CLARK AND SONS CONSTRUCTION

EST. 2000

Heritage Rings Sculpture
Lake Placid/North Elba, New York
Final Design Deliverable
April 16, 2020

Clarkson University
8 Clarkson Avenue
Potsdam, NY 13699

Consruction Management Section

TRANSMITTAL

To: The Lake Placid Appearance Committee

Date: April 15, 2020
Project # 2020-001

Project: Lake Placid Heritage Sculture

Attn: Erik C. Backus, P.E., LEED AP BD+C, ENV SP, FMP

Phone: 573-774-0962
Fax: 315-268-6522

We are sending you:

- [x] Herewith
- [ ] Manufacturer's Data
- [ ] Change Order
- [ ] Under separate cover via _____ the following items:
  - [ ] Shop Drawings
  - [ ] Copy of Letter
  - [ ] Prints
  - [x] Plans
  - [ ] Samples
  - [x] Specifications
  - [ ] Other _____

Copies	Date	No.	Description
1	4/15/2020	1	All of the required items as per the Clarkson Design Manual, Design Submittal Checklist for Final Design

These are transmitted as checked below:

- [ ] For Approval
- [ ] For Your Use
- [ ] As Requested
- [x] For Review and Comment
- [ ] For Bids Due _____
- [ ] Approved as Submitted
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- [ ] Resubmit ____ Copies for Approval
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Remarks:

Thank you for your attention to this matter.

Copies To:

Field:
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Yours Truly,

Riley J. White

Project Manager

TABLE OF CONTENTS

Basis of Design

Clark and Sons was tasked with presenting two locations for the Heritage Ring Sculpture in the Village of Lake Placid. We have performed analysis on the pros and cons of these locations presented in previous design iterations and have created two base designs for the Ring sculpture off of Olympic Drive. After receiving feedback from artist Naj Wikoff, and the Chairperson of the appearance committee, Dean Dietrich, we designed each base following a stair surrounding concept. Design 1 is simply an elevated square base and Design 2 is an elevated circular base with the same design premise and can be viewed in the following sections. We have also considered multiple alternatives pertaining to a walkway design that will be ADA accessible and visually appealing to the public and will have the ability to incorporate the history of athletics in the Adirondack region. In this design iteration, we are presenting a walkway that combines gray etched brick lining a concrete center. Our engineering team has performed geotechnical analysis to ensure the structural stability of the structure and the safety of viewers.

Owners Performance Requirement (OPR)

The sculptor, Naj Wikoff, and the Appearance Committee require a sculpture consisting of a pair of large-scale rings leaning on each other to be installed at one of three suggested locations with the following requirements:

- Symbolization of the 1980 Games being built on the legacy of the 1932 Games
- Community pride and admiration of the sculpture
- Ring height between 32 and 40 feet
- Mirror finish on the exterior side of the Rings to reflect nature along with people viewing the art
- Gold tint on the interior side of the Rings to represent the aspirations of Olympic athletes
- Outside edges of the Rings featuring the colors of the Olympic Rings and the five continents around the world
    - Bright blue, yellow, black, green and red
- LEED Silver Performance Standard preferred to be attained
- Surrounding amenities to be properly located
    - Benches, plaques, sidewalks, etc.

Program Reconfirmation

A critical part of Lake Placid's history is the hosting of the Winter Olympic Games on two separate occasions. The monument will highlight the past and the future of the competitive

games in the region. The addition of the proposed sculpture will allow the community as well as the local Olympians to be properly recognized. Creating an open-air gallery in Lake Placid would further allow for an increase in historic and art tourism from worldwide tourists.

Project Scope Profile

General Project Information

Company Name

- Clark and Sons Construction

Company Code

- N/A

Project Title

- Lake Placid Heritage Ring Sculpture

Company Priority

- N/A

Company Contact

- Riley White, Project Manager

Phone Number

- (585) 645-4439

Email Address

- rijwhite@clarkson.edu

New Construction Information

Proposed Use

Lake Placid is one of three communities in the world to have held two Winter Olympic Games. As the town changes over time, it is crucial to preserve its history. Doing so will ensure the legacy of the accomplishments will be remembered for many generations to come.

Currently, there is a sparse amount of street art representing the Olympic Games in Lake Placid, so the addition of the proposed Ring sculpture will serve as an aesthetically pleasing and informative memorial of the Olympic Games. The goal is to create a piece of art that is incredible enough to elicit awe similar to that of seeing an Olympian win a medal.

Basic Shape

Two 40 foot diameter rings leaning against each other.

Structure Height

Maximum Height: 39 feet
Minimum Height: 37 feet

Structure Material

The Rings will be constructed from steel. The foundation will be constructed from reinforced concrete and stone. Reference section: Fabrication Materials, for more information regarding the structural material.

Special Building Materials

- High Density Polyethylene
- Physical Vapor Deposition
- Galvanized Stainless Steel (structural frame)

Gross Volume Summary

For the excavation for both base designs, approximately 200 cubic yards of fill will be removed from the existing location to be hauled off site. Base number one will require 312 cubic yards of concrete while base design two will only comprise of 264 cubic yards. Both base designs will require the use of 4000 psi concrete at a mixture rate that will later be approved by an engineer.

Site Design

Location:
Olympic Drive
Lake Placid, NY 12946

This location was chosen based on the area available for use that would provide the sculpture to be viewed from multiple areas and have a grand appearance that would attract

viewers to the vicinity to help increase business while also incorporating the local history of Lake Placid. Additionally, this location on Olympic Drive is safe for the public to view from each side and would require little additional maintenance from external factors.

Soil Conditions

MhB: Monadnock fine sandy loam, 3 to 8 percent slopes
MhC: Monadnock fine sandy loam, 8 to 15 percent slopes
MkD: Monadnock fine sandy loam, 15 to 35 percent slopes, very bouldery

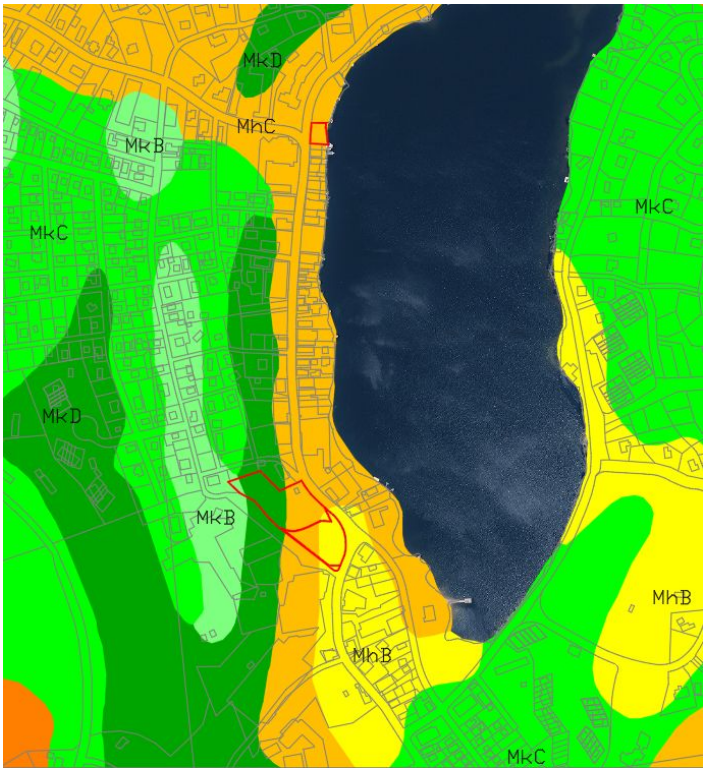


Figure 1: Soil Conditions for the Lake Placid Region

Existing Topography

See Appendix A for existing topography plan.

Proposed Topography

See Appendix A for proposed topography plan.

Roads and Parking

Parking access for the structure will be the existing parking lot at the bottom of Olympic Drive. There is a sidewalk that goes from the existing parking lot alongside Olympic Drive up to the Crowne Plaza. This can be taken advantage of for viewers to access the sculpture.

Landscaping

C&S proposes to provide additional saplings, shrubs, flowers to compliment the sculpture and make the landscape more aesthetically appealing. The purpose of this section is to spark conversation of a potential planting plan as there is no existing planting plan.

Design Concepts

C&S proposes two base designs to accommodate the requests of the ownership team. Both of the base designs provide a space to include the history of the Olympic Games and athletes, as well as a sizable viewing area.

Design 1

The first design is a square with a total footprint of 57'-4"x 57'-4", completely constructed in concrete. There are five stairs, with a typical 7" rise and 11" run, to climb to get to the rings, which makes the total height of the base 2'-11". Leading up to the sculpture will be a concrete walkway lined with bricks with room for names of athletes that competed in previous Olympic Games. This walkway will continue around the sculpture for ample viewing area from all angles. The estimated cost for this base design is $290,000; see Appendix A for detailed design.

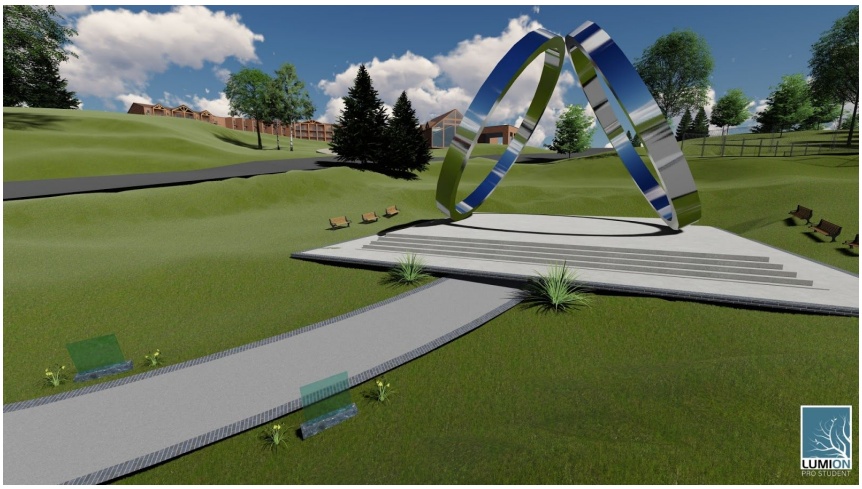


Figure 2: Base Design 1

Design 2

The second design is similar, but the footprint is a 59'-4" diameter circle. As with Design 1, there are five stairs to climb to get to the rings, including the same typical rise and run and base height. The sculpture will also include a concrete walkway lined with etched bricks, which will circle around the sculpture so that people are able to view the sculpture from all angles. The estimated cost for this base design is $270,000; see Appendix A for detailed design.

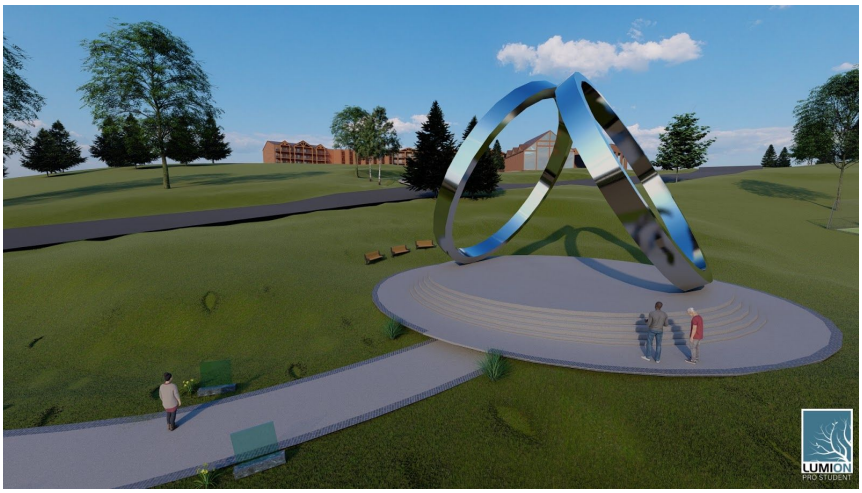


Figure 3: Base Design 2

Master Plan Documentation Compliance Check

The master plan of Lake Placid Village includes a revitalization component. The addition of this sculpture to the community complies with the goal of adding art to the area along with commemorating the Olympic Games.

Cost Estimate

The cost for base one is $290,000 while the cost for base two came in at $270,000. Base one has 48 more cubic yards of concrete when compared to base design number two. The reason behind the substantial increase in price is due to new information that was retrieved regarding soil conditions after presenting the schematic design. The results from the soil borings in close proximity to the sculpture stated that the soil has a lower bearing capacity than expected. New calculations were performed based on this information that caused the size of the caissons to increase substantially. The cost of the equipment also had to increase due to the installation of larger caissons. See Appendix E for the detailed cost estimate.

Engineering Analysis & Calculations

Structural

After performing initial geotechnical analysis, we determined the primary soil cover is sandy loam, which has a very poor bearing capacity. We spoke with an engineer who has performed geotechnical tests in Lake Placid and informed us that below the silty loam layer there is a dense layer of glacial till. The location of the engineers test specimens were within one quarter mile of the proposed sculpture locations, and the glacial till had a bearing capacity of roughly 5 tons per square foot. To ensure a conservative design, a drilled shaft design was performed by the C&S team in the event of a different soil profile in the final ring location. The designed drilled shafts will be two, 29' shafts placed under each ring contact point, they will be 5'-6" in diameter and have spiral rebar spaced 6". See Appendix D for calculations.

Civil

See Appendix A for proposed topography changes.

Project Schedule

See Appendix C for project schedule.

Summary

Within this section, the previous schedule referenced within the schematic design phase has been further developed. With only the addition of the major construction points within the schedule, the basis of the schedule is simply to allow the client to have a general understanding of the project duration as well as the key tasks associated. Currently, the project is estimated to be completed in 53 days. The referenced schedule is shown in Appendix C found in the below section.

Critical Path Items

Due to the limited project scope, the schedule is already precise and narrow. Since the project is smaller-scale, the majority of the items are on the critical path. There is not a lot of slack within the schedule which allows C&S to remain focused on reaching the goal and finishing the project both on-time and under budget.

Proposed Activity Sequence

Following the notice-to-proceed, proper building permits will be required to obtain which could consume a larger portion of the project duration based on how efficient the permit process occurs. Following the proper paperwork and permits, the sitework will be able to start, allowing for grading and excavation of the determined base location and design. Once all sitework has been completed, foundation work may be started including all caisson work, sidewalk work, base structure concrete work. Following concrete and masonry work, installation of the ring sculpture may begin leading to the finalization of the project.

Narrative Descriptions of Design Process and Decisions

Various construction types will be performed in the building envelope throughout the duration of the project including but not limited to the following:

- Siting/Surveying
- Grading
- Foundation Analysis
- Metal Fabrication
- Masonry
- Amenities (i.e. sidewalks, benches, plaques, etc.)

Sustainability Measures

As Lake Placid is a LEED Gold certified community, it is important for any project being developed to be mindful of the environment and its potential impact.As stated in the OPRs, a LEED Silver performance standard is preferred to be obtained. However, as the LEED rating systems were found to be less adequate in terms of rating the sculpture, these goals will be unable to be met. While Lake Placid as a community was rated using LEED for Cities and Communities v4, this rating system is unable to provide the Heritage Sculpture with a LEED rating. There are however different rating systems for different types of projects. The system best suited for this would be SITES (Sustainable Sites Initiative) v2 for Sustainable Land Design and Development. This system does have some parallels with LEED, but doesn't cover all of the same aspect, especially since the comparisons are made between LEED BD+C v4, instead of LEED Cities and Communities. With the small scope of the project a large majority of potential credits are unable to be attained, for reasons spanning from the lack of on-site parking or food production to designing for adaptability and disassembly. Some credits have the potential to be earned upon receiving different materials from material suppliers on their sustainability practices at the plants and during

the extraction process. Even with SITES v2, the Heritage Sculpture would be unable to achieve a SITES Certification rating, as seen in the scorecard attached in Appendix B. While there may be no specific rating system to achieve a certification, mindful practices can still be implemented through pollution prevention plans and other ways to minimize any pollutants that may occur during the construction phase. Please refer to Appendix B for further detail.

Erosion and Sediment Control Plan

The erosion and sediment control plan will conform to the latest edition of "New York Standards and Specifications for Erosion and Sediment Control" by the NYS Department of Environmental Conservation. There will be stabilized construction access for any traffic entering or leaving the construction site to reduce or eliminate the tracking of sediment onto public rights-of-way or streets. A concrete truck washout station will be in place to prevent high alkaline water from infiltrating the surrounding soil and the surface water of Mirror Lake. A silt fence will be lined along the base of the slope to prevent dust and sediment runoff. The existing vegetation in the area will be left as undisturbed as possible for further erosion and sediment control.

Amenities

The walkway will be constructed of concrete with gray etched brick pavers to match the color of the concrete. The plaques depicting the history of the Olympics and Lake Placid will be etched glass with au sable blue granite bases and will be placed along the walkway.

