



Department of Management Services
Purchasing Division
241 West South Street
Kalamazoo, MI 49007-4796
Phone: 269.337.8020
Fax: 269.337.8500
www.kalamazoo.org

INVITATION FOR BID (IFB)

The City of Kalamazoo, Michigan is soliciting sealed bids for:

**Project Name: LaCrone Splash Pad Improvements-REBID
FOR SPRING 2021 CONSTRUCTION**

Bid Reference #: 91244-011.0

IFB ISSUE DATE: September 24, 2020

BID DUE/OPENING DATE: October 15, 2020 @ 3:00 p.m. Local Time

Facsimile Bids Will Not Be Accepted.

MAILING ADDRESS & INSTRUCTIONS

Mail to:

Purchasing Division
241 W. South Street
Kalamazoo, MI 49007

Questions about this IFB should be directed to:

Department Contact: **Sean Fletcher, Parks & Recreation Director at (269) 337-8568**
or Melinda Whitten, MCSA Group, Inc. at
mwhitten@mcsagroup.com or (616) 451-3346

Include on the Envelope the Project Name and Bid Reference Number. All Envelopes Must Be Sealed.

You are invited to submit a bid for this project. Specifications, terms, conditions and instructions for submitting bids are contained herein. This Invitation for Bid with all pages, documents and attachments contained herein, or subsequently added to and made a part hereof, submitted as a fully and properly executed bid shall constitute the contract between the City and the successful bidder when approved and accepted on behalf of the City by an authorized official or agent of the City. Please review the bid document as soon as possible and note the **DEADLINE FOR QUESTIONS** in the Instructions to Bidders.

All bidders shall complete and return the Bid and Award page(s) and submit all information requested herein in order for a bid to be responsive. The bid document shall be returned in its entirety, in a properly identified and sealed envelope to the Purchasing Division at the above address. **BIDS MUST BE RECEIVED BEFORE THE DUE DATE - LATE BIDS WILL NOT BE CONSIDERED.** The City reserves the right to postpone the bid opening for its own convenience.

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE #</u>	<u>APPENDICES</u>
	Statement of No Bid	Appendix A
I	Instructions to Bidders	Appendix B
II	Bid & Award Pages	Prevailing Wages
III	Insurance Requirements	Specifications
IV	Special Requirements	Drawings/Plans
V	General Provisions	
VI	Terms & Conditions	

STATEMENT OF NO BID

NOTE: If you DO NOT intend to bid on this commodity or service, please complete and return this form immediately. Your response will assist us in evaluating all responses for this important project and to improve our bid solicitation process.

The Purchasing Division of the City of Kalamazoo wishes to keep its bidders list file up-to-date. If, for any reason you cannot supply the commodity/service noted in this bid solicitation, this form must be completed and returned to remain on the particular bid list for future projects of this type.

If you do not respond to this inquiry within the time set for the bid opening date and time noted, we will assume that you can no longer supply this commodity/service, and your name will be removed from this bid list.

- _____ Specifications too "tight", i.e. geared toward one brand or manufacturer only (explain below).
- _____ Specifications are unclear (explain below).
- _____ We are unable to meet specifications.
- _____ Insufficient time to respond to the Invitation for Bid.
- _____ Our schedule would not permit us to perform.
- _____ We are unable to meet bond requirements.
- _____ We are unable to meet insurance requirements.
- _____ We do not offer this product or service.
- _____ Remove us from your bidders list for this commodity or service.
- _____ Other (specify below).

REMARKS: _____

SIGNED: _____ NAME: _____
(Type or Print)

TITLE: _____ DATE: _____

FIRM NAME: _____
(if any)

ADDRESS: _____
(Street address) (City) (State) (Zip)

PHONE: _____ FAX: _____

EMAIL: _____

**SECTION I
INSTRUCTIONS TO BIDDERS**

1. **EXAMINATION OF BID DOCUMENT**-Before submitting a bid, bidders shall carefully examine the specifications and shall fully inform themselves as to all existing conditions and limitations. The bidder shall indicate in the bid the sum to cover the cost of all items included on the bid form.
2. **PREPARATION OF BID**-The bid shall be legibly prepared in ink or typed. If a unit price or extension already entered by the bidder on the Bid and Award form is to be altered, it shall be crossed out and the new unit price or extension entered above or below and initialed by the bidder with ink. The bid shall be legally signed, and the complete address of the bidder given thereon.

