categories I, III, and IV	II
Buildings and other structures, the failure of which could pose a substantial risk to human life.	III
Buildings and other structures, not included in Risk Category IV, with potential to cause a substantial economic impact and/or mass disruption of day-to-day civilian life in the event of failure.	
Buildings and other structures not included in Risk Category IV (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives) containing toxic or explosive substances where their quantity exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.	
Buildings and other structures designated as essential facilities.	IV
Buildings and other structures, the failure of which could pose a substantial hazard to the community.	
Buildings and other structures (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing sufficient quantities of highly toxic substances where the quantity exceeds a threshold quantity established by the authority having jurisdiction to be dangerous to the public if released and is sufficient to pose a threat to the public if released.*	
Buildings and other structures required to maintain the functionality of other Risk Category IV structures.	

*Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for classification to a lower Risk Category if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in Section 1.5.2 that a release of the substances is commensurate with the risk associated with that Risk Category.



Wind Speed (Frame only): 150 m.p.h.

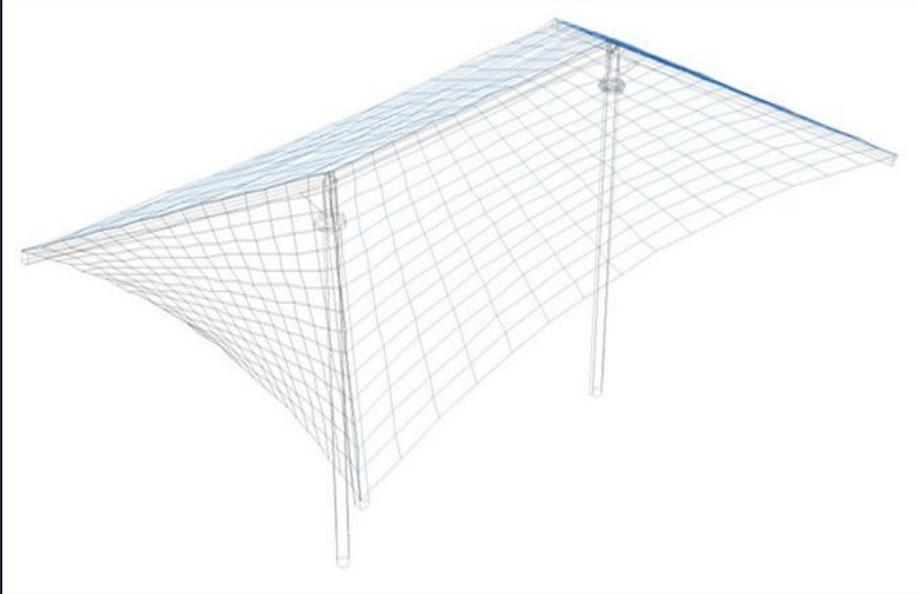
Wind Speed (Frame w/canopy): 90 m.p.h.

Live Load: None

Snow Load: None

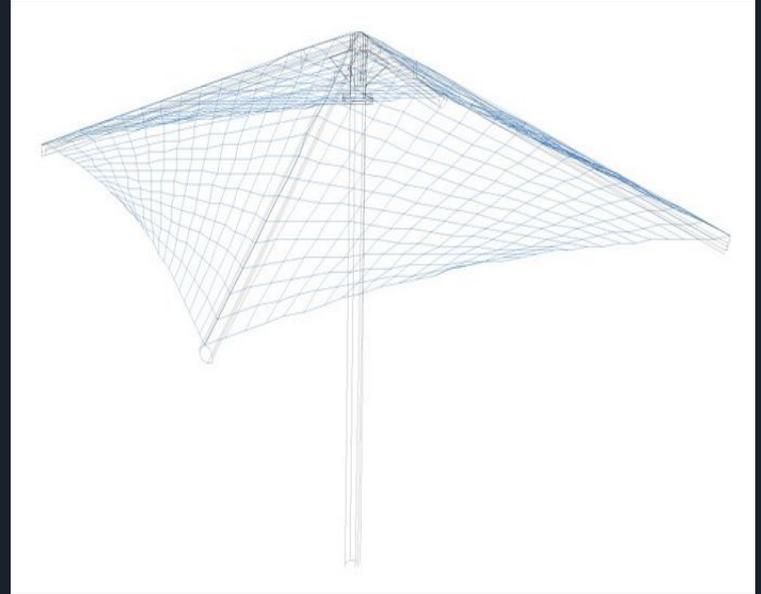
Option Considerations

Option 1



22'x14'

Option 2



15'x15'



Cost Estimate

Project Portion	Total Cost
Construction Engineering	\$35,000
Mobilization/Demobilization	\$20,000
Parking Lot Pavement Section	\$50,374
Shade Structure	\$ 4,400
Restroom/Shower room Structure	\$9,413
Sidewalk	\$9,745
Parking Lot Additional Features	\$5,004
Erosion Control Measures	\$3,730
Geotechnical Exploration/Testing	\$612
Rain Garden	\$3,413
Construction Surveying	\$4,000
Sum	\$145,690



Acknowledgments

Brent Shull - Town of Hamilton

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William Barry - Senior Design Advisor

Civil Engineering Faculty



Questions?