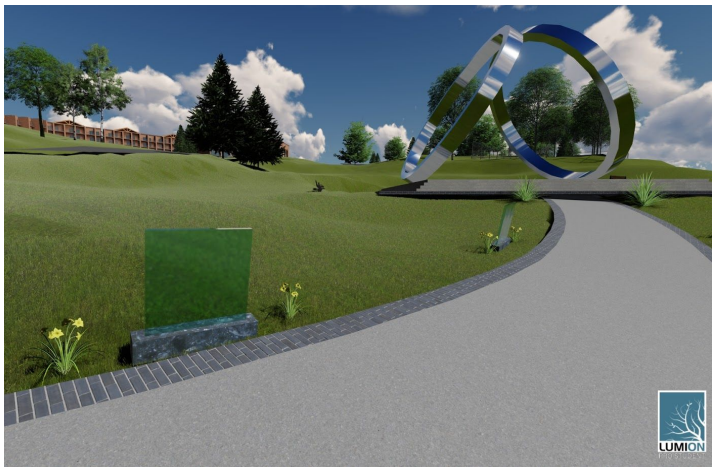


Figure 4: Walkway and Etched Glass Plaques

Appendices

Appendix A - Drawings

Appendix B - SITES v2 Scorecard

Appendix C - Schedule

Appendix D - Engineering Analysis & Calculations

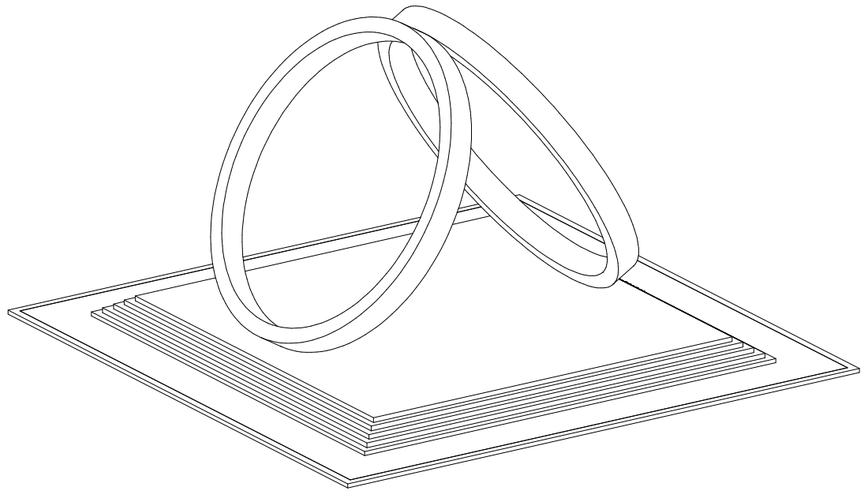
Appendix E - Estimate

Appendix F - CSI Specifications Pertaining to Project

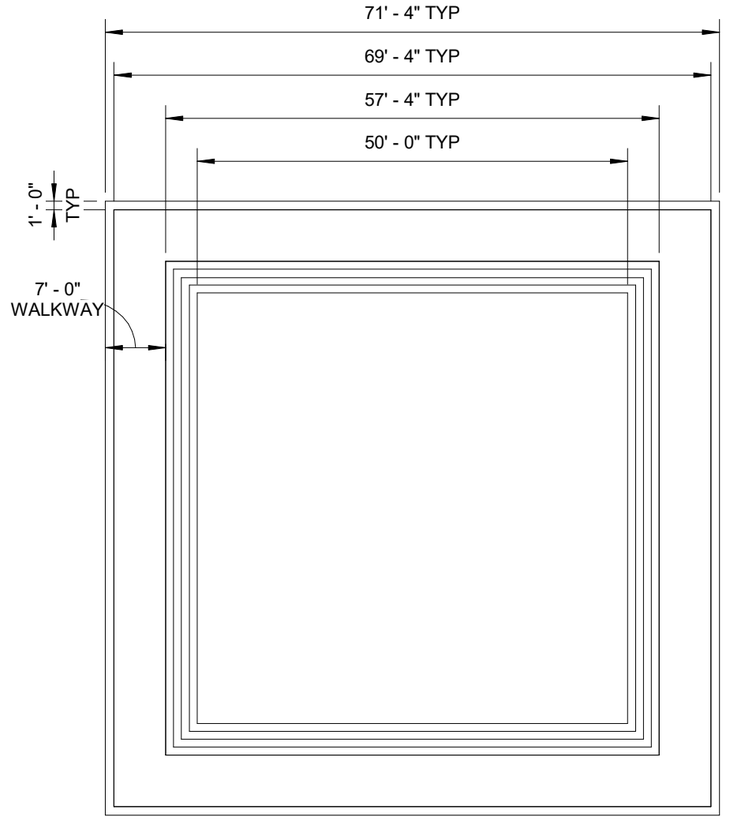
Appendix G - Renderings

Appendix H - Permits

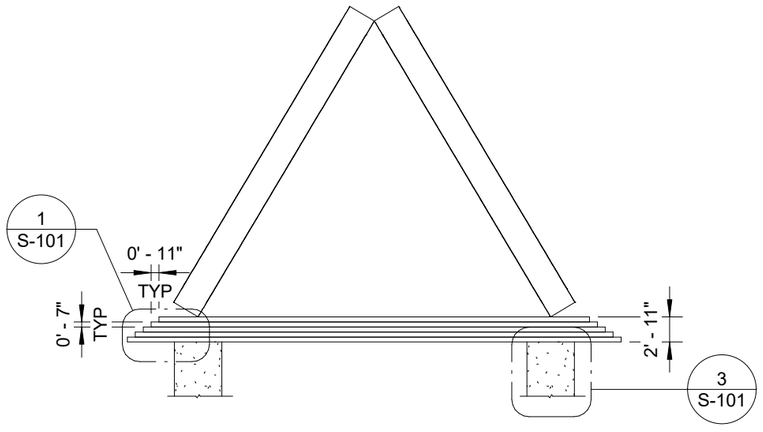
Appendix A - Base Design Drawings



3 Design 1 Isometric



1 Design 1 Plan
1/16" = 1'-0"



2 Design 1 Elevation
1/16" = 1'-0"

BY	DATE	DESCRIPTION

REVISION

CLARK AND SONS CONSTRUCTION
EST. 1956

CLARK AND SONS CONSTRUCTION
10 CLARKSON AVE., POTSDAM, NY, 13699

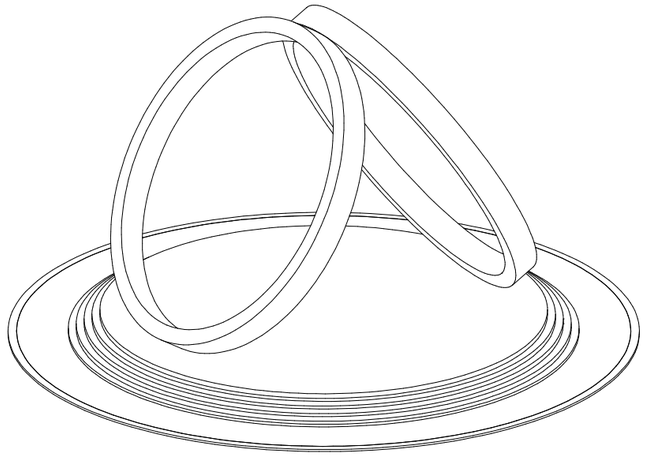
DRAWN BY: CEO	DESIGNED BY: CEO
CHECKED BY: RJW	DATE: 4/16/2020

PROJECT:
Clarkson University Senior Design
FISU Games Preparation

TITLE:
Foundation Design 1

DRAWING NO.: A-101

SCALE: | REVISION:



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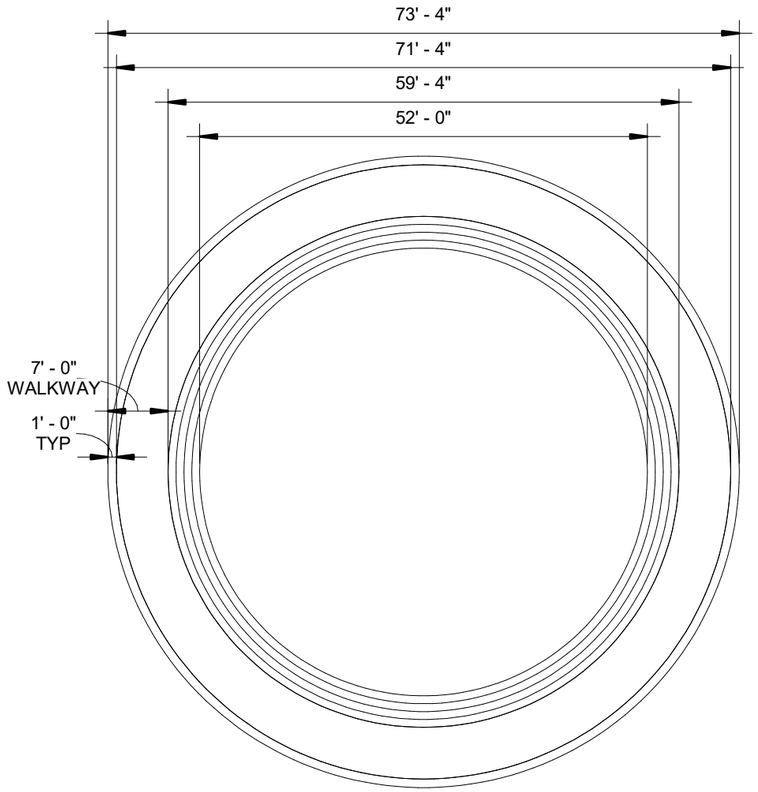

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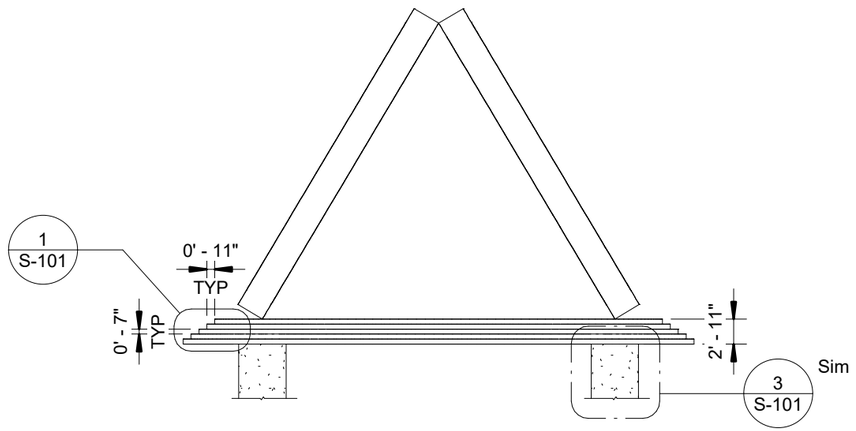

2 Design 2 Elevation
1/16" = 1'-0"

DATE	BY	DESCRIPTION	REVISION

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10 CLARKSON AVE., POTSDAM, NY, 13699

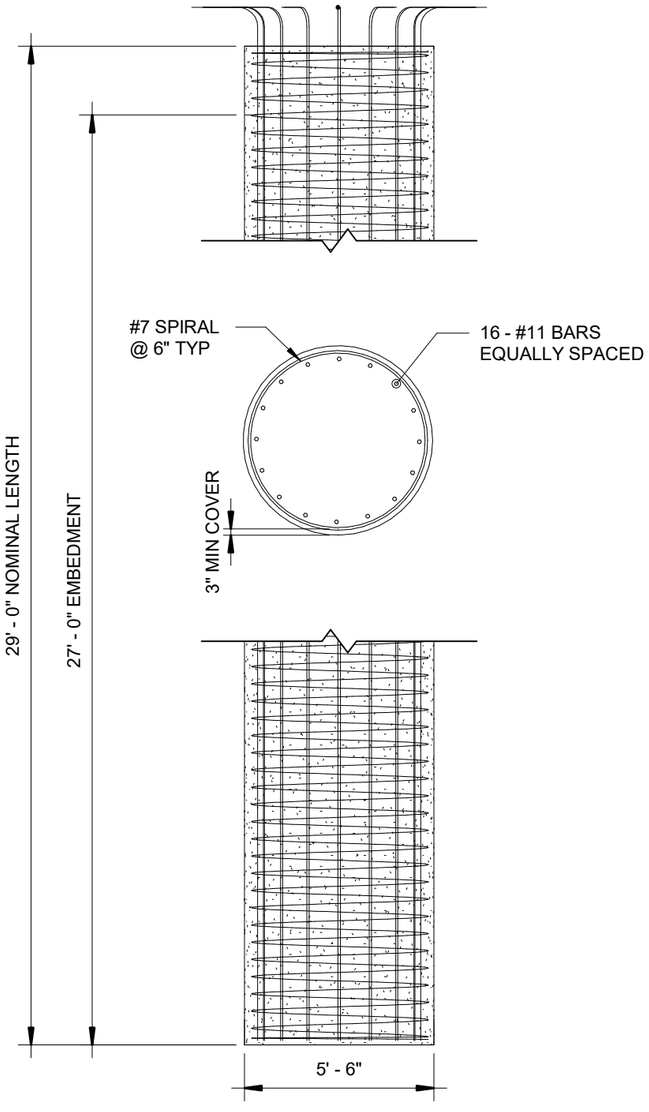
DRAWN BY:	DESIGNED BY:
CEO	CEO
CHECKED BY:	DATE:
RJW	4/16/2020

PROJECT:
Clarkson University Senior Design
FISU Games Preparation

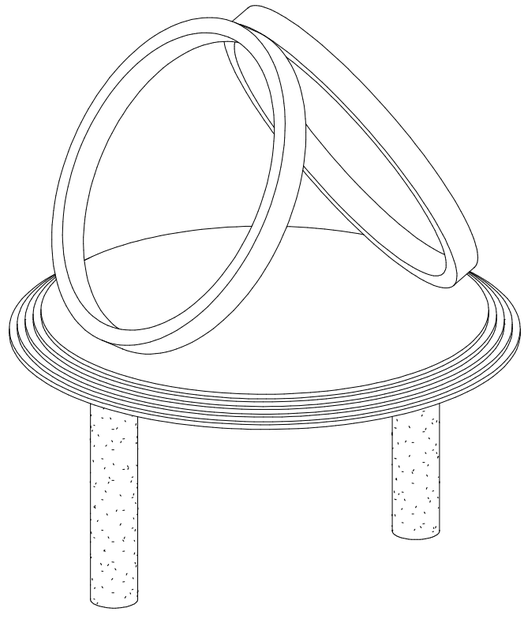
TITLE:
Foundation Design 2

DRAWING NO.: A-102

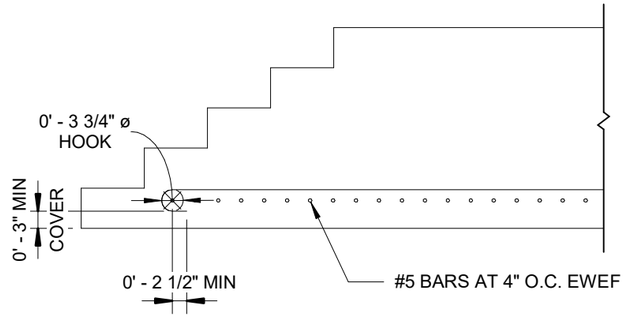
SCALE: | REVISION:



3 Drilled Shaft
1/4" = 1'-0"



2 Design 2 Isometric (Design 1 Sim.)



1 Reinforcing Section
1/2" = 1'-0"

DATE	BY	DESCRIPTION	REVISION

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10 CLARKSON AVE.,
POTSDAM, NY, 13699

DRAWN BY:	DESIGNED BY:
CEO	CEO
CHECKED BY:	DATE:
RJW	4/16/2020

PROJECT:
Clarkson University Senior Design
FISU Games Preparation

TITLE:
Structural Plan

DRAWING NO.: S-101

SCALE: | REVISION:

Appendix A - Site Drawings

DRAWING CONTENTS:

G-100: COVER
C-100: SITE PLAN 1
C-101: SITE PLAN 2
C-110: EROSION AND SEDIMENT CONTROL PLAN
A-101: FOUNDATION DESIGN 1
A-102: FOUNDATION DESIGN 2
S-101: STRUCTURAL PLAN

GENERAL NOTES:

1. SHEETS C-100 and C-101 REPRESENT THE TWO FOUNDATION BASE DESIGNS AVAILABLE TO THE CLIENT. THE SITE PLAN TO BE USED IN CONSTRUCTION IS DEPENDENT UPON THIS CHOICE.
2. UTILITY DATA, WITH THE EXCEPTION OF ELECTRIC UTILITY LOCATIONS, WAS UNAVAILABLE UPON THE TIME OF DRAFTING.
3. NO UTILITY CONNECTIONS ARE PROPOSED WITHIN THIS PLAN SET.

LINEWORK KEY:

PROPERTY BOUNDARY
WATER UTILITY — W —
ELECTRIC UTILITY — E —
STORM UTILITY — S —

REVISION	BY	DATE	DESCRIPTION

CLARK AND SONS CONSTRUCTION
EST 1898

CLARK AND SONS CONSTRUCTION
10 CLARKSON AVE., POTSDAM, NY, 13699

DRAWN BY:	JMC	DESIGNED BY:	JMC
CHECKED BY:	RJW	DATE:	03/05/20

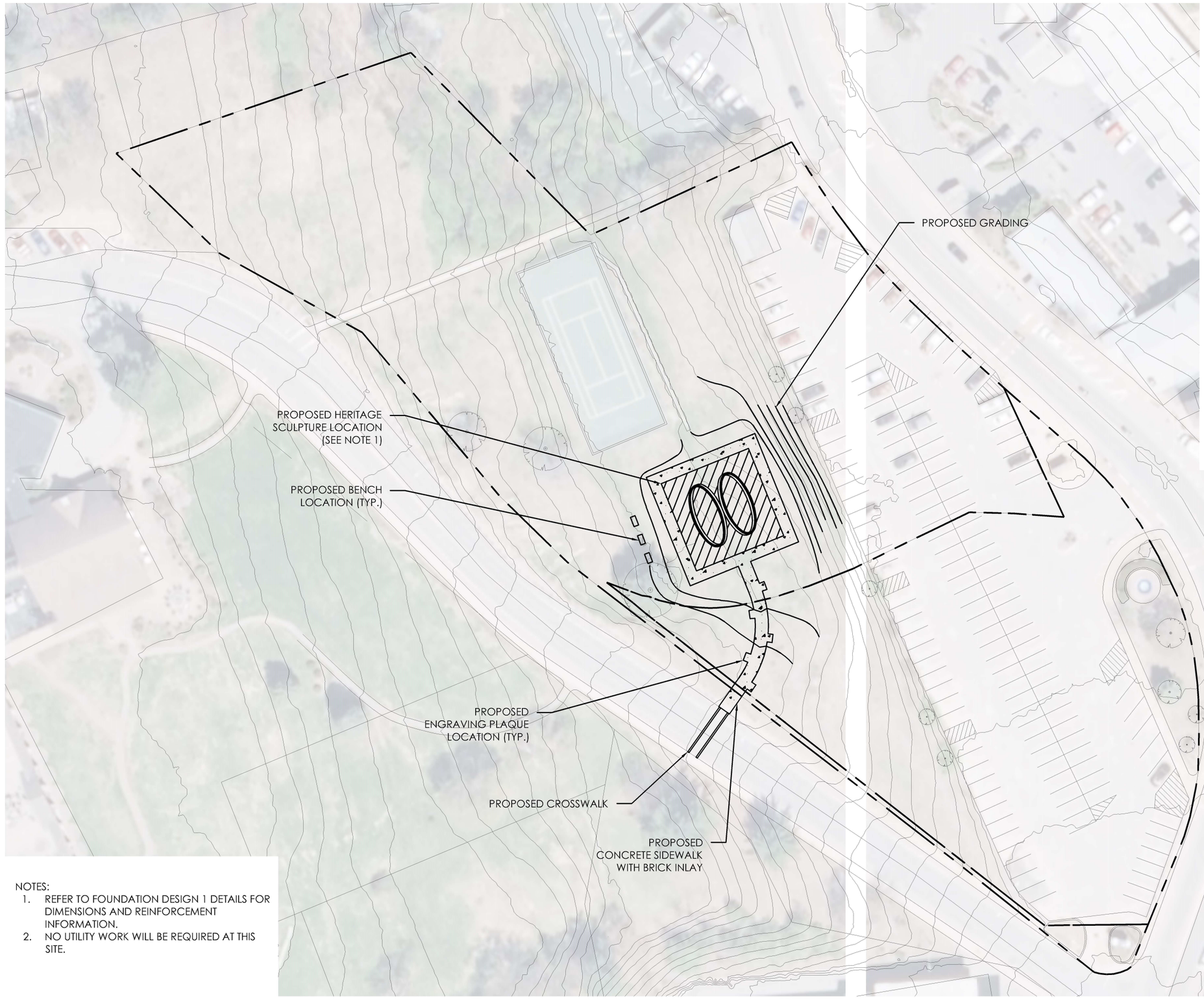
PROJECT:
CLARKSON UNIVERSITY
SENIOR DESIGN
FISU GAMES PREPARATION

TITLE:
COVER

DRAWING NO.: G-100

SCALE: NTS

REVISION:



SITE LOCATION MAP

N

0 15 30 60

SCALE: 1": 60'

NOTES:
1. REFER TO FOUNDATION DESIGN 1 DETAILS FOR DIMENSIONS AND REINFORCEMENT INFORMATION.
2. NO UTILITY WORK WILL BE REQUIRED AT THIS SITE.

REVISION	DESCRIPTION	BY	DATE

CLARK AND SONS CONSTRUCTION

CLARK AND SONS CONSTRUCTION
10 CLARKSON AVE., POTSDAM, NY, 13699

DRAWN BY:	JMC	DESIGNED BY:	JMC
CHECKED BY:	RJW	DATE:	04/16/20

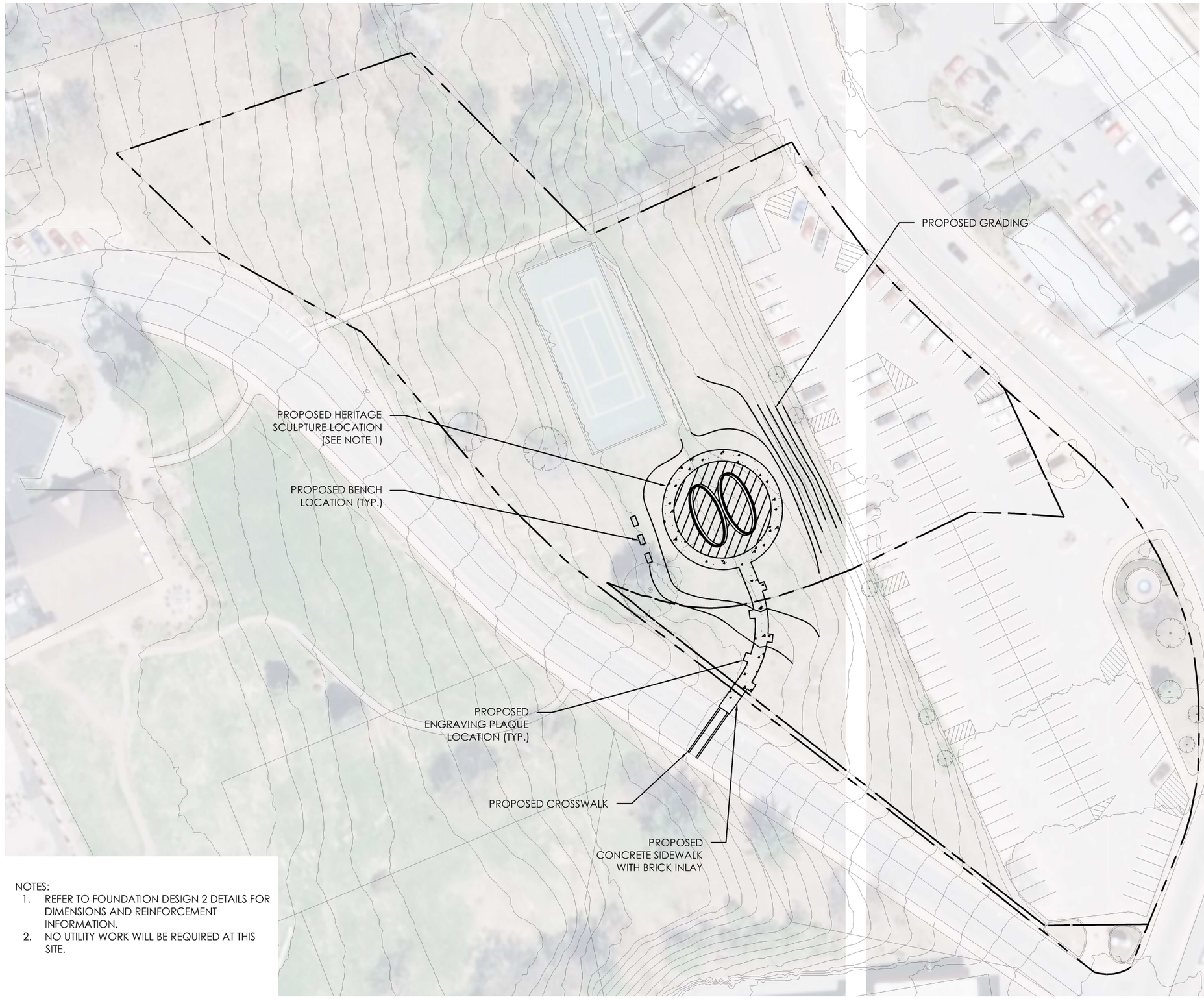
PROJECT:
CLARKSON UNIVERSITY
SENIOR DESIGN
FISU GAMES PREPARATION

TITLE:
SITE PLAN 1

DRAWING NO.: C-100

SCALE: 1":60'

REVISION:



SITE LOCATION MAP

N

0 15 30 60

SCALE: 1": 60'

NOTES:
1. REFER TO FOUNDATION DESIGN 2 DETAILS FOR DIMENSIONS AND REINFORCEMENT INFORMATION.
2. NO UTILITY WORK WILL BE REQUIRED AT THIS SITE.