All bids shall be tightly sealed in an envelope plainly marked SEALED BID and identified by project name, bid opening date and time. Bids opened by mistake, due to improper identification, will be so documented and resealed. The Purchasing Division will maintain and guarantee confidentiality of the contents until the specified opening date and time. Bids submitted by Fax machine will not be accepted.

3. **EXPLANATION TO BIDDERS**-Any binding explanation desired by a bidder regarding the meaning or interpretation of the Invitation for Bid (IFB) and attachments must be requested in writing, **at least business 5 days before the bid opening** so a reply may reach all prospective bidders before the submission of bids. Any information given to a prospective bidder concerning the IFB will be furnished to all prospective bidders as an amendment or addendum to the IFB if such information would be prejudicial to uninformed bidders. Receipt of amendments or addenda by a bidder must be acknowledged in the bid by attachment, or by letter or fax received before the time set for opening of bids. Oral explanation or instructions given prior to the opening will not be binding.
4. **CASH DISCOUNTS**-Discount offered for payment of less than thirty (30) days will not be considered in evaluating bids for award. Offered discounts of less than thirty (30) days will be taken if payment is made within the discount period, even though not considered in evaluation of the bid.
5. **WITHDRAWAL OF BIDS**-Bids may be withdrawn in person by a bidder or authorized representative, provided their identity is made known and a receipt is signed for the bid, but only if the withdrawal is made prior to the exact time set for receipt of bid. No bid may be withdrawn for at least ninety (90) days after bid opening.
6. **ALTERNATE BIDS**-bidders are cautioned that any alternate bid, unless specifically requested or any changes, insertions or omissions to the terms and conditions, specifications or any other requirement of this IFB may be considered non-responsive, and at the option of the City, result in rejection of the alternate bid.
7. **LATE BIDS**-Any bid received at the office designated herein after the exact time specified for receipt will not be considered. (Note: The City reserves the right to consider bids that have been determined by the City to be received late due to mishandling by the City after receipt of the bid and no award has been made.)
8. **UNIT PRICES**-If there is a discrepancy between unit prices and their extension, unit prices shall prevail.

SECTION II
BID AND AWARD

The undersigned having become thoroughly familiar with all of the bid/contract documents incorporated herein, the project site and the location conditions affecting the work, hereby proposes to perform everything required to be performed in strict conformity with the requirements of these documents, and to provide and furnish all the equipment, labor and materials necessary to complete in a professional manner the furnishing and installing of all of the following, meeting or exceeding the specifications as set forth herein for the prices as stated below.

BID WITH PREVAILING WAGES. This project will be awarded WITH Prevailing Wages.

LACRONE SPLASH PAD IMPROVEMENTS-REBID

GENERAL CONDITIONS					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
1.	Mobilization and maintaining traffic complete.	1	LS		
2.	Project sign as per specifications and location as directed by Landscape Architect.	1	LS		
3.	All layout and staking of site work elements complete.	1	LS		
GENERAL CONDITIONS TOTAL					\$

SITE PREPARATION AND GRADING					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
4.	Site preparation and grading including; rough and finish grading, erosion control measures and all other work shown on plans but not otherwise listed below.	1,866	SY		
5.	Sawcut and remove existing paving including bituminous, concrete and curb and gutter, complete as per plans and specifications.	694	SF		
SITE PREPARATION AND GRADING TOTAL					\$