REVISION	DESCRIPTION	BY	DATE

CLARK AND SONS CONSTRUCTION
EST. 2020

CLARK AND SONS CONSTRUCTION
10 CLARKSON AVE., POTSDAM, NY, 13699

DRAWN BY:	JMC	DESIGNED BY:	JMC
CHECKED BY:	RJW	DATE:	04/16/20

PROJECT:
CLARKSON UNIVERSITY
SENIOR DESIGN
FISU GAMES PREPARATION

TITLE:
SITE PLAN 2

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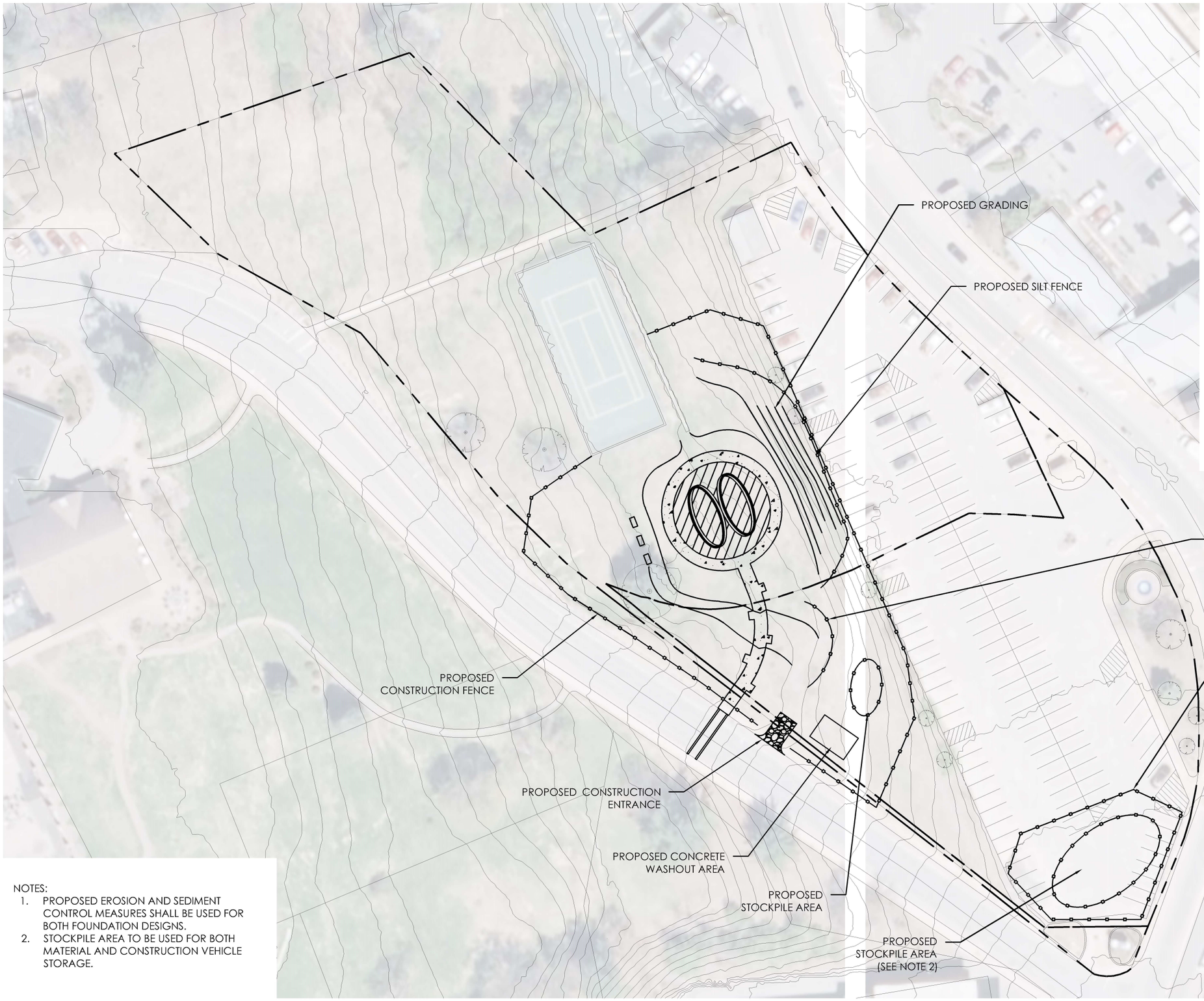


SITE LOCATION MAP

N

0 15 30 60

SCALE: 1": 60'

NOTES:
1. PROPOSED EROSION AND SEDIMENT CONTROL MEASURES SHALL BE USED FOR BOTH FOUNDATION DESIGNS.
2. STOCKPILE AREA TO BE USED FOR BOTH MATERIAL AND CONSTRUCTION VEHICLE STORAGE.

REVISION	DESCRIPTION	BY	DATE

CLARK AND SONS CONSTRUCTION
EST. 2020

CLARK AND SONS CONSTRUCTION
10 CLARKSON AVE., POTSDAM, NY, 13699

DRAWN BY:	JMC	DESIGNED BY:	JMC
CHECKED BY:	RJW	DATE:	04/16/20

PROJECT:
CLARKSON UNIVERSITY
SENIOR DESIGN
FISU GAMES PREPARATION

TITLE:
EROSION AND SEDIMENT CONTROL PLAN

DRAWING NO.: C-110

SCALE: 1":60'

REVISION:

Appendix B - SITES V2 Scorecard

Project Name: _____ Project ID#:_____ Date: _____

SITES v2 Scorecard Summary

YES	?	NO			
7	0	6	**1: SITE CONTEXT**	**Possible Points:**	**13**
Y			**CONTEXT P1.1**	Limit development on farmland	
Y			**CONTEXT P1.2**	Protect floodplain functions	
Y			**CONTEXT P1.3**	Conserve aquatic ecosystems	
Y			**CONTEXT P1.4**	Conserve habitats for threatened and endangered species	
		6	**CONTEXT C1.5**	Redevelop degraded sites	**3 to 6**
4			**CONTEXT C1.6**	Locate projects within existing developed areas	**4**
3			**CONTEXT C1.7**	Connect to multi-modal transit networks	**2 to 3**
0	0	3	**2: PRE-DESIGN ASSESSMENT + PLANNING**	**Possible Points:**	**3**
Y			**PRE-DESIGN P2.1**	Use an integrative design process	
Y			**PRE-DESIGN P2.2**	Conduct a pre-design site assessment	
Y			**PRE-DESIGN P2.3**	Designate and communicate VSPZs	
		3	**PRE-DESIGN C2.4**	Engage users and stakeholders	**3**
8	0	15	**3: SITE DESIGN - WATER**	**Possible Points:**	**23**
Y			**WATER P3.1**	Manage precipitation on site	
Y			**WATER P3.2**	Reduce water use for landscape irrigation	
4		2	**WATER C3.3**	Manage precipitation beyond baseline	**4 to 6**
4		2	**WATER C3.4**	Reduce outdoor water use	**4 to 6**
		5	**WATER C3.5**	Design functional stormwater features as amenities	**4 to 5**
		6	**WATER C3.6**	Restore aquatic ecosystems	**4 to 6**
4	0	36	**4: SITE DESIGN - SOIL + VEGETATION**	**Possible Points:**	**40**
Y			**SOIL+VEG P4.1**	Create and communicate a soil management plan	
Y			**SOIL+VEG P4.2**	Control and manage invasive plants	
Y			**SOIL+VEG P4.3**	Use appropriate plants	
4		2	**SOIL+VEG C4.4**	Conserve healthy soils and appropriate vegetation	**4 to 6**
		4	**SOIL+VEG C4.5**	Conserve special status vegetation	**4**
		6	**SOIL+VEG C4.6**	Conserve and use native plants	**3 to 6**
		6	**SOIL+VEG C4.7**	Conserve and restore native plant communities	**4 to 6**
		6	**SOIL+VEG C4.8**	Optimize biomass	**1 to 6**
		4	**SOIL+VEG C4.9**	Reduce urban heat island effects	**4**
		4	**SOIL+VEG C4.10**	Use vegetation to minimize building energy use	**1 to 4**
		4	**SOIL+VEG C4.11**	Reduce the risk of catastrophic wildfire	**4**
4	20	17	**5: SITE DESIGN - MATERIALS SELECTION**	**Possible Points:**	**41**
Y			**MATERIALS P5.1**	Eliminate the use of wood from threatened tree species	
4			**MATERIALS C5.2**	Maintain on-site structures and paving	**2 to 4**
		4	**MATERIALS C5.3**	Design for adaptability and disassembly	**3 to 4**
		4	**MATERIALS C5.4**	Use salvaged materials and plants	**3 to 4**
		4	**MATERIALS C5.5**	Use recycled content materials	**3 to 4**
	5		**MATERIALS C5.6**	Use regional materials	**3 to 5**
	5		**MATERIALS C5.7**	Support responsible extraction of raw materials	**1 to 5**
		5	**MATERIALS C5.8**	Support transparency and safer chemistry	**1 to 5**
	5		**MATERIALS C5.9**	Support sustainability in materials manufacturing	**5**

YES	?	NO			
10	5	15	**6: SITE DESIGN - HUMAN HEALTH + WELL-BEING**	**Possible Points:**	**30**
		3	**HHWB C6.1**	Protect and maintain cultural and historic places	**2 to 3**
2			**HHWB C6.2**	Provide optimum site accessibility, safety, and wayfinding	**2**
	2		**HHWB C6.3**	Promote equitable site use	**2**
		2	**HHWB C6.4**	Support mental restoration	**2**
		2	**HHWB C6.5**	Support physical activity	**2**
2			**HHWB C6.6**	Support social connection	**2**
		4	**HHWB C6.7**	Provide on-site food production	**3 to 4**
4			**HHWB C6.8**	Reduce light pollution	**4**
		4	**HHWB C6.9**	Encourage fuel efficient and multi-modal transportation	**4**
2			**HHWB C6.10**	Minimize exposure to environmental tobacco smoke	**1 to 2**
	3		**HHWB C6.11**	Support local economy	**3**
2	7	8	**7: CONSTRUCTION**	**Possible Points:**	**17**
Y			**CONSTRUCTION P7.1**	Communicate and verify sustainable construction practices	
Y			**CONSTRUCTION P7.2**	Control and retain construction pollutants	
Y			**CONSTRUCTION P7.3**	Restore soils disturbed during construction	
		5	**CONSTRUCTION C7.4**	Restore soils disturbed by previous development	**3 to 5**
	3	1	**CONSTRUCTION C7.5**	Divert construction and demolition materials from disposal	**3 to 4**
	4		**CONSTRUCTION C7.6**	Divert reusable vegetation, rocks, and soil from disposal	**3 to 4**
2		2	**CONSTRUCTION C7.7**	Protect air quality during construction	**2 to 4**
14	0	8	**8. OPERATIONS + MAINTENANCE**	**Possible Points:**	**22**
Y			**O+M P8.1**	Plan for sustainable site maintenance	
Y			**O+M P8.2**	Provide for storage and collection of recyclables	
		5	**O+M C8.3**	Recycle organic matter	**3 to 5**
4		1	**O+M C8.4**	Minimize pesticide and fertilizer use	**4 to 5**
4			**O+M C8.5**	Reduce outdoor energy consumption	**2 to 4**
4			**O+M C8.6**	Use renewable sources for landscape electricity needs	**3 to 4**
2		2	**O+M C8.7**	Protect air quality during landscape maintenance	**2 to 4**
0	11	0	**9. EDUCATION + PERFORMANCE MONITORING**	**Possible Points:**	**11**
	4		**EDUCATION C9.1**	Promote sustainability awareness and education	**3 to 4**
	3		**EDUCATION C9.2**	Develop and communicate a case study	**3**
	4		**EDUCATION C9.3**	Plan to monitor and report site performance	**4**
0	0	0	**10. INNOVATION OR EXEMPLARY PERFORMANCE**	**Bonus Points:**	**9**
			INNOVATION C10.1	Innovation or exemplary performance	**3 to 9**

YES	?	NO		
49	**43**	**108**	**TOTAL ESTIMATED POINTS**	**Total Possible Points: 200**

KEY		SITES Certification levels	Points
YES	Project confident points are achievable	**CERTIFIED**	70
?	Project striving to achieve points, not 100% confident	**SILVER**	85
NO	Project is unable to achieve these credit points	**GOLD**	100

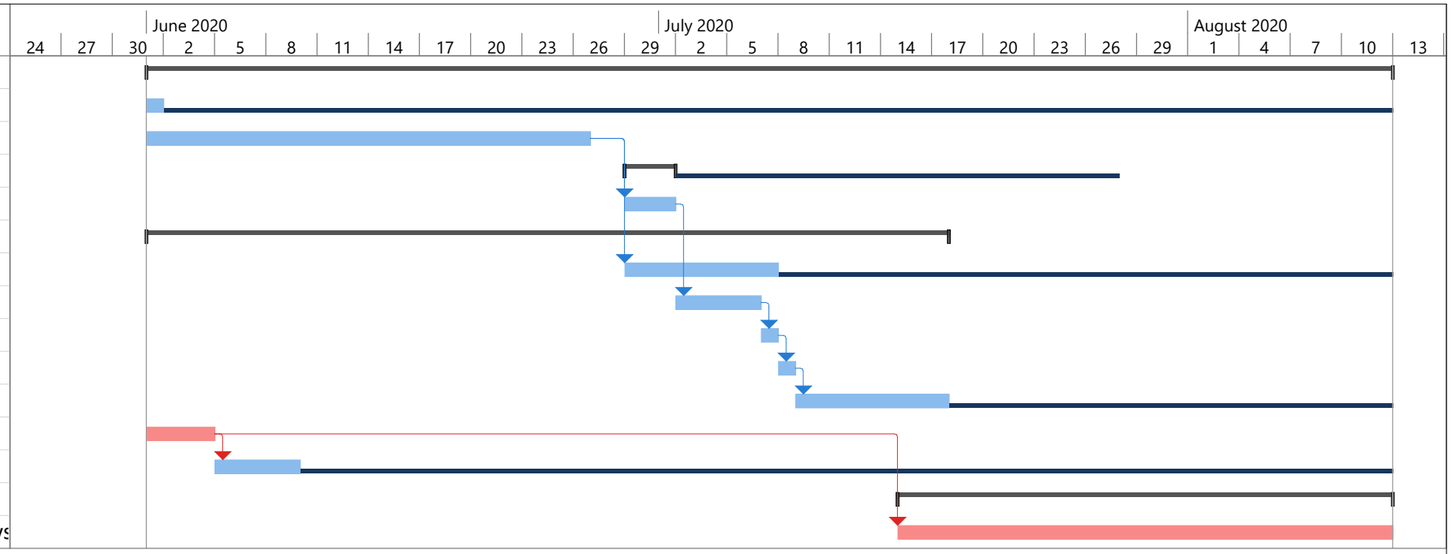
3/3/2020

SITES v2 Scorecard Summary

	5		**MATERIALS C5.10**	Support sustainability in plant production	**1 to 5**	**PLATINUM**	135

Appendix C - Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	**LP Heritage Sculpture**	**53 days**	**6/1/20**	**8/12/20**	
2	Notice-to-Proceed	1 day	6/1/20	6/1/20	
3	Acquire building permit	20 days	6/1/20	6/26/20	
4	**Site Work**	**3 days**	**6/29/20**	**7/1/20**	
5	grading/excavate base	3 days	6/29/20	7/1/20	3
6	**Concrete/Masonry**	**35 days**	**6/1/20**	**7/17/20**	
7	Assemble caisson cages on site	7 days	6/29/20	7/7/20	3
8	Drill caisson/piles	3 days	7/2/20	7/6/20	5
9	form caisson/pile cap	1 day	7/7/20	7/7/20	8
10	pour caisson/pile caps	1 day	7/8/20	7/8/20	9
11	form sidewalk/base	7 days	7/9/20	7/17/20	10
12	pour &finish sidewalk/base	4 days	6/1/20	6/4/20	
13	Sidewalk masonry	3 days	6/5/20	6/9/20	12
14	**Installation**	**21 days**	**7/15/20**	**8/12/20**	
15	Install sculpture/weld	21 days	7/15/20	8/12/20	12FS+28 days



Project: Ring schedule
Date: 4/15/20

Task	Inactive Task	Manual Summary Rollup	External Milestone	Manual Progress
Split	Inactive Milestone	Manual Summary	Deadline	Slack
Milestone	Inactive Summary	Start-only	Critical	
Summary	Manual Task	Finish-only	Critical Split	
Project Summary	Duration-only	External Tasks	Progress	

Appendix D - Engineering Analysis and Calculations

Drilled Shaft Design

Ring Properties:

H_{Ring}, Height of Sculpture	36	ft
B_{Ring}, Base Length of Sculpture	41	ft
ϑ_R, Angle of Single Ring	60.34	Degrees
W_R, Ring Weight (Per Ring)	15.00	tons

Loading Conditions

$Q_{yapplied}$, Vertical Applied Load	166065.50	lb
$Q_{xapplied}$, Horizontal Applied Load	23125.40	lb
$M_{applied}$, Applied Moment	389260.80	lbft

Soil Properties:

Water Table

Υ_w, Unit Weight of Water	62.40	lb/ft^2
d_w, Depth of Water Table	-	ft

Soil Layer #1: **Glacial Till**

Υ_{Sat}, Saturated Unit Weight	102.00	lb/ft^3	*Principles of Geotechnical Engineering by Braja M. Das Table 3.1, Page 68*
E_s, Modulus of Elasticity	519587.25	lb/ft^2	*NYS Geotechnical Design Manual Table 8-17, Page 83*
μ_s, Poisson's Ratio	0.20		*Principles of Geotechnical Engineering by Braja M. Das Table 11.5, Page 402*
φ', Friction Angle	46.4980	Degrees	*Principles of Geotechnical Engineering by Braja M. Das Table 17.24, Page 764*
C_u, Undrained Cohesion	0	lb/ft^2	
d_{S1}, Depth of Soil	9.0	ft	
Soil Type:	Granular		

Soil Layer #2: **Silty Sand**

Υ_{Sat}, Saturated Unit Weight	102.00	lb/ft^3	*Principles of Geotechnical Engineering by Braja M. Das Table 3.1, Page 68*
E_s, Modulus of Elasticity	821370.08	lb/ft^2	*NYS Geotechnical Design Manual Table 8-17, Page 83*
μ_s, Poisson's Ratio	0.20		*Principles of Geotechnical Engineering by Braja M. Das Table 12.1, Page 402*
φ', Friction Angle	52.5376	Degrees	*Principles of Geotechnical Engineering by Braja M. Das Table 17.24, Page 764*
C_u, Undrained Cohesion	0	lb/ft^2	
d_{S2}, Depth of Soil	6	ft	
Soil Type:	Granular		

Drilled Shaft Properties:

D_s, Shaft Diameter	5.50	ft
D_b, Base Diameter	5.50	ft
L_1, Shaft Length (w/o Bell)	29.00	ft
L, Total Shaft Length	29.00	ft
L_e, Embedded Height of Shaft	27.00	ft
A_p, Area of Base	$= \pi D_b^2/4$	
	23.76	ft^2

References

Designed By: James Clark

Checked By: Riley White

p, Shaft Perimeter		$= \pi D_s$	
	17.28	*ft*	
Υ_c, *Unit Weight of NW Concrete*	150.00	lb/ft^3	
W_{ds}, *Weight of Drilled Shaft*	103348.58	*lb*	
ω_{ds}, *Distributed Load at Base*	4350.00	lb/ft^2	
E_p, *Modulus of Elasticity*	4.5948E+08	lb/ft^2	

$Q_{p(Net)}$, Base Bearing Capacity, Granular Soil:

Bearing Capacity Factors

q', Effective Vertical Stress at Base of Shaft	$= \Sigma(\Upsilon_n d_n) - \Upsilon_w d_w$		
	2754.00	lb/ft^2	
N_q, *General Bearing Factor*	18.40		*Principles of Geotechnical Engineering by Braja M. Das Table 16.2, Page 725*
F_{qs}, *Bearing Shape Factor*	$= 1 + \tan(\varphi')$		*Principles of Foundation Engineering by Braja M. Das Equation 10.6, Page 517*
	2.30		
C, Bearing Depth Adjust. Factor	$= 2\tan(\varphi')(1 - \sin(\varphi'))^2$		*Principles of Foundation Engineering by Braja M. Das Equation 10.8, Page 517*
	0.11		
F_{qd}, *Bearing Depth Factor*	$= 1 + C\tan^{-1}(L/D_b)$ (Rad)		*Principles of Foundation Engineering by Braja M. Das Equation 10.7, Page 517*
	1.15		
I_{cr}, *Critical Rigidity Index*	$= 0.5\exp[2.85\cot(45 - \varphi'/2)]$		*Principles of Foundation Engineering by Braja M. Das Equation 10.9, Page 517*
	2234.43		
I_r, *Rigidity Index*	$= Es/(2(1 + \mu s)q'\tan(\varphi'))$		*Principles of Foundation Engineering by Braja M. Das Equation 10.11, Page 518*
	95.23		
p_a, *Atmospheric Pressure*	2000.00	*lb/ft2*	
n, Rigidity Index Factor	$= 0.005(1 - (\varphi' - 25)/20)$		*Principles of Foundation Engineering by Braja M. Das Equation 10.15, Page 518*
	0.0000		
Δ, Rigidity Index Reduction	$= n(q'/p_a)$		*Principles of Foundation Engineering by Braja M. Das Equation 10.14, Page 518*
	0.0000		
I_{rr}, Reduced Rigidity Index	$= I_r/(1 + \Delta I_r)$		*Principles of Foundation Engineering by Braja M. Das Equation 10.10, Page 518*
	95.23		
F_{qc}, *Bearing Cohesion Factor*	p{(-3.8tan(φ') + [(3.07sin(φ'))(log10(2Irr))]/(1 + sin(φ		*Principles of Foundation Engineering by Braja M. Das Equation 10.17, Page 518*
Irr < Icr	0.16		
$Q_{p(net)}$, *Base Bearing Capacity*	$= A_p[q'(N_q - 1)F_{qs}F_{qd}F_{qs}]$		*Principles of Foundation Engineering by Braja M. Das Equation 10.5, Page 516*
	469756.53	*lb*	

Qs, Shaft Frictional Resistance, Granular Soil:

K, Earth Pressure Coeficient	$= 1 - \sin(\varphi')$		*Principles of Foundation Engineering by Braja M. Das Equation 10.22, Page 520*
	0.21		
σ'_o, *Effective Vertical Stress at Any Depth z*	$= \sigma'_o + \Delta\sigma_z$		*Principles of Geotechnical Engineering by Braja M. Das Table 10.8, Page 362*
	2754.00	lb/ft^2	
δ', Friction Angle Correction	$= 0.70\varphi'$ to $0.80\varphi'$		
	36.78	*Degrees*	
f, Unit Frictional Resistance	$= K\sigma'_o\tan(\delta')$		*Principles of Foundation Engineering by Braja M. Das Equation 10.21, Page 520*
	424.56		
Qs, Shaft Frictional Resistance	$= \int_0^{L1} pfdz$		*Principles of Foundation Engineering by Braja M. Das Equation 10.23, Page 520*
	198066.69	*lb*	

Q_u, Ultimate Bearing Capacity (Granular):

Q_u, Ultimate Bearing Capacity	$= Q_{p(net)} + Q_s$		*Principles of Foundation Engineering by Braja M. Das Equation 10.23, Page 520*
	667823.22	*lb*	
FS, Factor of Safety	4.00		
Q_{all}, Allowable Bearing Capacity	$= (Q_{p(net)} + Q_s)/FS$		*Principles of Foundation Engineering by Braja M. Das Equation 10.24, Page 520*
	166955.80	***lb***	

Designed By: James Clark

Checked By: Riley White

Loading vs. Bearing Capacity Check:

Qall >= Qapplied

The bearing capacity of the drilled shaft is sufficient to handle the applied load.

x_o, Ground Line Deflection:

R_I, *Ratio of Moment of Inertia*	1.00		*Principles of Foundation Engineering by Braja M. Das Section 10.12, Page 538*
For Clay Soils			
Q_c, *Chacteristic Load*	$= 7.34 D_s^2 E_p R_I (C_u/E_p R_I)^{0.68}$		*Principles of Foundation Engineering by Braja M. Das Equation 10.44, Page 538*
	0.00E+00	*lb*	
M_c, *Characteristic Moment*	$= 3.86 D_s^3 E_p R_I (C_u/E_p R_I)^{0.46}$		*Principles of Foundation Engineering by Braja M. Das Equation 10.46, Page 538*
	0.00E+00	*lbft*	
For Sandy Soils			
K_p, *Rankine Passive Pressure Cofficient*	$= \tan^2(45 + \varphi'/2)$		*Principles of Foundation Engineering by Braja M. Das Section 10.12, Page 538*
	6.28		
Q_c, *Characteristic Load*	$= 1.57 D_s^2 E_p R_I (\Upsilon' D_s \varphi' K_p/E_p R_I)^{0.57}$		*Principles of Foundation Engineering by Braja M. Das Equation 10.45, Page 538*
	1.38E+08	*lb*	
M_c, *Characteristic Moment*	$= 1.33 D_s^3 E_p R_I (\Upsilon' D_s \varphi' K_p/E_p R_I)^{0.40}$		*Principles of Foundation Engineering by Braja M. Das Equation 10.47, Page 538*
	2.91E+09	*lbft*	
Ground Line Loads			
Q_g, *Ground Shear Load*	$= Q_{xapplied}$		
	23125.40	*lb*	
M_g, *Ground Moment*	$= M_{applied}$		
	389260.80	*lbft*	
Q_g/Q_c, *Ground Shear Load Ratio*	0.0002		
M_g/M_c, *Ground Moment Ratio*	0.0001		
Head Fixture State:	Free Head		
x_o/D_s, *Deflection Ratio*	From Figure 10.20 for Clay From Figure 10.21 for Sand		*Principles of Foundation Engineering by Braja M. Das Figure 10.20 and Figure 10.21, Page 540*
	0.0048		
x_o, Shaft Deflection	**0.32**	***in***	*Principles of Foundation Engineering by Braja M. Das Section 10.12, Page 540*

Shaft Deflection Check:

x_{Max}, *Maximum Allowed Head Deflection*	0.50	*in*	*Chosen at Engineer's Discretion*

xMax >= xo

The drilled shaft meets the deflection requirements.

Shear Reinforcement:

f_c', *Concrete Strength*	4000	*psi*
f_{yt}, *Steel Tensile Strength*	60000	*psi*
C, Min. Reinforcement Cover	3.00	*in*
A_g, *Gross Concrete Area*	3421.19	in^2
A_{ch}, *Core Concrete Area*	$= \pi (r_s - c)^2$	
	2827.43	in^2
d, Adjusted Shaft Diameter	$= 0.80 D_s$	
	52.80	*in*
V_u, *Ultimate Shaft Strength*	$= V_c + V_s = Q_g$	
	23.13	*kip*

V_c, *Concrete Shear Strength*	$= 2(1 + 36000/(2000A_g))(4000)^{1/2} dD_s$	*ACI 318-14 Section 22.5.6.1*
	443.12 *kip*	
V_s, *Required Steel Strength*	$= V_u - V_c$	
	0.00 *kip*	
ρ_s, *Minimum Steel Reinforcement*	$= 0.45(Ag/Ach - 1)(fc'/fyt)$	*ACI 318-14 Section 25.7.3.3*
	0.0063	
L_{sp}, *Length of One Spiral Turn*	$= 2\pi(r_s - c)$	
	188.50 *in*	
A_{sp}, *Provided Steel Area*	Use #4 Rebar	
	0.60 in^2	
L_c, *Spacing of Spiral Bar*	$= (A_{sp} L_{sp}/A_{ch}\rho_s)$	*ACI 318-14 Section Chapter 2*
	6.35 *in*	
	Use #7 Bars at 6 in. Spiral Spacing	

Longitudinal Reinforcement:

Υ, *Coverage Ratio*	$= (D_s - 2(1.5C))/D_s$	*Reinforced Concrete Mechanics and Design - 6th Edition Section 11-3, Page 506*
	0.86	
Axial Load-Gross Area Ratio	$= 0.75P_y/A_g$	*Reinforced Concrete Mechanics and Design - 6th Edition Page 540*
	0.04 kip/in^2	
Moment-Gross Area Ratio	$= 0.75M_{applied}/A_g h$	*Reinforced Concrete Mechanics and Design - 6th Edition Page 541*
	0.02 kip/in^2	
ρ_{g1}, *Steel Ratio*	For Υ = 0.75	*Reinforced Concrete Mechanics and Design - 6th Edition Figure A-13b, Page 1128*
	< 0.01	
ρ_{g2}, *Steel Ratio*	For Υ = 0.9	*Reinforced Concrete Mechanics and Design - 6th Edition Figure A-13c, Page 1129*
	< 0.01	
ρ_g, *Interpolated Steel Ratio*	0.01	
A_{st}, *Required Steel Area*	$= \rho_g A_g$	
	34.21 in^2	
A_{sp}, *Provided Steel Area*	Use 16 #11 Bars	
	24.96 in^2	
L_c, *Spacing of Longitudinal Bar*	11.78 *in*	
	Use 16 #11 Bars at ~9.5 in. Spacing	

SOIL PROPERTIES

-IN-SITU SOILS ARE of BROWN SAND (GRANULAR) WITH TRACE TO SOME GRAVEL AND SILT AND VARYING COMPACTION.
- GROUNDWATER TABLE NOT ENCOUNTERED IN ANY BORINGS UP TO 15'-0".

FOR LOOSE ANGULAR-GRAINED SILTY SAND:

DRY UNIT WEIGHT, $\gamma_d = 102\ lb/ft^3$ — ACCORDING TO PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS, TABLE 5.1, PAGE 68.

COHESION, $C' = 0\ lb/ft^3$

-STANDARD HAMMER WEIGHT AND FALL HEIGHT USED (60% ENERGY).

ASSUME 2 SOIL LAYERS:

SOIL LAYER #1:

DEPTH = 0.0 ft TO 9.0 ft

$d_1 = (9.0\ ft)$

$\sigma'_{o1} = d_1 \gamma$

$= (9.0\ ft)(102\ lb/ft^3)$

$= (918.0000\ lb/ft^2)$

$$N_{60,AVE} = \frac{(6+7)+(11+8)+(9+12)+(6+5)+(20+28)+(13+22)}{6}$$

$$= \frac{(147)}{6} = (24.5000)$$

ATMOSPHERIC PRESSURE, $P_a = 2116.2166\ lb/ft^2$

CORRECTION NUMBER, $C_N = \left(\frac{1}{\frac{\sigma'_o}{P_a}}\right)^{0.50}$ — ACCORDING TO PRINCIPLES & GEOTECHNICAL ENGINEERING BY BRAJA M. DAS, EQUATION 17.10, PAGE 761.

$$C_N = \left(\frac{1}{\frac{(918.0000\ lb/ft^2)}{(2116.2166\ lb/ft^2)}}\right)^{0.50}$$

$$= \left(\frac{1}{(0.4338)}\right)^{0.50} = (2.3052)^{0.50} = (1.5183)$$

CORRECTED BLOW COUNT, $N_1(60) = C_N N_{60}$ — ACCORDING TO PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS, EQUATION 17.9, PAGE 761.

$N_1(60) = (1.5183)(24.5000)$

$= (37.1984)$

SOIL LAYER #2:

DEPTH = 9.0 ft TO 15.0 ft

$d_2 = (6.0\ ft)$

$\sigma'_{o2} = d_2 \gamma + d_1 \gamma$

$= (6.0\ ft)(102\ lb/ft^3) + (9.0\ ft)(102\ lb/ft^3)$

$= (612.0000\ lb/ft^2) + (918.0000\ lb/ft^2) = (1530.0000\ lb/ft^2)$

$$N_{60,AVE} = \frac{(38+54)+(40+58)+(51+88)+(29+54)}{4}$$

$$= \frac{(412)}{4} = (103) \rightarrow \text{LIMIT MAX } N_{60,AVE} \text{ TO } 50.$$

SOIL PROPERTIES (CONTINUED)

CORRECTION NUMBER, $C_N = \left(\frac{1}{\frac{\sigma_o'}{P_a}}\right)^{0.50}$

PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS EQUATION 7.10, PAGE 761.

$$C_N = \left(\frac{1}{\frac{(1530.0000\ lb/ft^2)}{(2116.2166\ lb/ft^2)}}\right)^{0.50}$$

$$= \left(\frac{1}{(0.7230)}\right)^{0.50} = (1.3831)^{0.50} = (1.1761)$$

CORRECTED BLOW COUNT, $N_{1(60)} = C_{N_2} N_{60,2}$

PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS EQUATION 17.9, PAGE 761.

$$N_{1(60)} = (1.1761)(50)$$

$$= \boxed{(58.8037)}$$

CORRELATED VALUES:

SOIL LAYER #1:

$N_{60,1} = (24.5000)$

$N_{1(60),1} = (37.1984)$

$$\phi_1' = \tan^{-1}\left(\frac{N_{60,1}}{12.2 + 20.3\left(\frac{\sigma_o'}{P_a}\right)}\right)^{0.34}$$

PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS EQUATION 17.24, PAGE 764.

$$= \tan^{-1}\left(\frac{(24.5000)}{12.2 + 20.3\ \frac{(918.0000\ lb/ft^2)}{(2116.2166\ lb/ft^2)}}\right)^{0.34}$$

$$= \tan^{-1}\left(\frac{(24.5000)}{12.2 + 20.3\ (0.4338)}\right)^{0.34}$$

$$= \tan^{-1}\left(\frac{(24.5000)}{12.2 + 8.8060}\right)^{0.34}$$

$$= \tan^{-1}(1.1663)^{0.34} = \tan^{-1}(1.0537) = \boxed{(46.4980^\circ)}$$

ELASTIC MODULUS, $E_s = 97 N_{1(60),1}$

NYS GEOTECHNICAL DESIGN MANUAL, TABLE 8-17 PAGE 83

$$= 97\ (37.1984)$$

$$= \boxed{(3608.2448\ lb/in^2)}$$

SOIL LAYER #2:

$N_{60,2} = (50)$

$N_{1(60)_2} = (58.8037)$

$$\phi_1' = \tan^{-1}\left(\frac{N_{1(60),2}}{12.2 + 20.3\left(\frac{\sigma_o'}{P_a}\right)}\right)^{0.34}$$

PRINCIPLES of GEOTECHNICAL ENGINEERING BY BRAJA M. DAS EQUATION 17.24, PAGE 764

$$= \tan^{-1}\left(\frac{(58.8037)}{12.2 + 20.3\left(\frac{(1530.0000\ lb/ft^2)}{(2116.2166\ lb/ft^2)}\right)}\right)^{0.34}$$

$$= \tan^{-1}\left(\frac{(58.8037)}{12.2 + 20.3\ (0.7230)}\right)^{0.34}$$

$$= \tan^{-1}(2.1879)^{0.34} = \tan^{-1}(1.3050) = \boxed{(52.5376^\circ)}$$

ELASTIC MODULUS, $E_s = 97 N_{1(60),2}$

NYS GEOTECHNICAL DESIGN MANUAL, TABLE 8-17 PAGE 83

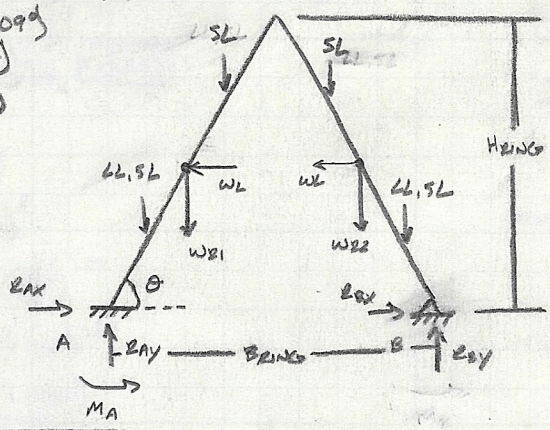
$$= 97\ (58.8037)$$

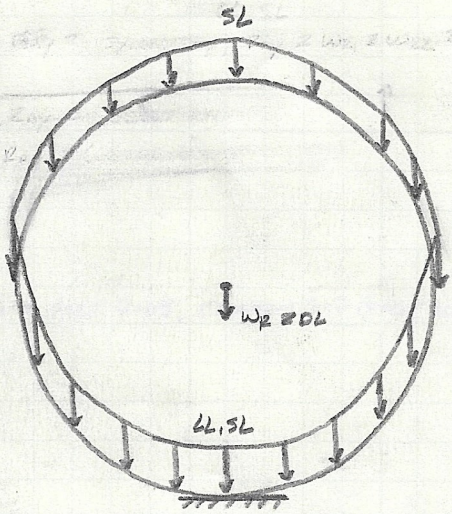
$$= \boxed{(5703.9589\ lb/in^2)}$$

FREE BODY DIAGRAM

$W_{E1} = W_{E2} = (15 \text{ TONS})$ FOR ALUMINUM
$= (35 \text{ TONS})$ FOR STEEL

$\theta_2 = (60.3409°)$
$H_{RING} = (30 \text{ ft})$
$B_{RING} = (41 \text{ ft})$





OCCUPANCY CATEGORY: II

FROM ASCE 7-05, 2015 IBC, AND NYS IBC SUPPLEMENTS

$LL = (20 \text{ lb/ft}^2)$ ACCORDING TO ASCE 7-05, TABLE 4-1, ROOFS - ALL OTHER CONSTRUCTION (PAGE 13)

WIND LOAD (ASCE 7-05, CHAPTER 6)

SUGGESTED USE OF WIND LOAD DESIGN METHOD 3 - WIND TUNNEL PROCEDURE. — ACCORDING TO ASCE 7-05, SECTION 6.6 (PAGE 30)

FOR SAKE OF SCHEMATIC DESIGN, ASSUME METHOD 2 - ANALYTICAL PROCEDURE. — ACCORDING TO ASCE 7-05, SECTION 6.5 (PAGE 25)

$V = (90 \text{ MPH})$
$= (132 \text{ ft/s})$ — ACCORDING TO ASCE 7-05, SECTION 6.5.4, AND FIGURE 6-1 (PAGE 33)

$K_d = (0.85)$ FOR OPEN SIGNS AND LATTICE FRAMEWORK — ACCORDING TO ASCE 7-05, SECTION 6.5.4.4 AND TABLE 6-4 (PAGE 80)

$I = (1.00)$ FOR OCCUPANCY CATEGORY II BUILDINGS — ACCORDING TO ASCE 7-05, SECTION 6.5.5 AND TABLE 6-1 (PAGE 77)

SURFACE ROUGHNESS: C
EXPOSURE CATEGORY: C OR D — ACCORDING TO ASCE 7-05, SECTION 6.5.6.2 AND 6.5.6.3 (PAGES 25 AND 26)

$K_h = (1.22)$ FOR $z = (40 \text{ ft})$, EXPOSURE CATEGORY D
$z_g = (700 \text{ ft})$ FOR EXPOSURE CATEGORY D
$\alpha = (11.5)$ — ACCORDING TO ASCE 7-05, TABLE 6-3 AND TABLE 6-2 (PAGES 78 AND 79)

FOR $15 \text{ ft} \le z = (40 \text{ ft}) \le z_g = (700 \text{ ft})$

$K_z = 2.01 (z/z_g)^{2/\alpha}$
$= 2.01 \left(\frac{(40 \text{ ft})}{(700 \text{ ft})} \right)^{\frac{2}{11.5}}$
$= 2.01 (0.0571)^{0.1739}$
$= 2.01 (0.6079)$
$= (1.2218)$

$K_{zt} = (1.00)$ — ACCORDING TO ASCE 7-05, SECTION 6.5.7.2 (PAGE 26)

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GUST EFFECT FACTOR:

$\bar{z} = (56\text{ ft})$

FROM ASCE 7-05, TABLE 6-2 (PAGE 79):

$l = (650\text{ ft})$

$\bar{\epsilon} = \frac{1}{0.80} = \frac{(1.00)}{(0.80)} = (1.25)$

$c = (0.15)$

$z_{min} = (7\text{ ft})$

$L_z = L\left(\frac{\bar{z}}{33}\right)^{\bar{\epsilon}}$ ACCORDING TO ASCE 7-05, EQUATION 6-7 (PAGE 26)