SITE IMPROVEMENTS					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
6.	Construct 4” concrete sidewalk as per detail 3 on sheet 10 and per plans and specifications.	4,052	SF		
7.	Construct 4” colored concrete as per detail 3 on sheet 10 and per plans and specifications.	1,197	SF		
8.	Furnish and install Bituminous Paving Patch as per detail 5 on sheet 10 and per plans and specifications.	46	SF		
9.	Furnish and install Concrete Curb and Gutter as per detail 3 on sheet 10 and per plans and specifications.	20	LF		
10.	Install Owner Provided Benches as per detail 4 and 3 on sheet 11 and per plans and specifications.	2	EA		
SITE IMPROVEMENTS TOTAL					\$

SPLASH PAD					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
11.	Construct 6” Reinforced Colored Concrete for Splash Pad as per detail 6 on sheet 10 and per plans and specifications.	1,816	SF		
12.	Furnish and install Splash Pad Equipment as per plans and specifications.	1	LS		
13.	Furnish and Install Splash Pad Mechanical, Electrical, Plumbing and Controls as per plans and specifications.	1	LS		
SPLASH PAD TOTAL		\$			

SHELTER					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
14.	Furnish and Install Shade Shelter as per detail 5 on sheet 11 and per plans and specifications.	1	LS		
SHELTER TOTAL		\$			

SITE UTILITIES					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
15.	Furnish and Install 4” Water Service Line as per plans and specifications.	18	LF		
16.	Furnish and Install 3” Water Line as per plans and specifications.	93	LF		
17.	Furnish and install Water Connections (Tap by City) as per plans and specifications.	1	LS		
18.	Furnish and install all backflow preventors as per plans and specifications.	1	LS		
19.	Furnish and install Meter Vault as per plans and specifications.	1	LS		
20.	Furnish and install 8” Sanitary line as per plans and specifications.	210	LF		
21.	Furnish and install Sanitary Cleanout as per plans and specifications.	2	EA		
22.	Furnish and install Electrical Distribution and Connections as per plans and specifications.	1	LS		
SITE UTILITIES TOTAL		\$			

LANDSCAPE PLANT MATERIALS: Furnish and install the following landscape plant material, complete as per details 1 and 2 and as per sheet no. 10. Perennial and Shrub Installation.					
Item No.	Description/Botanical Name/Common Name	Quantity	Min. Size/Unit	Installed Unit Price	Unit Total
23.	Calamagrotis X acutiflora 'Karl Foerster' Karl Foerster Feather Reed Grass	40	#3 Container Minimum		
24.	Echinacea purpurea 'Pow Wow Wildberry' Coneflower	9	#1 Container Minimum		
25.	Hemerocallis 'Black eyed Stella' 'Black Eyed Stella' Daylily	5	#1 Container Minimum		
26.	Ribes Alpinum 'Green Mound' Green Mound Alpine Currant	16	#3 Container Minimum		
27.	Rudbeckia fulgida var. sullivantaii 'goldstrum' 'Goldstrum' Orange Coneflower	9	#2 Container Minimum		
28.	Furnish and install Lawn Seeding and Topsoil as per plans and specifications.	908	SY		
SITE UTILITIES TOTAL					

Total Bid <u>WITH</u> Prevailing Wages	\$
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PROVIDE UNIT PRICES FOR THE FOLLOWING:				
Item No.	Description	Quantity	Unit	Installed Unit Price
A.	Removal of unsuitable soils and backfill with engineered fill.	1	CY	

BID WITHOUT PREVAILING WAGES. This project will be awarded WITHOUT Prevailing Wages.

LACRONE SPLASH PAD IMPROVEMENTS

GENERAL CONDITIONS					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
1.	Mobilization and maintaining traffic complete.	1	LS		
2.	Project sign as per specifications and location as directed by Landscape Architect.	1	LS		
3.	All layout and staking of site work elements complete.	1	LS		
GENERAL CONDITIONS TOTAL		\$			

SITE PREPARATION AND GRADING					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
4.	Site preparation and grading including; rough and finish grading, erosion control measures and all other work shown on plans but not otherwise listed below.	1,866	SY		
5.	Sawcut and remove existing paving including bituminous, concrete and curb and gutter, complete as per plans and specifications.	694	SF		
SITE PREPARATION AND GRADING TOTAL		\$			

SITE IMPROVEMENTS					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
6.	Construct 4" concrete sidewalk as per detail 3 on sheet 10 and per plans and specifications.	4,052	SF		
7.	Construct 4" colored concrete as per detail 3 on sheet 10 and per plans and specifications.	1,197	SF		
8.	Furnish and install Bituminous Paving Patch as per detail 5 on sheet 10 and per plans and specifications.	46	SF		
9.	Furnish and install Concrete Curb and Gutter as per detail 3 on sheet 10 and per plans and specifications.	20	LF		
10.	Install Owner Provided Benches as per detail 4 and 3 on sheet 11 and per plans and specifications.	2	EA		
SITE IMPROVEMENTS TOTAL		\$			

SPLASH PAD					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
11.	Construct 6” Reinforced Colored Concrete for Splash Pad as per detail 6 on sheet 10 and per plans and specifications.	1,816	SF		
12.	Furnish and install Splash Pad Equipment as per plans and specifications.	1	LS		
13.	Furnish and Install Splash Pad Mechanical, Electrical, Plumbing and Controls as per plans and specifications.	1	LS		
SPLASH PAD TOTAL		\$			

SHELTER					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
14.	Furnish and Install Shade Shelter as per detail 5 on sheet 11 and per plans and specifications.	1	LS		
SHELTER TOTAL		\$			

SITE UTILITIES					
Item No.	Description	Quantity	Unit	Unit Price	Unit Total
15.	Furnish and Install 4” Water Service Line as per plans and specifications.	18	LF		
16.	Furnish and Install 3” Water Line as per plans and specifications.	93	LF		
17.	Furnish and install Water Connections (Tap by City) as per plans and specifications.	1	LS		
18.	Furnish and install all backflow preventors as per plans and specifications.	1	LS		
19.	Furnish and install Meter Vault as per plans and specifications.	1	LS		
20.	Furnish and install 8” Sanitary line as per plans and specifications.	210	LF		
21.	Furnish and install Sanitary Cleanout as per plans and specifications.	2	EA		
22.	Furnish and install Electrical Distribution and Connections as per plans and specifications.	1	LS		
SITE UTILITIES TOTAL		\$			

LANDSCAPE PLANT MATERIALS: Furnish and install the following landscape plant material, complete as per details 1 and 2 and as per sheet no. 10. **Perennial and Shrub Installation.**

Item No.	Description/Botanical Name/Common Name	Quantity	Min. Size/Unit	Installed Unit Price	Unit Total
22.	Calamagrotis X acutiflora 'Karl Foerster' Karl Foerster Feather Reed Grass	40	#3 Container Minimum		
23.	Echinacea purpurea 'Pow Wow Wildberry' Coneflower	9	#1 Container Minimum		
24.	Hemerocallis 'Black eyed Stella' 'Black Eyed Stella' Daylily	5	#1 Container Minimum		
25.	Ribes Alpinum 'Green Mound' Green Mound Alpine Currant	16	#3 Container Minimum		
26.	Rudbeckia fulgida var. sullivantaii 'goldstrum' 'Goldstrum' Orange Coneflower	9	#2 Container Minimum		
27.	Furnish and install Lawn Seeding and Topsoil as per plans and specifications.	818	SY		
SITE UTILITIES TOTAL		\$			

Total Bid <u>WITHOUT</u> Prevailing Wages	\$
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PROVIDE UNIT PRICES FOR THE FOLLOWING:

Item No.	Description	Quantity	Unit	Installed Unit Price
A.	Removal of unsuitable soils and backfill with engineered fill.	1	CY	

Bidder shall provide all of the information as requested herein with their bid. **Failure to do so and/or failure to provide post-bid requested information may be cause for rejecting the bid as non-responsive.**

Bidder/Contractor has examined and carefully studied the bidding documents and attachments, and acknowledges receipt of the following addenda:

Addendum No: _____

Dated: _____

Work shall start within ____ working days after receipt by Contractor of Notice to Proceed and shall be completed within _____ working days thereafter. The selected Contractor agrees to develop a schedule with the Owner as a condition of this contract and agrees to substantial completion of the project as outlined in these documents by **July 16, 2021**.