$= (650\text{ ft})\left(\frac{(76\text{ ft})}{33}\right)^{1.25}$

$= (650\text{ ft})(0.2121)^{1.25}$

$= (650\text{ ft})(0.1440)$

$= (93.5715\text{ ft})$

$Q = \sqrt{\frac{1}{1+0.63\left(\frac{B+h}{L_z}\right)^{0.63}}}$ ACCORDING TO ASCE 7-05, EQUATION 6-6 (PAGE 26)

$= \sqrt{\frac{1}{1+0.63\left(\frac{(41\text{ ft}+36\text{ ft})}{(93.5715\text{ ft})}\right)^{0.63}}}$

$= \sqrt{\frac{1}{1+0.63\left(\frac{(76\text{ ft})}{(93.5715\text{ ft})}\right)^{0.63}}}$

$= \sqrt{\frac{1}{1+0.63(0.8122)^{0.63}}}$

$= \sqrt{\frac{1}{1+0.63(0.8772)}}$

$= \sqrt{\frac{1}{1+0.5526}}$

$= \sqrt{\frac{1}{(1.5526)}}$

$= \sqrt{(0.6441)}$

$= (0.8025)$

$I_{\bar{z}} = c\left(\frac{33}{\bar{z}}\right)^{1/6}$ ACCORDING TO ASCE 7-05, EQUATION 6-5 (PAGE 26)

$= (0.15)\left(\frac{33}{(56\text{ ft})}\right)^{1/6}$

$= (0.15)(0.9167)^{1/6}$

$= (0.15)(0.9856)$

$= (0.1478)$

$g_Q = g_V = (3.4)$ ACCORDING TO ASCE 7-05, SECTION 6.5.8.1 (PAGE 26)

$G = 0.925\left(\frac{(1+1.7g_Q I_{\bar{z}} Q)}{(1+1.7g_V I_{\bar{z}})}\right)$ ACCORDING TO ASCE 7-05, EQUATION 6-4 (PAGE 26)

$= 0.925\left(\frac{(1+1.7(3.4)(0.1478)(0.8025))}{(1+1.7(3.4)(0.1478))}\right)$

$= 0.925\left(\frac{(1+(5.78)(0.1186))}{(1+(5.78)(0.1478))}\right)$

$= 0.925\left(\frac{(1+(0.6858))}{(1+(0.8545))}\right)$

$= 0.925\left(\frac{(1.6858)}{(1.8545)}\right)$

$= 0.925(0.9090)$

$= (0.8408)$

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VELOCITY PRESSURE:

$q_z = 0.00256 K_z K_{zt} K_d V^2 I$

$= 0.00256 (1.221 \text{ lb/ft}^2)(1.00)(0.85)(90 \text{ MPH})^2 (1.00)$

$= (0.00313)(0.85)(8100 \text{ MPH}^2)$

$= (0.00266)(8100 \text{ MPH}^2)$

$= (21.5357 \text{ lb/ft}^2)$

FORCE COEFFICIENT:

$A_{gT} = A_{RWGT} \sin(\theta)$

$= (\pi (20 \text{ ft})^2) \sin(60.3409)$

$= \pi (400 \text{ ft}^2)(0.8690)$

$= (1256.6371 \text{ ft}^2)(0.8690)$

$= (1091.9986 \text{ ft}^2)$

$A_S = (A_{RWGT} - A_{RWO\,NOID}) \sin(\theta)$

$= ((1256.6371 \text{ ft}^2) - \pi (18.15 \text{ ft})^2) \sin(60.3409)$

$= ((1256.6371 \text{ ft}^2) - \pi (329.4225 \text{ ft}^2))(0.8690)$

$= ((1256.6371 \text{ ft}^2) - (1034.9113 \text{ ft}^2))(0.8690)$

$= (221.7258 \text{ ft}^2)(0.8690)$

$= (192.6763 \text{ ft}^2)$

$\epsilon = \frac{A_S}{A_{gT}}$ — ACCORDING TO ASCE 7-05, FIGURE 6-22, NOTE 4 (PAGE 75)

$= \frac{(192.6763 \text{ ft}^2)}{(1091.9986 \text{ ft}^2)}$

$= (0.1764)$

$C_F = (1.8)$ FOR FLAT SIDED MEMBERS WITH $\epsilon = 0.10$ TO 0.29 — ACCORDING TO ASCE 7-05, FIGURE 6-22 (PAGE 75)

DESIGN WIND LOAD:

$F_W = q_z G C_F A_F$ — ACCORDING TO ASCE 7-05, SECTION 6.5.15 (PAGE 29)

$= (21.5357 \text{ lb/ft}^2)(0.8408)(1.8)(192.6763 \text{ ft}^2)$

$= (18.1072 \text{ lb/ft}^2)(346.8174 \text{ ft}^2)$

$= (6279.8977 \text{ lb})$

(OR)

$w_L = q_z G C_F$

$= (21.5357 \text{ lb/ft}^2)(0.8408)(1.8)$

$= (18.1072 \text{ lb/ft}^2)(1.8)$

$= (32.5930 \text{ lb/ft}^2)$

SNOW LOAD (ASCE 7-05 CHAPTER 7)

$P_g = (80 \text{ lb/ft}^2)$ FOR LAKE PLACID, NY. — ACCORDING TO 2017 UNIFORM CODE SUPPLEMENT FOR NYS, FIGURE R301.2(5) (PAGE 28)

$C_e = (0.80)$ FOR FULLY EXPOSED ROOF IN TERRAIN CATEGORY D. — ACCORDING TO ASCE 7-05, SECTION 7.3.1 AND TABLE 7-2 (PAGE 92)

$C_t = (1.2)$ FOR UNHEATED STRUCTURES — ACCORDING TO ASCE 7-05, SECTION 7.3.2 AND TABLE 7-3 (PAGE 93)

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$I = (1.0)$ FOR ESL CATEGORY II BUILDINGS — ACCORDING TO ASCE 7-05, SECTION 7.3.3 AND TABLE 7-4 (PAGE 93)

FLAT ROOF SNOW LOAD:

$P_f = 0.70 C_e C_t I P_g$

$= 0.70(0.80)(1.20)(1.00)(80 lb/ft^2)$

$= (0.56)(1.20)(80 lb/ft^2)$

$= (0.6720)(80 lb/ft^2)$

$= (53.7600 lb/ft^2)$

SEISMIC DESIGN

ASSUME SITE CLASS D

$S_s \approx (0.47)$ — ACCORDING TO ASCE 7-05, FIGURE 22-1 (PAGE 211)

$S_1 \approx (0.10)$ — ACCORDING TO ASCE 7-05, FIGURE 22-2 (PAGE 218)

$F_a = \frac{(1.4-1.6)}{(0.50-0.25)}(0.47-0.25) + (1.6)$ — ACCORDING TO ASCE 7-05, TABLE 11.4-1 (PAGE 115)

$= \frac{(-0.20)}{(0.25)}(0.22) + (1.6)$

$= (-0.80)(0.22) + (1.6)$

$= (-0.176) + (1.6)$

$= (1.424)$

$F_v = (2.4)$ — ACCORDING TO ASCE 7-05, TABLE 11.4-2 (PAGE 115)

$S_{MS} = F_a S_s$ — ACCORDING TO ASCE 7-05, EQUATION 11.4-1 (PAGE 115)

$= (1.424)(0.47)$

$= (0.6693)$

$S_{M1} = F_v S_1$ — ACCORDING TO ASCE 7-05, EQUATION 11.4-2 (PAGE 115)

$= (2.4)(0.10)$

$= (0.2400)$

$S_{DS} = \frac{2}{3} S_{MS}$ — ACCORDING TO ASCE-7-05, EQUATION 11.4-3 (PAGE 115)

$= \frac{2}{3}(0.6693)$

$= (0.4462)$

$S_{D1} = \frac{2}{3} S_{M1}$ — ACCORDING TO ASCE 7-05, EQUATION 11.4-4 (PAGE 115)

$= \frac{2}{3}(0.2400)$

$= (0.1600)$

$I = (1.00)$ FOR OCCUPANCY CATEGORY I STRUCTURES — ACCORDING TO ASCE 7-05, TABLE 11.5-1 (PAGE 116)

SEISMIC DESIGN CATEGORY: C — ACCORDING TO ASCE 7-05, TABLE 11.6-1 (PAGE 116)

THE ASCE 7-05 MANUAL SUGGESTS CONDUCTING A GEOTECHNICAL INVESTIGATION ON SLOPE STABILITY, LIQUEFACTION, DIFFERENTIAL SETTLEMENT, ETC. FOR THE SITE.

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$R = (2)$

$\Omega_0 = (2)$ FOR AMUSEMENT STRUCTURES AND MONUMENTS — ACCORDING TO ASCE 7-05, TABLE 15.4-2 (PAGE 169)

$C_d = (2)$

FOR ALUMINUM SUPERSTRUCTURE: — ACCORDING TO ASCE 7-05, EQUATION 15.4-5 (PAGE 164)

$V = 0.50 S_{DS} W I$

$= 0.50 (0.4462)(30000\,lb)(1.00)$

$= (0.1339)(30000\,lb)$

$= \boxed{4015.8000\,lb}$

FOR STEEL SUPERSTRUCTURE:

$V = 0.50 S_{DS} W I$

$= 0.50 (0.4462)(70000\,lb)(1.00)$

$= (0.1339)(70000\,lb)$

$= \boxed{9370.2000\,lb}$

$\rho = (1.0)$ — ACCORDING TO ASCE 7-05, SECTION 12.3.4 (PAGE 165)

$E_h = \rho Q_E$ — ACCORDING TO ASCE 7-05, SECTION 15.6 AND SECTION 12.4.2.1 (PAGES 165 AND 126)

$= (1.0) Q_E$

$= \boxed{Q_E = V}$

$E_V = 0.20 S_{DS} D$

$= 0.20 (0.4462) D$

$= \boxed{(0.0892) D}$

USE REFERENCE DOCUMENTS FOR FURTHER SEISMIC ANALYSIS OF STRUCTURE. FOR NOW, ASSUME LATERAL AND VERTICAL LOADS AS SHOWN ABOVE. — ACCORDING TO ASCE 7-05, SECTION 15.6.3 (PAGE 166)

ICE LOAD (CHAPTER 10)

$d_{RWG} = (3.8\,ft)$ (RWG WIDTH/DEPTH)

$t_{RWG} = (1.85\,ft)$ (RWG THICKNESS)

USE $\boxed{f_z = (1.00)}$ — ACCORDING TO ASCE 7-05, SECTION 10.4.3 (PAGE 100)

$I = (1.00)$ — ACCORDING TO ASCE 7-05, TABLE 10-1 (PAGE 100)

$K_{zt} = (1.00)$ — ACCORDING TO ASCE 7-05, SECTION 6.5.7.2 (PAGE 26)

$t = (0.75\,in)$ — ACCORDING TO ASCE 7-05, FIGURE 10-2 (PAGE 105)

$t_d = 2.0\, t\, I\, f_z\, (K_{zt})^{0.35}$ — ACCORDING TO ASCE 7-05, EQUATION 10-5 (PAGE 100)

$= 2.0 (0.75\,in)(1.00)(1.00)(1.00)^{0.35}$

$= (1.50\,in)(1.00)$

$= \boxed{(1.50\,in)}$

$D_0 = \sqrt{d_{RWG}^2 + t_{RWG}^2}$ — ACCORDING TO ASCE 7-05, FIGURE 10-1 (PAGE 101)

$= \sqrt{(3.80\,ft)^2 + (1.85\,ft)^2}$

$= \sqrt{(10.89\,ft^2) + (3.4225\,ft^2)}$

$= \sqrt{(14.3125\,ft^2)}$

$= (3.7832\,ft) = \boxed{(45.3982\,in)}$

$A_i = \pi t_d (D_0 + t_d)$ — ACCORDING TO ASCE 7-05, EQUATION 10-1 (PAGE 100)

$= \pi (1.50\,in)((45.3982\,in) + (1.50\,in))$

$= (4.7124\,in)(46.8982\,in)$

$= (221.0027\,in^2) = \boxed{1.5347\,ft^2}$

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$P_i = (56\ lb/ft^3)$

ACCORDING TO ASCE 7-05, SECTION 10.4.1 (PAGE 100)

$C_{RING} = \pi D_{RING}$
$= \pi(40\ ft)$
$= (125.6637\ ft)$

$W_i = A_i C_{RING} P_i$
$= (1.5347\ ft^2)(125.6637\ ft)(56\ lb/ft^3)$
$= (192.8613\ ft^3)(56\ lb/ft^3)$
$= (10800.2813\ lb)$

LOADING COMBINATIONS

DEAD LOAD (w/ ICE LOAD):

$DL_x = (0\ kip)$
$DL_y = (30\ kip)$ FOR ALUMINUM $DL_y = (70\ kip)$ FOR STEEL
$DL_{ix} = (0\ kip)$
$DL_{iy} = (10.8002\ kip)$

LIVE LOAD:

$LL_x = (0\ kip)$
$LL_y = LL\left(\frac{C}{2}\right) d_E$
$= (0.0200\ kip/ft^2)\left(\frac{(125.6637\ ft)}{2}\right)(3.30\ ft)$
$= (0.0660\ kip/ft)(62.8319\ ft)$
$= (4.1469\ kip)$

SNOW LOAD:

$SL_x = (0\ kip)$
$SL_y = P_E C d_E$
$= (0.05376\ kip/ft^2)(125.6637\ ft)(3.30\ ft)$
$= (6.7557\ kip/ft)(3.30\ ft)$
$= (22.2937\ kip) = (11.1469\ kip/HALF\ of\ RING)$

WIND LOAD:

$WL_x = WLA_E$
$= (0.03259\ kip/ft^2)(221.7258\ ft^2)$
$= (7.2267\ kip)$

$WL_y = (0\ kip)$

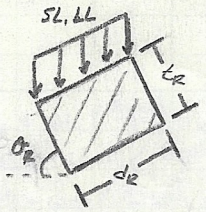
SEISMIC LOAD:

$E_x = V$
$= (4.0158\ kip)$ FOR ALUMINUM
$= (9.3702\ kip)$ FOR STEEL

$E_y = 0.0892(DL_y + DL_{iy})$
$= (0.0892)((30\ kip) + (10.8002\ kip))$
$= (0.0892)(40.8002\ kip)$
$= (3.6410\ kip)$ FOR ALUMINUM
$= (0.0892)((70\ kip) + (10.8002\ kip))$
$= (0.0892)(80.8002\ kip)$
$= (7.2106\ kip)$ FOR STEEL

ALL LOADS SIZED PER RING

STRUCTURE CROSS SECTION



LOAD COMBINATIONS

COMBINATIONS FROM ASCE 7-05, SECTION 2.3.2

COMBINATION 2:

$= 1.2D + 1.6L + 0.5S + 0.7D_i$
$= 1.2(30\ kip) + 1.6(4.1469\ kip) + 0.50(22.2937\ kip) + 0.70(10.8002\ kip)$
$= (36\ kip) + (6.6350\ kip) + (11.1469\ kip) + (7.5601\ kip)$
$= (42.6850\ kip) + (18.7070\ kip)$
$= (61.3920\ kip)$ FOR ALUMINUM

$= 1.2(70\ kip) + 1.6(4.1469\ kip) + 0.50(22.2937\ kip) + 0.70(10.8002\ kip)$
$= (84\ kip) + (6.6350\ kip) + (11.1469\ kip) + (7.5601\ kip)$
$= (90.6350\ kip) + (18.7070\ kip)$
$= (109.3420\ kip)$ FOR STEEL

COMBINATION 3:

$= 1.2D + 1.6(0.70(D_i + S)) + L$
$= 1.2(30\ kip) + 1.6(0.70((10.8002\ kip) + (22.2937\ kip))) + (4.1469\ kip)$
$= (36\ kip) + 1.6((7.5601\ kip) + (22.2937\ kip)) + (4.1469\ kip)$
$= (36\ kip) + 1.6(29.8538\ kip) + (4.1469\ kip)$
$= (40.1469\ kip) + (47.7661\ kip)$
$= (87.9130\ kip)$ FOR ALUMINUM

$= 1.2(70\ kip) + 1.6(0.70((10.8002\ kip) + (22.2937\ kip))) + (4.1469\ kip)$
$= (84\ kip) + 1.6((7.5601\ kip) + (22.2937\ kip)) + (4.1469\ kip)$
$= (88.1469\ kip) + 1.6(29.8538\ kip)$
$= (88.1469\ kip) + (47.7661\ kip)$
$= (135.9130\ kip)$ FOR STEEL

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COMBINATION 5:

$= 1.20 + 1.0E + L + 0.2S$

$= 1.2(30\ \text{KIP}) + 1.0(3.6410\ \text{KIP}) + (4.1469\ \text{KIP}) + 0.20(22.2937\ \text{KIP})$

$= (36\ \text{KIP}) + (3.6410\ \text{KIP}) + (4.1469\ \text{KIP}) + (4.4587\ \text{KIP})$

$= (39.6410\ \text{KIP}) + (8.6056\ \text{KIP})$

$= (48.2466\ \text{KIP})$ FOR ALUMINUM

$= 1.2(70\ \text{KIP}) + 1.0(3.6410\ \text{KIP}) + (4.1469\ \text{KIP}) + 0.20(22.2937\ \text{KIP})$

$= (84\ \text{KIP}) + (3.6410\ \text{KIP}) + (4.1469\ \text{KIP}) + (4.4587\ \text{KIP})$

$= (87.6410\ \text{KIP}) + (8.6056\ \text{KIP})$

$= (96.2466\ \text{KIP})$ FOR STEEL

COMBINATION 4:

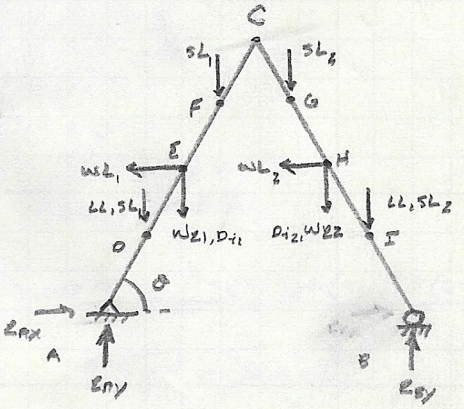
$= 1.2D + 1.6W + L + 0.5S$

$= 1.6(7.2267\ \text{KIP})$

$= (11.5627\ \text{KIP})$

USE COMBINATION #3 FACTORS FOR VERTICAL LOADS

USE COMBINATIONS #4 FACTORS FOR HORIZONTAL LOADS



$\Sigma M_A = E_{BY} B_{EWG} + WL_1\left(\frac{H_{EWG}}{2}\right) + WL_2\left(\frac{H_{EWG}}{2}\right) - SL_1\left(\frac{3}{8}B_{EWG}\right)$
$- SL_2\left(\frac{5}{8}B_{EWG}\right) - LL.SL_1\left(\frac{B_{EWG}}{8}\right) - LL.SL_2\left(\frac{7}{8}B_{EWG}\right)$
$- WZ_1\left(\frac{B_{EWG}}{4}\right) - WZ_2\left(\frac{3}{4}B_{EWG}\right) = 0$

$0 = E_{BY}(41\text{ft}) + (11.5627\ \text{KIP})(18\text{ft}) + (11.5627\ \text{KIP})(18\text{ft})$
$- 1.6(11.1469\ \text{KIP})(15.3750\text{ft}) - 1.6(11.1469\ \text{KIP})(25.6250\text{ft})$
$-((4.1469\ \text{KIP}) + 1.6(11.1469\ \text{KIP}))((5.1250\text{ft}) + (35.8750\text{ft}))$
$-(1.2(30\ \text{KIP}) + 1.12(10.8002\ \text{KIP}))((10.2500\text{ft}) + (30.7500\text{ft}))$

$0 = E_{BY}(41\text{ft}) + (208.1290\ \text{KIPft}) + (208.1290\ \text{KIPft})$
$- (274.2137\ \text{KIPft}) - (457.0229\ \text{KIPft}) - (901.2595\ \text{KIP})$
$- (1971.9452\ \text{KIPft})$

$0 = E_{BY}(41\text{ft}) + (416.2579\ \text{KIPft}) - (3604.4414\ \text{KIPft})$

$0 = E_{BY}(41\text{ft}) - (3188.1834\ \text{KIPft})$

$E_{BY} = (77.7606\ \text{KIP})$

$\Sigma F_y = E_{AY} + E_{BY} - LL - SL - WZ_1 - WZ_2 - D + L = 0$

$0 = E_{AY} + (77.7606\text{KIP}) - 2(4.1469\ \text{KIP}) - 1.60(2(22.2937\ \text{KIP})) - (70\ \text{KIP}) - (70\ \text{KIP}) - 1.12(2(10.8002\ \text{KIP}))$

$0 = E_{AY} + (77.7606\ \text{KIP}) - (8.2938\ \text{KIP}) - (71.3398\ \text{KIP}) - (140\ \text{KIP}) - (24.1924\ \text{KIP})$

$0 = E_{BY} + (77.7606\ \text{KIP}) - (243.8261\ \text{KIP})$

$0 = E_{AY} - (166.0655\ \text{KIP})$

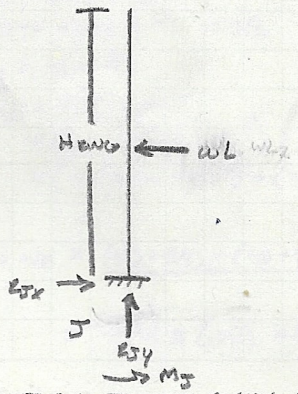
$E_{AY} = (166.0655\ \text{KIP})$

$Q_{Y\text{APPLIED}} = (166.0655\ \text{KIP})$
$Q_{X\text{APPLIED}} = (23.1254\ \text{KIP})$
$M_{\text{APPLIED}} = (389.2608\ \text{KIPft})$

$\Sigma F_x = E_{AX} - 2WL_1 = 0$

$0 = E_{AY} - 2(11.5627\ \text{KIP})$

$E_{AX} = (23.1254\ \text{KIP})$



$WL = (32.5930\ \text{lb/ft}^2)(\pi D_{EWG})(B_{EWG})1.6$
$= (52.1488\ \text{lb/ft}^2)(125.6637\ \text{ft})(3.3\ \text{ft})$
$= (52.1488\ \text{lb/ft}^2)(414.690\text{2 ft}^2)$
$= (21625.5979\ \text{lb})$
$= (21.6256\ \text{KIP})$

$\Sigma M_J = WL\left(\frac{H_{EWG}}{2}\right)$
$= (21.6256\ \text{KIP})(18\text{ft})$
$= (389.2608\ \text{KIPft})$

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Appendix D - Engineering Analysis and Calculations

Foundation Reinforcement Design

Foundation Properties:

			References
D_f, Diameter of Foundation	52.00	ft	
t_F, Foundation Thickness	2.92	ft	
A_F, Area of Foundation	$= \pi D_F^2/4$ 2123.72	ft^2	
ρ_c, Normal Weight Concrete	150.00	lb/ft^3	

Loading Conditions:

			References
D_L, Dead Load	437.50	lb/ft^2	
L_L, Live Load	100.00	lb/ft^2	*International Building Code Table 1607.1*
S_L, Snow Load	53.76	lb/ft^2	
$Q_{Applied}$, Applied Load	$= 1.2D_L + 1.6L_L + 0.50\,S_L$ **711.88**	**lb/ft^2**	

Soil Properties:

Water Table

			References
γ_w, Unit Weight of Water	62.40	lb/ft^2	
d_w, Depth of Water Table	-	ft	

Soil Layer #1: Glacial Till

			References
γ_{Sat}, Saturated Unit Weight	102.00	lb/ft^3	*Principles of Geotechnical Engineering by Braja M. Das Table 3.1, Page 68*
E_s, Modulus of Elasticity	519587.25	lb/ft^2	*NYS Geotechnical Design Manual Table 8-17, Page 83*
μ_s, Poisson's Ratio	0.20		*Principles of Geotechnical Engineering by Braja M. Das Table 11.5, Page 402*
φ', Friction Angle	46.4980	Degrees	*Principles of Geotechnical Engineering by Braja M. Das Table 17.24, Page 764*
C_u, Undrained Cohesion	0	lb/ft^2	
d_{S1}, Depth of Soil	9.0	ft	
Soil Type:	Granular		

Soil Bearing Capacity:

			References
N_γ, Soil Bearing Capacity Factor	For $\varphi' =$ 46.4980 366.86		*Principles of Foundation Engineering by Braja M. Das Table 4.2, Page 170*
$F_{\gamma s}$, Soil Shape Factor	$= 1 - 0.40(B/L)$ 0.60		*Principles of Foundation Engineering by Braja M. Das Table 4.3, Page 170*
$F_{\gamma d}$, Soil Depth Factor	1.00		*Principles of Foundation Engineering by Braja M. Das Table 4.3, Page 170*
$F_{\gamma i}$, Soil Inclination Factor	1.00		*Principles of Foundation Engineering by Braja M. Das Table 4.3, Page 171*
q_u, Ultimate Bearing Capacity	$= (1/2)\gamma B N_\gamma F_{\gamma s} F_{\gamma d} F_{\gamma i}$ 583752.98	lb/ft^2	*Principles of Foundation Engineering by Braja M. Das Equation 4.26, Page 168*
q_{all}, Ultimate Bearing Capacity	$= q_u/3$ **194584.33**	**lb/ft^2**	*Principles of Foundation Engineering by Braja M. Das Table 4.2, Page 170*

Loading vs. Bearing Capacity Check:

qAllow >= Qapplied

The bearing capacity of the soil is sufficient for the foundation

Tensile Steel Reinforcement:

Designed By: James Clark

Checked By: Riley White

f_c', Concrete Strength	4000	lb/in^2	
f_y, Steel Yield Strength	60000	lb/in^2	
E_s, Elastic Modulus of Steel	2.90E+07	lb/in^2	
s_b, Steel Percentage	$= 0.7225(f_c'/f_y)(87000/(87000+f_y)$		*Principles of Foundation Engineering by Braja M. Das Equation A.7b, Page 905*
	0.0285		
C, Steel Coverage	3.00	*in*	
A_s, Area of Steel per Foot	$= s_b bd$		*Principles of Foundation Engineering by Braja M. Das Equation A.6, Page 905*
	0.9122	in^2/ft	
A_{sp}, Area of Steel Provided	Use #5 Bars		
	0.31	in^2	
N, Number of Bars per Foot	$= A_s/A_{sp}$		
	Use 2.94	Bars	

Use 3 #5 Bars
at 4.00 in. Spacing both Laterally
and Longitudinally

Designed By: James Clark

Checked By: Riley White

Appendix E - Cost Estimate

Cost Estimates for Bases

Base Design #1					
Item			**Total Cost**	**Cost per unit**	**Units**
312cy of 4000psi concrete including labor			$109,200	$350	Cubic Yard
Concete and etched grey brick sidewalk / surrounding walkway			$13,000	-	-
Remove approx 200cy of fill			$10,000	$50	Cubic Yard
Excavation			$10,000	-	-
Landscaping (saplings, shrubs, flowers)			$2,500	-	-
Caissons			$50,000		
Equipment for installation of caissons			25,000	$25,000	Per Day
(6) Seating benches			$6,000	$1,000	Per Bench
(6) Glass plaques			$12,000	$2,000	Per Plaque
Total Bid			**$237,700**		
Design & Construction Allowance			$47,540		20%
Overall Bid			**$285,240**		

Base Design #2					
Item			**Total Cost**	**Cost per unit**	**Units**
264cy of 4000psi concrete including labor			$92,400	$350	Cubic Yard
Concete and etched grey brick sidewalk / surrounding walkway			$13,000	-	-
Remove approx 200cy of fill			$10,000	$50	Cubic Yard
Excavation			$10,000	-	-
Landscaping (saplings, shrubs, flowers)			$2,500	-	-
Caissons			$50,000		
Equipment for installation of caissons			25,000	$25,000	Per Day
(6) Seating benches			$6,000	$1,000	Per Bench
(6) Glass plaques			$12,000	$2,000	Per Plaque
Total Bid			**$220,900**		
Design & Construction Allowance			$44,180		20%
Overall Bid			**$265,080**		

Appendix F - CSI Specifications

DOCUMENT 003132

GEOTECHNICAL DATA

The subsurface logs are to be provided by an independent surveying firm not associated with the General Contractor. The Contractor requires soil borings to a depth of fifteen (15) feet below existing grade.

The observed water levels and/or conditions noted on the subsurface logs are as recorded at the time of exploration. These water levels and/or conditions may vary considerably with time, according to the prevailing climate, rainfall, or other factors and are otherwise dependent on the duration of and method used in the explorations program.

Sound engineering judgment was exercised in preparing the subsurface logs. This information was prepared and is intended for State design and estimate purposes only. Its presentation is for the purpose of providing intended users with access to the same information available to the State. These subsurface logs are to be presented in good faith and are not intended as a substitute for personal investigation, independent interpretations, or judgment of the bidders.

END OF SECTION

SECTION 023313

UNDERGROUND UTILITY LOCATE SERVICE

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Field Engineering: Section 017123

1.2 REFERENCES

A. American Society of Civil Engineers, CI/ASCE 38-02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."

B. American Public Works Association, Uniform Color Code."

1.3 DEFINITIONS

A. Utility Quality Levels:

1. Level A: Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.
2. Level B: Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.

1.4 DESCRIPTION

A. Retain an independent utility locator service company to field locate and mark existing underground utilities and service connections. The word "independent" as used above means a person not in the regular employment of the Contractor or having any vested interest in the Contractor's business.

1. Level B locator service shall be performed in all project areas where excavations, regarding the ground surface, and penetrations of the ground surface are to be performed.
    a. In heavy metal areas, such as near perimeter fences, ground penetrating radar shall be used to determine the location of underground utilities. The use of equipment that induce a tracing signal along the utility path (such as a Metrotech unit) can cause false readings, shall not be used within five feet of fences.
2. The Level A investigation shall be performed as follows:
    a. Hand excavation may be performed for depths of three feet or less.
    b. Vacuum excavation shall be performed at depths greater than three feet.
    c. All excavation test pits shall be backfilled by close of business that day.

B. Support and protect all utilities and service connections to remain in place.

1. The locator service shall field locate and mark underground utilities and service connections prior to excavation.
2. The contractor shall be responsible for coordinating the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
3. All costs associated with the repair of underground utilities and service connections hit/damaged during the investigative work shall be the responsibility of the contractor.
4. Utility location services shall be in accordance with the provisions of CIASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

1.5 SUBMITTALS

A. Quality Control Submittals:

1. Submit detailed experience and qualification information about the underground utility locator service company and the persons that will be performing the Work. Detailed experience and qualification information shall include:
    a. Minimum of five (5) years experience in field locating, marking and staking out of existing underground utilities and service connections.
        i. Qualifying Experience: Project information of 5 similar projects, which the locator service company, had worked on during the past 5 years. Information shall include for each project:
            1. Name and Address of project.
            2. Dates worked on the project.
            3. Name and telephone Number of contact person at the project site for which the locator service was performed.

B. Description of types of utility locator equipment (investigation equipment) that company will utilize to perform the underground utility investigation.

C. Names of persons that will be performing the Work, including the number of years of experience and training that the persons have in the use of the equipment. Include a copy of training certificates for locator equipment proving the person performing the locator service is trained on the equipment being used.

D. Submit Quality Control Submittals within 10 days of contract award.

E. Investigate Report:

1. Submit detailed written reports and scaled drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified.
    a. All documentation shall be referenced to existing data (horizontal and vertical) previously established.

b. Provide three (3) paper copies and one (1) electronic copy of detailed written reports and drawings.

2. Submit Investigative Report at least two weeks prior to advancing construction within the scheduled areas of excavation within the project site.

1.6 COORDINATION AND SCHEDULING

A. Coordinate the Work to determine the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.

B. Coordinate the Work with the Director's Representative to minimize utility disruptions and facility operations. Provide a schedule for the Work required to the Director's Representative for approval. Upon approval of the schedule, notify the Director's Representative a minimum of three (3) working days prior to performing the Work.

C. Within the areas of excavation, all underground utilities and service connections shall be field located and their locations marked at least two (2) weeks prior to the performance of the required excavation work.

PART 2 EXECUTION

2.1 WORK AREAS AND PERFORMANCE

A. If any underground utilities and service connections are hit or damaged during the Work, immediately inform the Director's Representative for directions on how to proceed.

B. The utility locator service investigative work, field location and marking of underground utilities and service connections and submission of the investigative report must be completed before any excavation work can begin.

1. Contractor shall maintain markings throughout the contract duration or until a time when directed (in writing) by the Director's Representative that maintenance of the markings are no longer required.

2. Provide subsurface investigation information, detailed written report and drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified, prior to the performance of the required excavation work.
3. If during the Level B investigations, unknown underground utilities are discovered, the Director's Representative shall be notified as soon as possible or before the close of that business day.
4. Field Marking of underground utilities shall follow the American Public Works Association (APWA) uniform color code:

White: Proposed Excavation.

Pink: Temporary Survey Markings.

Red: Electric power lines, cables, conduit and lighting cables.

Yellow: Gas, oil, steam, petroleum and gaseous material.

Orange: Communications, alarm, signal lines, cables or conduit.

Blue: Potable water.

Purple: Reclaimed water, irrigation and slurry lines.

Green: Sewer and drain lines.

END OF SECTION

SECTION 032100
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the applicable requirements of the following:

1. Manual of Standard Practice, MSP-1-01 of the Concrete Reinforcing Steel Institute (CRSI).

1.2 SUBMITTALS

A. Shop Drawings: Placing drawings for bar reinforcement.

B. Quality Control Submittals:

1. Certificates: Affidavit required under Quality Assurance Article.

1.3 QUALITY ASSURANCE

A. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.

1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of the latest mill or purchase orders for material replacement.
    a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
2. Fabricator and Erector's Qualifications Data: Name and experience of fabricator and erector.

B. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

1.4 MATERIALS

A. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

B. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

1. Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
2. Insoluble plastic, with minimum 1,500 psi tensile strength and capable of retaining fabricated shape at temperatures between 5 degrees F and 170 degrees F.
3. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Anchor Bolts: Installed under Section 033000 or 033001.
B. Loose Bearing Plates: Installed under Section 042000 or 042113 and 042200.
C. Loose Lintels: Installed under Section 042000 or 042113 and 042200.

1.2 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
    1. Design, Fabrication, and Erection: "Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design" adopted by the American Institute of Steel Construction, June 1, 1989 (AISC Specification).
        a. Design and Fabrication of Cold-Formed Shapes: "Specification for the Design of Cold-Formed Steel Structural Members", by the American Iron and Steel Institute (AISI Specification).
    2. Welding: "Structural Welding Code - Steel, AWS D1.1", or "Structural Welding Code - Sheet Steel, AWS D1.3", by the American Welding Society (AWS Codes).

B. Organizations:

    1. AISC: American Institute of Steel Construction, One East Wacker Dr., Suite 700, Chicago, IL 60601-1802, 866-275-2472, www.aisc.org.
    2. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.
    3. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.

4. ANSI: American National Standards Institute, 1819 L Street, NW, 6th Floor, Washington, DC 20036, (202) 293-8020, www.ansi.org.
5. ASME: ASME International, 3 Park Ave., New York, NY 10016-5990, (800) 843-2763, www.asme.org.
6. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.
7. MPI: The Master Painters Institute Inc., 2808 Ingleton Ave., Burnaby, BC, V5C 6G7, (888) 674-8937, www.specifypaint.com.
8. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.3 SUBMITTALS

A. Shop Drawings: Show application to project. Furnish setting drawings and templates for installation of bolts and anchors in other Work. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.

B. Product Data: Catalog sheets, specifications, and installation instructions for each fabricated item specified, except submit data for fasteners only when directed.

C. Quality Control Submittals:

1. Certificates: Copy of certificates required under Quality Assurance Article.

D. LEED Design Submittals:

1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

1.4 QUALITY ASSURANCE

A. Certificates:

1. Affidavit by the structural steel manufacturer certifying that structural steel items meet the contract requirements.
    a. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
        i. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
2. The Contractor agrees, that if the value of this contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

B. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.

1.5 DELIVERY AND STORAGE

A. Coordinate delivery of items to be built into other construction to avoid delay.

B. Promptly cover and protect steel items delivered to the Site.

PART 2 PRODUCTS

2.1 MATERIALS

A. M and S-Shapes, Channels and Angles: ASTM A 36 or ASTM A 572, Grade 50.

B. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.

C. Steel Bars and Bar-Size Shapes: ASTM A 675, Grade 70; or ASTM A 36.

D. Merchant Quality Steel Bars: ASTM A 575, grade as selected by fabricator.

E. Cold-Finished Steel Bars: ASTM A 108, grade as selected by fabricator.

F. Hot-Rolled Carbon Steel Sheet and Strip: ASTM A 569, pickled and oiled.

G. Cold-Rolled Carbon Steel Sheet: ASTM A 366, oiled.

H. Galvanized Steel Sheet: ASTM A 526, with G90 hot-dip process zinc coating complying with ASTM A653.

I. Steel Hollow Structural Sections (Round, Square, or Rectangular): ASTM A 500, Grade B; or ASTM A 500, Grade C.

J. Cold-Drawn Steel Tubing: ASTM A 512, buttwelded, cold-finished carbon steel tubing, sink drawn and stress relieved.

K. Cast Iron Castings: ASTM A 48, gray iron castings, Class 30.

L. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.

M. Steel Castings: ASTM A 27, grade and class as required by use of item.

N. Steel Pipe: ASTM A 53, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified.

O. Rolled Steel Floor Plate, Raised Pattern: ASTM A 786; raised herringbone pattern unless otherwise indicated.

P. Stainless Steel: Type 302/304; ASTM A 666 for plate, sheet and strip; ASTM A 276 for bars and shapes; ASTM A 269 for tubing.

Q. Anchors: Except where shown or specified, select anchors of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, anchors shall be galvanized or of corrosive-resistant materials.

1. Threaded-Type Concrete Inserts: Galvanized ferrous casting, internally threaded to receive 3/4 inch diameter machine bolt; either malleable iron or cast steel.
2. Wedge-Type Concrete Inserts: Galvanized box-type ferrous casting, designed to accept 3/4 inch diameter bolt having special wedge-shaped head; either malleable iron or cast steel.
    a. Bolts: Carbon steel bolts having special wedge-shaped heads, nuts, washers and shims.

3. Slotted-Type Concrete Inserts: Galvanized 1/8 inch thick pressed steel plate complying with ASTM A 283; box-type welded construction with slot designed to receive 3/4 inch diameter square head bolt and with knockout cover.

4. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.

    a. Carbon Steel: Zinc-Plated; ASTM B 633, Class Fe/Zn 5.
    b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.

R. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, fasteners shall be galvanized.

1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
2. Stainless Steel Fasteners: ASTM A 666; Type 302/304 for interior Work; Type 316 for exterior Work; Phillips flathead (countersunk) screws and bolts for exposed Work unless otherwise specified.
3. Eyebolts: ASTM A 489.
4. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.

5. Machine Screws: ASME B18.6.3.
6. Lag Screws: ASME B18.2.1.
7. Wood Screws: Flat head, ASME B18.6.1.
8. Plain Washers: Round, ASME B18.22.1.
9. Lock Washers: Helical, spring type, ASME B18.21.1.
10. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.

S. Shop Paint (General): Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use a primer containing pigments that make it easily distinguishable from zinc-rich primer.
2. Shrink-Resistant Grout is to be approved by structural engineer in the best interest to prevent weathering of connections.

2.2 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate metal framing and supports to support related items required by the Work. Fabricate of welded construction unless otherwise indicated. Preassemble to largest extent possible.

B. When required to be built into other Work, equip units with integral anchors spaced not more than 24 inches on center.

C. Galvanize exterior steel framing and supports.

2.3 MISCELLANEOUS STEEL TRIM

A. Fabricate trim of shapes, sizes, and profiles shown, with continuously welded joints and smooth exposed edges, unless otherwise indicated or approved. Use concealed field splices wherever possible. Furnish necessary cutouts, fittings, and anchorages.

B. Galvanize exterior steel trim.

2.4 LOOSE BEARING PLATES

A. Steel plates fabricated flat, free from warp or twist, and of required thickness and bearing area. Drill plates as required for anchor bolts and for grouting access. Furnish bearing plates where shown and where required for steel items bearing on masonry or concrete construction.

2.5 LOOSE LINTELS

A. Structural steel shape lintels, fabricated for openings and recesses in masonry walls and partitions as indicated. Loose lintels bearing on masonry or concrete shall have a minimum end bearing length of 6 inches at each end, unless otherwise shown.

B. Galvanize lintels to be installed in exterior walls.

1. Wall Return Fittings: Cast iron castings, flush-type, with the same projection as specified for wall brackets.

2. 6 SAFETY NOSINGS

A. Nosings: Cast, abrasive non-slip type, of profiles indicated, extending full length of concrete treads or other concrete edges to be protected unless otherwise indicated. Equip each nosing with integrally cast, welded, or riveted anchors located not more than 4 inches from each end of nosing and intermediate anchors spaced not over 15 inches oc. Abrasive grain shall be integrally cast into the wearing surface.

2.7 FABRICATION

A. Use materials of size and thickness indicated. If not indicated, use material of required size and thickness to produce adequate strength and durability for the intended use of the finished product. Furnish suitable, compatible anchors and fasteners to support assembly.

B. Fabricate items to be exposed to view of material entirely free of surface blemish, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove surface blemishes by grinding or by welding and grinding prior to cleaning, treating, and

finishing. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown.

C. Joints: Fabricate accurately for close fit. Weld exposed joints continuously unless otherwise indicated or approved. Dress exposed welds flush and smooth.