The City encourages the use of local labor in fulfilling the requirements of this contract.

By my signature below, I certify that the firm bidding on this contract, when making hiring decisions, does not use a past criminal conviction as a bar to or preclude a person with a criminal conviction from being considered for employment with the bidding firm unless otherwise precluded by federal or state law. I further certify that I have read and agree to be bound by the provisions of the City's Non-Discrimination Clause found in Appendix A as updated by City Ordinance 1856.

Signed: _____ Name: _____

Title: _____

CITY OF KALAMAZOO EX-OFFENDER POLICY CHECKLIST

As part of the City’s commitment to reducing unacceptable poverty, encouraging rehabilitation, reducing recidivism and strengthening families in Kalamazoo, the City has updated its Purchasing Policy to ensure that firms with whom the City does business share in this commitment by utilizing hiring practices that do not unfairly deny people with arrest and conviction records gainful employment. *(Important: This requirement also extends to any subcontractors the bidder intends to use to fulfill the contract for goods or services being sought from the City.)*

Part I: Proof that the bidder does not inquire about an individual’s past arrest or criminal history on the bidders employment application form

- Attach a copy of the current application for employment being used by the bidder

Part II: Certification that the bidder does not use an individual’s past arrest or criminal history to unlawfully discriminate against them by checking *one or more* of the following:

- That pursuant to federal or state law bidder is precluded from hiring persons with certain criminal records from holding particular positions or engaging in certain occupations by providing a cite to the applicable statute or regulation; if checking this box, provide a citation to the applicable statute or rule upon which the bidder is relying: _____
- That bidder conducts criminal history background checks only as necessary, and only after making a conditional offer of employment; that any withdrawal of an offer of employment to an individual because of a past criminal history is job-related and consistent with business necessity after the individual has been provided an individualized assessment opportunity to review and challenge or supplement the history of past criminal conduct being relied upon by the bidder;
- That the use by bidder of criminal history background checks complies with the U.S. Equal Employment Opportunity Commission’s Enforcement Guidance on the Consideration of Arrest and Conviction Records in Employment Decisions and that the bidder has not had a determination rendered against it in past 7 years that it discriminated against a person through the use of an individual’s arrest or criminal history

I CERTIFY THAT THE ABOVE STATEMENTS ARE TRUE.

Date

Signature

Printed Name

Position

**CITY OF KALAMAZOO
LOCAL PREFERENCE POLICY AND CERTIFICATION**

The lowest responsive Kalamazoo County bidder whose bid is not low but falls within 2% of the lowest responsive bid is afforded the opportunity to become the successful bidder if it agrees to reduce its bid to match the lowest responsive bid. The City of Kalamazoo is the sole determiner whether a bidder is responsible, qualifies as a Kalamazoo County bidder, and if its bid is responsive to the City’s specifications, terms and conditions.

If the lowest Kalamazoo County bidder chooses not to match the lowest bid, the next lowest responsive Kalamazoo County bidder whose bid falls within 2% of the lowest bid, is given the opportunity to match the lowest responsive bid.

To qualify as a Kalamazoo County bidder, the bidder must meet both the following criteria:

1. Have a physical presence in Kalamazoo County by maintaining a permanent office, factory or other facility in Kalamazoo County with employees working in Kalamazoo County.
2. Have paid real or personal property taxes related to said business to the City of Kalamazoo, County of Kalamazoo or other municipal corporation within Kalamazoo County in the previous tax year, except that a non-profit entity need not meet this requirement.