D. Connections: Form exposed connections with flush, smooth, hairline joints. Use concealed fasteners wherever possible. Use Phillips flathead (countersunk) bolts or screws for exposed fasteners, unless otherwise shown or specified.

1. Furnish flat washer under connections requiring raised bolt heads.
2. Furnish lock washer under nuts when through-bolting occurs.

E. Punch, reinforce, drill, and tap metal Work as required to receive hardware and other appurtenant items.

F. Galvanizing:

1. In addition to specific items specified or noted to be galvanized, galvanize items attached to, embedded in, or supporting exterior masonry (including interior wythe of exterior masonry walls) and concrete Work.
2. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
    a. ASTM A 123 for plain and fabricated material, and assembled products.
    b. ASTM A 153 for iron and steel hardware.

G. Shop Painting:

1. Cleaning Steel: Thoroughly clean all steel surfaces. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, or SSPC SP-7 “Brush-Off Blast Cleaning”.

2. Galvanized Items:
    a. Galvanized items which are to be finish painted under Section 099101 shall be rinsed in hot alkali or in an acid solution and then in clear water.
    b. Welded and abraded areas of galvanized surfaces shall be wire brushed and repaired with a coating of cold galvanizing compound.
3. Apply one coat of shop paint to all steel surfaces except as follows:
    a. Do not shop paint steel surfaces to be field welded and steel to be encased in cast-in-place concrete.
    b. Apply 2 coats of shop paint, before assembly, to steel surfaces inaccessible after assembly or erection, except surfaces in contact.
    c. Do not paint galvanized items which are not to be finished painted under Section 099101.
4. Apply paint and compound on dry surfaces in accordance with the manufacturer's printed instructions, and to the following minimum thickness per coat:
    a. Shop Paint (General): 4.0 mils wet film.
    b. Shop Paint for Galvanized Steel: 3.0 mils wet film.
    c. Cold Galvanizing Compound: 2.0 mils dry film.

PART 3 EXECUTION

3.1 PREPARATION

A. Temporarily brace and secure items which are to be built into concrete, masonry, or similar construction.

B. Isolate non-ferrous metal surfaces to be permanently fastened in contact with ferrous metal surfaces, concrete, or masonry by coating non-ferrous metal surface with bituminous mastic, prior to installation.

3.2 INSTALLATION

A. Fit and set fabricated metal Work accurately in location, alignment, and elevation. Securely fasten in place. Cut off exposed threaded portion of bolts flush with nut.

B. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar or grout.

C. Attached Work: Fasten to concrete and solid masonry with expansion anchors and to hollow masonry with toggle bolts in cells, unless otherwise indicated. Drill holes for fasteners to exact required size using power tools.

END OF SECTION

SHORT VERSION
SECTION 310000
EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Provide earthwork operations.

1.2 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.

1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below) .
2. Subgrade Surface: Surface which subbase or topsoil is placed.
3. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
4. Foundation Bearing Grade: Grade/elevation at which bottom-of-footings are constructed.
5. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 1557 (Modified Proctor).
6. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
7. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
8. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Director's Representative.
9. Grading Limit Line: Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.3 SUBMITTALS

A. Product Data:

1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Director's Representative, and submit to the Directors Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:

1. Select Granular Material: 50 - 60 lb (Two Samples).
2. Select Fill: 40 - 50 lb.
3. Crushed Stone: 30 lb.

C. Quality Control Submittals:

1. Excavation Procedure: Submit a lay out drawing or detailed outline of the intended excavation procedure for the Director's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
3. Other Aggregates: Name and location of source and soil laboratory test results.

1.4 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root

systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

C. The contractor is obligated to locate all utilities on site before they start excavation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a ½ inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

2.2 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)

1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
2. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

2.3 BRICK AND MORTAR

A. Mortar Materials: Dry packaged, proportioned for Type M unit masonry mortar, complying with ASTM C 387.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Director's Representative.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).

1. Trenches: Deposit excavated material on one side of the trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Director's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:

1. Interior Floors: 6 inches unless otherwise indicated.
2. Exterior Slabs and Steps: 12 inches unless otherwise indicated.

H. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Director.

1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the Director before any concrete or backfilling Work commences.

I. Notify the Director's Representative upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Director's Representative will be made on 3 working days notice.

3.2 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with an additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter

fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.3 PLACING FILL AND BACKFILL

A. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Director's Representative. Do not backfill with excavated material unless it meets the requirements of this Section.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.

D. Under Exterior Concrete Slabs and Steps:

1. Under Exterior Concrete Slabs and Steps
2. Subbase Material: Place 12 inches of select granular material over subgrade surface.

E. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

3.4 COMPACTION

A. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

1. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified

below and at a moisture content suitable to obtain the required densities, but at not less than three percent drier or more than two percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).

a. Structures (entire area within ten feet outside perimeter): 95 percent.
b. Concrete Slabs and Steps: 95 percent.
c. Landscaped Areas: 90 percent.
d. Pavements and Walks: 95 percent.

2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be re-compacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.

3.5 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes.

3.6 RESTORATION

A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

3.7 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on State property designated by the Director's Representative, and dispose of such materials as directed.

3.8 FIELD QUALITY CONTROL

A. Compaction Testing: Notify the Director's Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by the Director's Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Director's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.9 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

SECTION 312513
EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Provide erosion and sedimentation control.

1.2 REFERENCES

A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "NEW YORK STANDARDS and SPECIFICATIONS for EROSION and SEDIMENT CONTROL" by NYS Department of Environmental Conservation DOW (i.e., Bluebook). Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical) included in the Storm Water Pollution and Prevention Plan (SWPPP).

1.3 RESPONSIBILITY

A. During construction conduct operations in such a manner as to prevent or reduce to a minimum any damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.

B. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

C. The Contractor will submit copies of certificates documenting that on-site workers have completed a NYS Department of Environmental Conservation endorsed Erosion & Sediment Control training as required by State Pollutant Discharge Elimination

System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001).

1.4 DESCRIPTION

A. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the contract documents or as ordered by the Director's Representative during the life of the contract to provide erosion and sediment control.

B. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include debris basins, diversion, grade stabilization structure, land grading, lined waterway (rock), paved channel, paved flume, retaining wall, riprap, rock outlets, and stream bank protection or other erosion control devices or methods as required.

C. Vegetative measures shall include brush matting, dune stabilization, grassed waterway, vegetating waterway, mulching, protecting vegetation, seeding, sod, straw/hay bale dike, stream bank protection, temporary swale, topsoil, and vegetating waterways.

D. Biotechnical measures shall include wattling (live fascines, brush matting, brush layering, live cribwall, and branchpacking) vegetated rock gabions, live staking, tree revetment, and fiber rolls.

E. Weekly inspections will be completed by the Director's Representative. Comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and the site is properly stabilized, a minimum of monthly inspections must be maintained. The stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from

fall frosts and allow for proper germination/establishment.

1.5 DEFINITIONS - TEMPORARY STRUCTURAL MEASURES

A. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile where traffic enters a construction site to reduce or eliminate tracking of sediment to public roads.

B. Sediment Basin: A barrier constructed across a drainage way to intercept and trap sediment.

C. Silt Fence: A barrier of geo-textile fabric installed on contours across the slope to intercept runoff by reducing velocity. Replace after 1 year.

1.6 DEFINITIONS - PERMANENT STRUCTURAL MEASURES

A. Grade Stabilization Structure: A structure to stabilize the grade by providing channel linings that can withstand high velocities.

B. Retaining Wall: A structural wall constructed to prevent soil movement down steep slopes.

C. Riprap: A layer of stone designed to protect slopes that are subject to erosion.

PART 2 EXECUTION

2.1 WORK AREAS

A. The Director's Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Director's Representative may increase or decrease this area of erodible earth material exposed at one time as determined by their analysis of project, weather and other conditions. The Director's Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated

capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.

B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.

C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall apply rye grass at a rate of 1 lb/ 1000 sq.ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5 lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/ 1000 sq. ft. or wood fiber hydromulch at the manufacturer's recommended rate. Hay or straw shall be anchored.

D. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.

E. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION

SECTION 316400

CAISSONS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Soil Boring Data: Document 003132.

B. Record Drawings: Section 017716.

C. Cast-In-Place Concrete: Section 033000 or 033001.

D. Concrete Forming: Section 031100.

E. Steel Concrete Reinforcement: Section 032100.

F. Earthwork: Section 310000.

1.2 SYSTEM DESCRIPTION

A. Caisson Foundation System: Caissons and pile caps which transfer the loads of the structural elements indicated on the Drawings to the underlying soils/ledgerock.

1.3 DESIGN REQUIREMENTS

A. The caisson foundation system shall be designed in conformance with the requirements specified and shown on the Drawings.

B. Design Criteria: Transfer the dead loads and live loads indicated on the Drawings through the caisson foundation system to the underlying soils/ledgerock at the elevations indicated on the Drawings.

1.4 SUBMITTALS

A. Shop Drawings (Submit within 7 days after approval of firm to perform the Work of this Section):

1. Show size, spacing and location of piles, and details of the pile caps.

B. Quality Control Submittals:

1. Qualifications Data (Submit within 7 days after approval of the Contract by the Comptroller): Name and address of the firm proposed to perform the Work of this Section. Include such qualifying information as necessary to verify that the firm meets the requirements specified under Quality Assurance Article.
2. Design and Construction Information (Submit with Shop Drawings): Include design calculations for each pile capacity and specifications of materials intended for use (unless specified in the Sections listed under "Related Work Specified Elsewhere").
3. Installation Sequence (Submit with Shop Drawings): Include details of the installation sequence and equipment to be used for the caisson construction. The grouting shall be performed in accordance with the PTI (Post Tensioning Institute) "Recommended Practice for Grouting of Post Tensioned Prestressed Concrete" as applicable. Installation equipment shall be capable of drilling the caisson hole of the required minimum diameter to the required depth and maintaining the caisson hole open and clear until designated steel reinforcing has been inserted and the required minimum volume of grout as been placed. This submittal will not relieve the Contractor of responsibility for the successful performance of the caisson foundation system.

1.5 QUALITY ASSURANCE

A. Designer's and Installer's Qualifications: The firm that performs the Work of this Section shall have a minimum of 5 years experience in the type of design and construction required for the Work of this Section and shall have designed and installed foundation systems for at least 5 projects of equivalent or greater difficulty as required by this Contract.

1. The firm's staff shall include at least one Professional Engineer licensed by New York State.
2. The firm's supervising engineer and site foreman or superintendent for this project shall have at least 5 years of experience in this type of foundation Work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish the materials required for the Work of this Section.

PART 3 EXECUTION

3.1 INSTALLATION

A. Caissons may be drilled by rotary or rotary percussive drilling equipment. Coring bits, roller bits, drag bids and/or down the hole hammers (DTH) may be utilized to advance the caisson hole through overburden soils, fill, or obstructions, etc. the required depth. Flush joint threaded drill casing shall be continuously placed to the required depth to prevent the collapse of the caisson hole.

B. Drill cuttings shall be eliminated by wash water or other means which will not appreciably alter soil stability or aggravate existing environmental conditions. All debris from the drilling operations shall be removed by the Contractor.

C. Prior to installing the approved reinforcing and grout placement, the caisson hole shall be flushed with clean water to remove all contaminated water and cuttings.

D. The approved reinforcing steel shall be inserted for the depth of the caisson hole not more than 48 hours prior to grouting.

E. If required, splicing of reinforcing shall provide for compressive and flexural strength at least equal to that of the reinforcing.

F. Grout placement into the caisson hole shall be accomplished by tremie method. A tremie pipe of suitable diameter shall be inserted to the bottom of the caisson hole. Water shall be pumped at a high

velocity through the tremie pipe until the wash water at the top of the casing is clear. The caisson hole shall be grouted immediately thereafter.

G. The approved grout mix shall be pumped through the tremie pipe to the bottom of the caisson hole. Pumping shall continue until all water is displaced and the basing is full to the top of the caisson hole with a homogeneous grout mix. The tremie pipe shall be gradually lifted as the cement is being pumped to facilitate the upward flow of the grout. The end of the tremie pipe shall always be embedded at least five feet into the rising grout within the cased hole. Once the casing is overflowing with grout the tremie pipe shall be fully removed.

H. The flush joint casings shall be gradually extracted from the caisson hole. A positive flow of grout into the caisson hole shall be maintained at all times when the casing is being withdrawn. Blockage inside the casing must be prevented in order to maintain a positive flow of grout into the caisson hole. The flow of grout shall be equal to or greater than the column represented by the outside diameter of the casing multiplied by the length of the casing withdrawn.

I. The concrete grout in the casing shall be pressurized either continuously or periodically as the casing is extracted. The caisson contractor elects to use periodic pressurization, no more than five feet of casing shall be withdrawn between applications of pressure.

J. Application of pressure to the caisson grout may be accomplished by either pneumatic or specific injection. The amount of pressure applied shall be such that the resulting caisson diameter meets the design requirements and pile bond values are enhanced without causing detrimental side effects.

K. As the grout column drops in the casing during withdrawal and pressurization, additional grout shall be added to raise the grout level to the top of the casing.

L. The grouting of the pile shall continue uninterrupted and shall be completed within a time frame not to exceed the initial setting time of the mixture.

M. Tolerances:

1. Variation from Vertical: 2 degrees maximum.
2. Center of Top of Pile: Within 2 inches of design position.

3.2 FIELD QUALITY CONTROL

A. Load Testing Piles: Test piles in accordance with ASTM D 1143, Quick Load Test Method for Individual Piles with the following modifications:

1. Do not start a load test until the earth is removed to the elevation of the bottom of the pile cap.
2. Notify the Director's Representative 5 working days prior to start of a load test.
3. Perform a load test on one pile in each pile cap group indicted on the Drawings to be load tested.
4. Apply load in 10-15 percent increments at 2.5 minute intervals to 200 percent of the allowable design load.
5. Hold full test load for a period of one hour.
6. Remove full test load in four 25 percent decrements at 5.0 minute intervals.
7. The net settlement after rebound shall not exceed 0.50 inch.
8. Test piles, if properly located and not exceeding 0.50 inch net settlement, are acceptable as permanent and may be left in place.
9. Submit one copy of load test results, stamped by a New York State licensed professional engineer, to the Director's Representative.

END OF SECTION

SECTION 321600

SIDEWALKS, CURBS, AND GUTTERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete Work shall consist of air entrained Portland cement constructed on a prepared subgrade in accordance with these specifications. The completed Work shall conform to the thicknesses and typical cross-sections shown on the drawings. The completed WORK shall conform to the lines and grades shown on the drawings or to those established by the engineer at the job site.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
    a. M6, Standard Specification for Fine Aggregate for Hydraulics Cement Concrete.
    b. M80, Standard Specification for Coarse Aggregate for Hydraulics Cement Concrete.
    c. M148, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    d. M154, Standard Specification for Air-Entraining Admixtures for Concrete.
    e. M171, Standard Specification for Sheet Materials for Curing Concrete.
    f. M182, Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.
    g. M194M/M194, Standard Specification for Chemical Admixtures for Concrete.
    h. T22, Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens.
    i. T23, Standard Method of Test for Making and Curing Concrete Test Specimens in the Field.

j. T26, Standard Method of Test for Quality of Water to Be Used in Concrete.
k. T27, Sieve Analysis of Fine and Coarse Aggregates.
l. T96, Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
m. T11, Standard Method of Test for Clay Lumps and Friable Particles in Aggregate.
n. T119M/T119, Standard Method of Test for Slump of Hydraulic Cement Concrete.
o. T121M/T121, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
p. T141, Standard Method of Test for Sampling Freshly Mixed Concrete.
q. T152, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
r. T176, Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
s. T199, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Chace Indicator

2. ASTM International (ASTM):
   a. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
   b. C920, Standard Specification for Elastomeric Joint Sealants.

1.3 SUBMITTALS

A. The Contractor shall cooperate with the engineer in obtaining and providing samples of all specified materials.

B. The Contractor shall submit certified laboratory test certificates for all items required in this section.

C. Contractor shall submit a mix design for concrete in writing to the engineer for approval prior to placement of concrete.

D. The Contractor shall submit batch tickets for each load of concrete. Tickets shall show the weight of all materials and additives used in each batch.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Conformance:

1. Concrete shall conform to the following requirements:

Concrete Requirements	
28-Day Field Compressive Strength	3,500 psi
Cement/Fly Ash	600 lbs./cu. yd.
Max. Water/Cement Ratio	0.53
Air Content % Range	5-8
Maximum Slump	4"
Fine Aggregate (max. % of total Aggregate)	50%

2. This material shall consist of a mixture of coarse and fine aggregates, Portland cement, water and other materials or admixtures as required. The type of cement shall be Type I, II, or I/II unless sulfate conditions dictate otherwise. If sulfate conditions exist, Type V cement shall be used.

B. Concrete Aggregates: The grading and composition requirements for coarse and fine aggregates for concrete shall conform to the following tables.

Coarse Aggregates for Portland Cement Concrete	
Sieve Size or Test Procedure	**% Passing or Test Requirement**
1 inch	100
¾ inch	90-100
⅜ inch	20-55
No. 4	0-10
No. 8	0-5
% Wear	45, Max
Clay Lumps * Friable Particles, %	2.0, Max
Coal & Lignites, %	0.5, Max

C. Fly Ash and Water: Upon approval based on a satisfactory trial mix, the Contractor shall have the option of substituting approved fly ash for Portland cement, up to a maximum of twenty percent (20%) by weight. The total weight of cement and fly ash shall not be less than the specified mix design.

1. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water shall be tested in accordance with, and shall meet the suggested requirements of AASHTO T26. Water known to be of potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be enclosed so as to exclude silt, mud, grass, or other foreign materials.

D. Concrete Curing Materials and Admixtures:

1. Curing Materials: Curing materials shall conform to the following requirements as specified:
    a. Burlap Cloth made from Jute or Kenaf: AASHTO M182.
    b. Liquid Membrane-Forming Compounds Curing Concrete: AASHTO M148.
    c. Sheet Materials for Curing Concrete: AASHTO M171.
2. Air-Entraining Admixture: Air-entraining admixtures shall conform to the requirements of AASHTO M154. Admixtures which have been frozen will be rejected. No chloride containing additives shall be permitted.

3. Chemical Admixtures: Chemical admixtures for concrete shall conform to the requirements of AASHTO M194M/M194. Admixtures which have been frozen will be rejected.
4. Joint Fillers: The joint fillers shall meet the requirements of ASTM C920.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. The subgrade shall be excavated or filled to the required grades and lines. All soft, yielding, or otherwise unsuitable material shall be removed and replaced with suitable material with ENGINEER's approval. Filled sections shall be compacted and compaction shall extend a minimum of six (6) inches outside the form lines.

B. The moisture content of the subgrade shall be brought within +/- two percent (2%) of optimum moisture content and compacted to ninety-five percent (95%) of the maximum standard Proctor density (ASTM D698) for subgrade materials classified as A-4 through A-7 or ninety five percent (95%) of modified proctor density for materials classified as A-1 through A-3.

3.2 CONCRETE PLACEMENT

A. General:
1. Concrete transported in truck mixers or truck agitators shall be delivered to the site of the Work and completely discharged within a period of ninety (90) minutes after the cement comes in contact with the mixing water or with the combined aggregates containing free moisture in excess of two percent (2%) by weight.
2. The concrete shall be placed either by an approved slip form/extrusion machine, by the formed method, or by a combination of these methods.
3. The subgrade shall be conditioned to provide a uniformly moist surface when concrete is placed.

B. Machine Placement: The slip form/extrusion machine shall be so designed to place, spread, consolidate, screed, and finish the concrete in one (1) complete pass in such a manner that a minimum of hand finishing will be necessary to provide a dense and homogenous concrete section. The machine shall shape, vibrate, and/or extrude the concrete for the full width and depth of the concrete section being placed. It shall be operated with as nearly a continuous forward movement as possible. All operations

of mixing, delivery, and spreading concrete shall be so coordinated as to provide uniform progress, with stopping and starting of the machine held to a minimum.

C. Formed Method:

1. The vertical face of previously sawed and adjacent asphalt pavement may NOT be used as a forming surface. The Contractor shall use forms on front and back of all curb and gutter, sidewalks and crosspans.
2. The forms shall be of metal or other suitable material that is straight and free from warp, having sufficient strength to resist the pressure of the concrete without displacement and sufficient tightness to prevent the leakage of mortar. Flexible or rigid forms of proper curvature may be used for curves having a radius of one hundred (100) feet or less. Division plates shall be metal. Where directed by the engineer, the Contractor shall use a thin metal back form to preserve landscaping, sprinklers, etc. Form shall be straight and rigid and shall be approved by the engineer prior to use on the project.
3. The front and back forms shall extend for the full depth of the concrete. All of the forms shall be braced and staked so that they remain in both horizontal and vertical alignment until their removal. No wooden stakes will be allowed. They shall be cleaned and coated with an approved form-release agent before concrete is placed against them. The concrete shall be deposited into the forms without segregation and then it shall be tamped and spaded or mechanically vibrated for thorough consolidation. Low roll or mountable curbs may be formed without the use of a face form by using a straight edge and template to form the curb face. When used, face forms shall be removed as soon as possible to permit finishing. Front and back forms shall be removed without damage to the concrete after it has set.

3.3 FINISHING

A. The plastic concrete shall be finished smooth by means of a wood float and then it shall be given final surface texture using a light broom or burlap drag. Concrete that is adjacent to forms and formed joints shall be edged with a suitable edging tool to the dimensions shown on the drawings.

3.4 JOINTING

A. Contraction Joints:

1. Contraction and construction joints shall be placed at the standard spacing of ten (10) feet in curb, gutter, sidewalks, crosspans, trickle channel, etc. A minimum spacing of five (5) feet shall be allowed for repairs.
2. Contraction joints may be sawed, hand-formed, or made by one-eighth inch (1/8") thick division plates in the formwork. Sawing shall be done early after the concrete has set to prevent the formation of uncontrolled cracking. The joints may be hand-formed either by (1) using a narrow or triangular jointing tool or a thin metal blade to impress a plane of weakness into the plastic concrete, or (2) inserting one-eighth inch (1/8") thick steel strips into the plastic concrete temporarily. Steel strips shall be withdrawn before final finishing of the concrete. Where division plates are used to make contraction joints, the plates shall be removed after the concrete has set and while the forms are still in place.

B. Expansion Joints:

1. Expansion joints shall be constructed at right angles to the curb line at immovable structures and at points of curvature for short radius curves. Filler material for expansion joints shall conform to requirements of the requirements of ASTM C920 and shall be furnished in a single one-half inch (1/2") thick piece for the full depth and width of the joint.
2. Expansion joints in a slip-formed curb or curb-and-gutter shall be constructed with an appropriate hand tool by raking or sawing through partially set concrete for the full depth and width of the section. The cut shall be only wide enough to permit a snug fit for the joint filler. After the filler is placed, open areas adjacent to the filler shall be filled with concrete and then troweled and edged. Contractor may choose to place the filler and pour the concrete around it.

3.5 PROTECTION

A. The Contractor shall always have materials available to protect the surface of the plastic concrete against rain. These materials shall consist of waterproof paper or plastic sheeting. For slip-form construction, materials such as wood planks or forms to protect the

edges shall also be required. Concrete damaged by rain shall be required to be removed and replaced at the Contractor's expense.

3.6 CURING

A. Concrete shall be cured for at least seven (7) days after placement to protect against loss of moisture, rapid temperature change, and mechanical injury prior to any overlay or reconstruction work. Moist burlap, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used as the curing material. Membrane curing shall not be permitted in frost-affected areas when the concrete will be exposed to deicing chemicals within thirty (30) days after completion of the curing period.

3.7 BACKFILLING

A. The spaces in front and back of curbs shall be refilled with suitable material to the required elevations after the concrete has set sufficiently. The fill material shall be thoroughly tamped in layers.

3.8 TOLERANCE

A. Forms shall not deviate from true line by more than one-quarter (1/4) inch at any point.

B. Mixed concrete shall be not less than fifty degrees Fahrenheit (50°F), nor more than eighty degrees Fahrenheit (80°F) at the time of placement in forms, unless otherwise directed.

C. If air temperature is thirty-five degrees Fahrenheit (35°F) or less at the time of placing, the engineer shall require water and/or aggregate heated to not less than seventy degrees Fahrenheit (70°F), or more than one-hundred fifty degrees Fahrenheit (150°F).

D. Finished joints shall not deviate more than one-quarter (1/4) inch in the horizontal alignment from a straight line.

E. No ponding of water greater than three-eighths (3/8) inch shall be allowed.

F. Pedestrian walks shall have a minimum of two percent (2.0%) and a maximum of two and one half percent (2.5%) slope toward the roadway.

3.9 QUALITY CONTROL

A. Repair:

1. Prior to backfilling and after forms are removed, honeycombed, defective or damaged areas of concrete shall be repaired. Repairs shall be made within seven (7) days after the forms are removed.

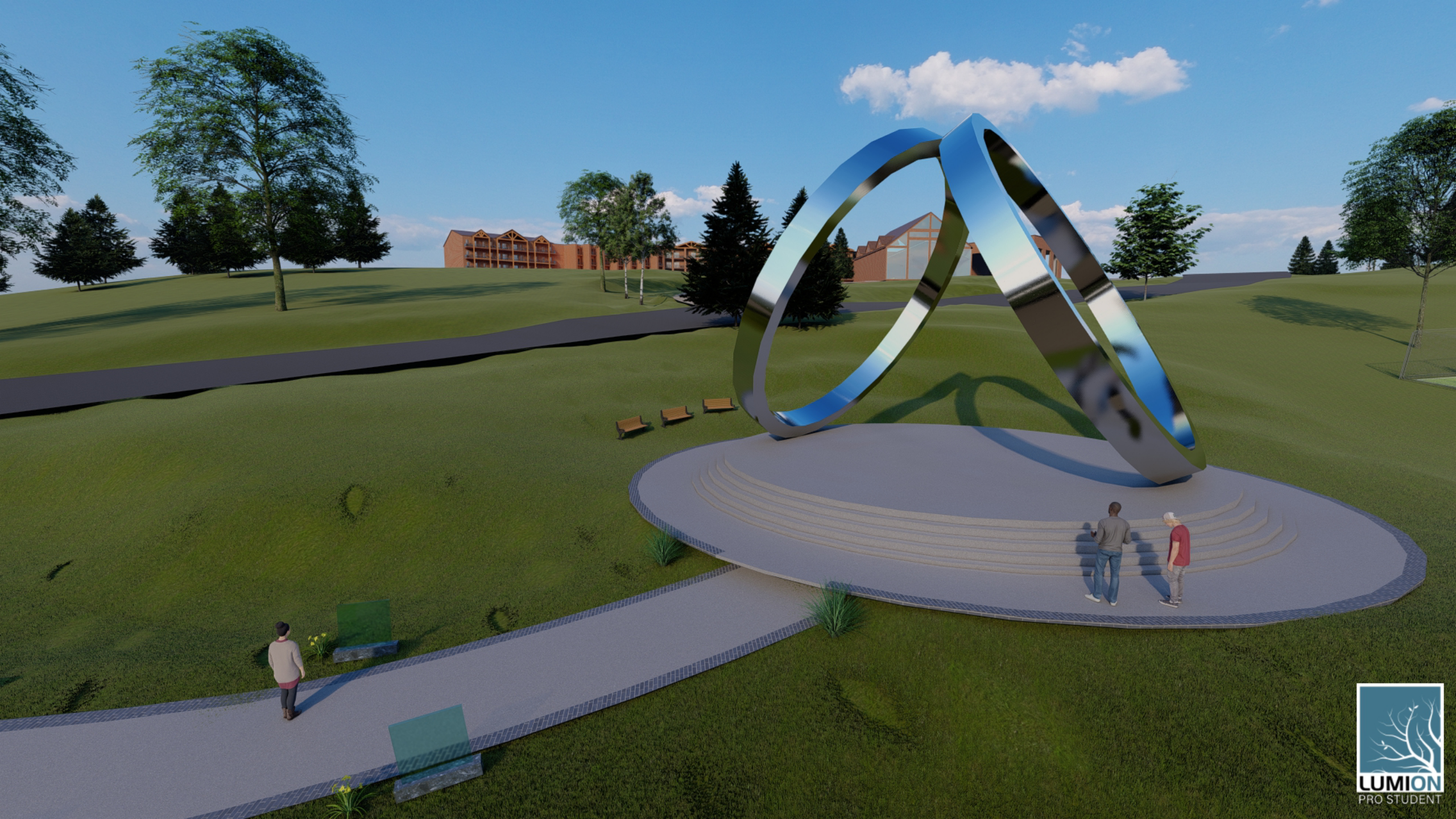
2. At the time of final acceptance inspection, the repair of all cracks shall be completed.
    a. Cracks that are less than one-quarter (1/4) inch wide, exhibit no horizontal or vertical shifting, and do not meet the conditions in 2, 3, and 4, below may, at the discretion of the OWNER, be sealed by routing approximately three-quarter (3/4) inch to one (1) inch deep by one-quarter (1/4) inch wide and filling with Sikaflex 1-A or equivalent.
    b. Any crack that extends through a joint shall require removal and replacement of the entire cracked area.
    c. Any longitudinal cracked section of concrete shall require complete removal and replacement of that section between joints.

3.10 CLEAN-UP

A. The surface of the concrete shall be thoroughly cleaned upon completion of the Work and prior to the substantial completion walk through, and the site left in a neat and orderly condition.

END OF SECTION

Appendix G - Renderings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PRO STUDENT


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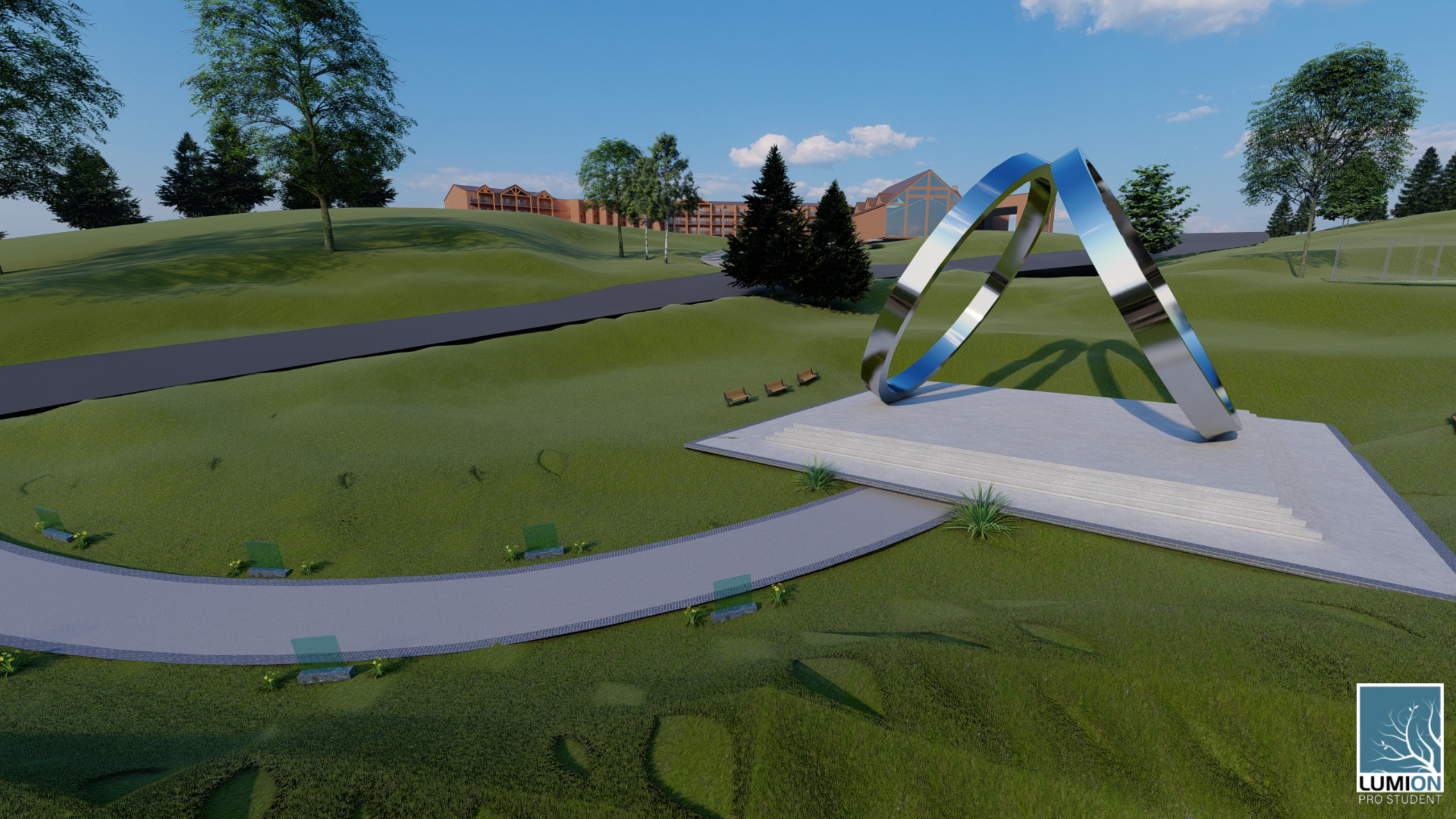
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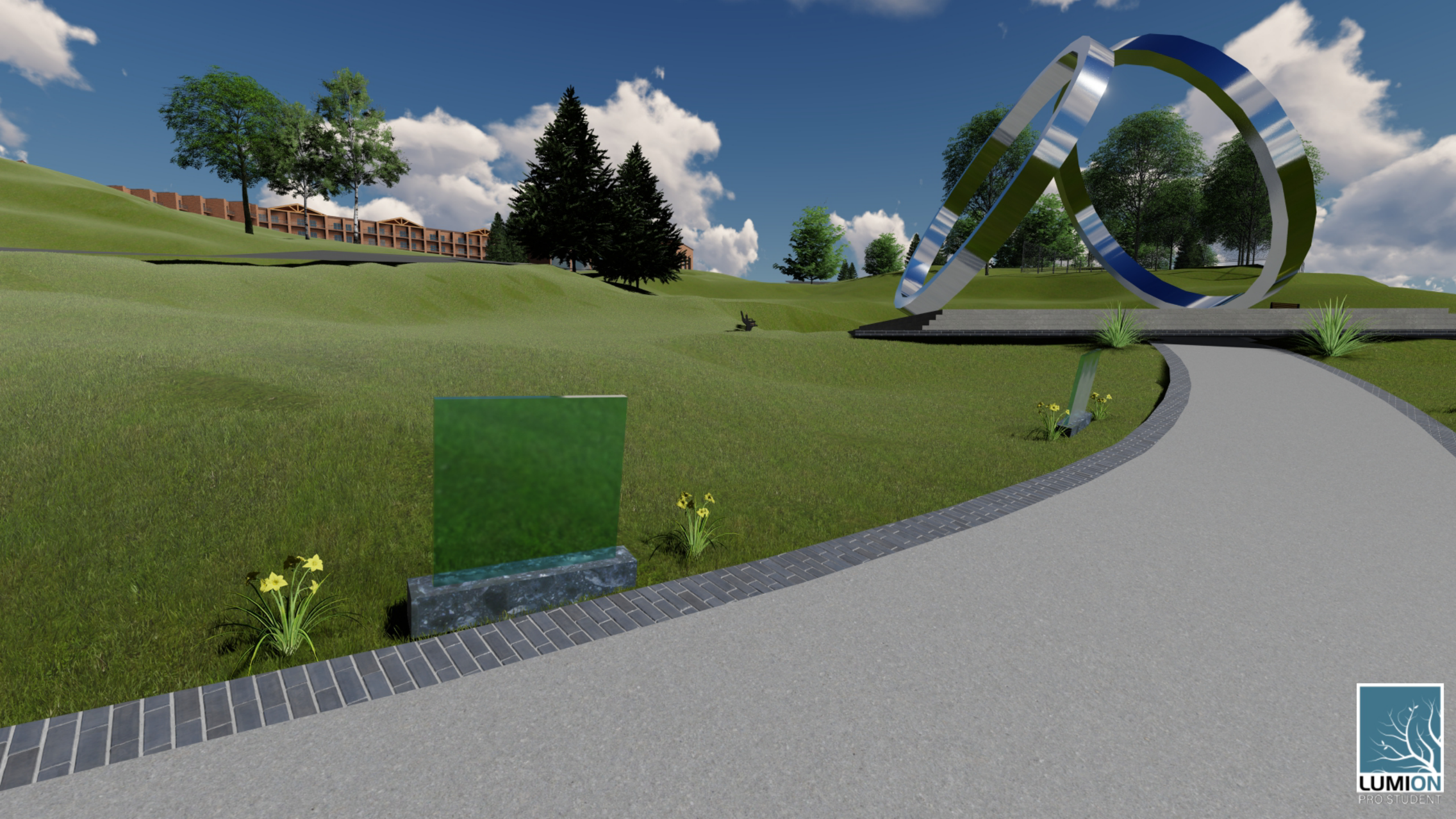
LUMION
PRO STUDENT

Appendix H - Permits

FOUNDATION PERMIT APPLICATION

TOWN OF NORTH ELBA **VILLAGE OF LAKE PLACID**

Property Tax Map No.: 42.191-1-1.100

Owner's Name: Lake Placid Vacation Corp. **Phone:** (518) 523-2556

Address: 101 Olympic Drive, Lake Placid, NY 12946

Contractor: Clark & Sons Construction **Phone:** (585)-645-4439

Address: 8 Clarkson Ave., P.O. Box 5710, Potsdam, NY 13676

Architect/Engineer: Clark & Sons Construction **Phone:** (585) 645-4439

Address: 8 Clarkson Ave., P.O. Box 5710, Potsdam, NY 13676

Description of Project: (SITE PLAN IS REQUIRED FOR FOUNDATION)
Base for Olympic Ring Sculpture

Zoning District: Village Center (VC)

Is the property in **Land Preservation?** No **Lake Overlay?** No **Scenic Preservation?** Yes

Does the property have? **(attached square footage worksheet MUST be completed)**

Water: **Size of Lot:** 2.18 acres **Sq. Ft. of Construction:** 3300 sq. ft.

Sewer: **Size of Structure:** 57'4"X 57'4" **Survey Date:**

Estimated Cost of Project: $286,000

Required Fee: $50.00 **Cash** X **Check** ___ **Date:** 4/15/2020

Date Application Received: 4/15/2020

Was the matter referred to:

Joint Review Board: **Zoning Board of Appeals:**___

Reason for referral:

Board's Decision:

By signing below, I acknowledge that I understand the current NYS Worker's Compensation Law and that I must provide a copy of that and my Liability Insurance before any work can commence. And that the improvement is located wholly within the property owned and controlled by the owner of record.

Kerry Lakin 4/15/2020

Applicant **Date** **Notary**

Applicant's Name: Clark & Sons Construction

Applicant's Address: 8 Clarkson Ave. P.O. Box 5710, Potsdam, NY 13676

Telephone Number: (585) 645-4439

Property Owner (if different than applicant): Lake Placid Vacation Corp

Address: 101 Olympic Drive, Lake Placid, NY 12946 Telephone Number: (518) 523-2556

The undersigned applicant, after being duly sworn, certifies and affirms, under the penalties of perjury, the following:

1. The information submitted herein is complete and correct and the applicant herby acknowledges that he is making application for approval of a project, building or use under the: (check as is appropriate)
   - ♦ Building and Safety Regulations: X
   - ♦ Zoning Regulations: X

   and no work shall be initiated thereon until all requisite approvals have been achieved;

2. That the applicant acknowledges an application for any required Certificate of Occupancy is hereby made concurrently with this application and, upon its approval, it shall be the applicant's responsibility to notify the Enforcement Officer of the completion of the project for which applications is being made and to obtain the requisite Certificate of Occupancy, absent which such project shall be held in violation of the Land Use Code;

3. That the applicant acknowledges nothing contained herein, including the application and any approval hereinafter granted for a project, shall be construed as complying with or as fulfilling any requirements with respect to said application or project with the provisions of the Adirondack Park Agency Act. The Town of North Elba/Village of Lake Placid makes no representations pertaining to the applicant's compliance with the Adirondack Park Agency Act and assumes no responsibility for any such requirements or for any obligation for notification and coordination in connection therewith;

4. That if any labor is employed for or in conjunction with the construction of any project approved pursuant to this application, the applicant will secure and thereafter maintain appropriate workmen compensation insurance coverage insuring such laborers during the course of such construction as may be required by the Workmen Compensation Law of the State of New York; and

5. That the applicant, if other that the owner of the property on which the building or use is to be undertaken, is acting as the duly authorized representative on behalf of said owner in all matters pertaining to the application and shall be forever therefore.

Applicant's Signature: Kelly White Date: 4/15/2020

Subscribed and sworn to before me this _____ day of _____ 2014.

_____
Notary Public

TOWN OF NORTH ELBA
2693 MAIN STREET
LAKE PLACID, NEW YORK 12946
phone: (518) 523-9516 fax: (518) 523-9569
web: www.northelba.org

SQUARE FOOTAGE WORKSHEET FOR BUILDING PERMIT

Basement Type: **Pier/Slab** X **Crawl**____ **Partial** _____ **Full** _____

Finished Basement area: Size:_____ **Sq. Ft.** _____

First Story Area: Size: 57'4"X57'4" **Sq. Ft.:** 3,300

Second Story Area: Size:_____ **Sq. Ft.**_____

Additional Story Area: Size:_____ **Sq. Ft.:**_____

Total Attic Area: Size:_____ **Sq. Ft.:**_____

Finished Attic Area: Size_____ **Sq. Ft.:**_____

Total Square Footage of Building Area: 3,300

Estimated Cost: $286,000