This local preference policy applies only to purchases for materials, supplies, capital outlay, and services for maintenance, repair or operation of City facilities that are over \$25,000. If more than 50% of the contract is sub-contracted to firms located outside of Kalamazoo County that bid does not qualify for the local preference policy outlined above. The local preference policy will not apply if prohibited by law. The Purchasing Agent has the authority to finally determine if the bidder qualifies as a Kalamazoo County bidder as set forth herein. The Purchasing Agent may take into account the permanency of the business in Kalamazoo, and whether the business appears to be claiming to be a Kalamazoo County business solely or primarily to qualify as a Kalamazoo County business under this Resolution, and any other material factors.

CERTIFICATION

If you qualify as a Kalamazoo County bidder and wish to be considered for the local preference provisions as provided above please certify that fact by providing the information requested below and attesting to its accuracy.

Firm Name: _____

Street Address of Business: _____

City, State, and Zip Code: _____

Number of employees working in Kalamazoo County: _____

Name the city or township to which business real and/or personal property taxes are paid or provide non-profit status:

The above information is accurate:
Signature: _____ Date: _____

Title: _____



MANAGEMENT SERVICES DEPARTMENT
PURCHASING DIVISION
241 W. South Street
Kalamazoo, Michigan 49007-4796
Telephone (269) 337-8020
FAX (269) 337-8500
cokpurchasing@kalamazoo.org

COVID-19 ADDENDUM
March 16, 2020

TO: ALL Prospective Bidders
PROJECT: ALL Upcoming Projects

The purpose of this addendum is to clarify and/or modify the sealed bid delivery and bid opening process for all upcoming projects. All work affected is subject to all applicable terms and conditions of the Bidding and Contract Documents.

1. UPDATE TO SEALED BID DELIVERY AND BID OPENING POLICY

Effective immediately and continuing until further notice, due to the COVID-19 virus the City of Kalamazoo will no longer be accepting sealed bids in-person or conducting public bid openings.

Bidders can submit sealed bids in one of the following ways:

- Mail your bid, to be received before the bid due date and time indicated in the bid document, to the City of Kalamazoo at the following address:

City of Kalamazoo
Purchasing Division
241 West South Street
Kalamazoo, MI 49007

- Deliver your bid to the Treasurer's Office Payment Drop Box located in the northwest corner of City Hall before the bid due date and time indicated in the bid document. Pictures of the drop box location have been provided in **Photo Attachment**.

Bidders are strongly encouraged to deliver their sealed bid to the Treasurer's Office Payment Drop Box. However, if hand delivery of your bid to the drop box is not an option, please be sure to allow enough time for possible mail delays when mailing sealed bids to the City. Any bid received after the exact date and time specified for receipt will not be considered. (Note: The City reserves the right to consider bids that have been determined by the City to be received late due to mishandling by the City after receipt of the bid and no award has been made.)

All bids shall be tightly sealed in an envelope plainly marked SEALED BID and identified by project name, bid opening date and time. Bids opened by mistake, due to improper identification, will be so documented and resealed. The Purchasing Division will maintain and guarantee confidentiality of the contents until the specified opening date and time. Bids submitted by fax machine or email will not be accepted.

The Purchasing Division will post bid tabulations to the City of Kalamazoo website within 24 hours after the bid opening date and time at: <https://www.kalamazoo.org/bidopportunities>.

Questions regarding this sealed bid delivery and bid opening policy change related to the COVID-19 virus should be directed to the City of Kalamazoo at (269) 337-8020.

Sincerely,



Michelle Emig
Purchasing Division Manager



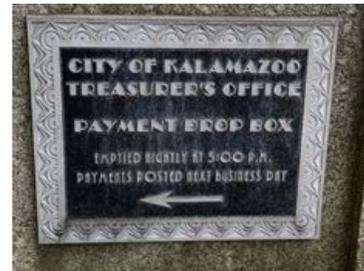
COVID-19 Addendum

PHOTO ATTACHMENT

***CITY OF KALAMAZOO
TREASURER'S OFFICE PAYMENT DROP
BOX PICTURES***

CITY OF KALAMAZOO TREASURER’S OFFICE PAYMENT DROP BOX

Deliver your bid to the Treasurer’s Office Payment Drop Box located in the northwest corner of City Hall before the bid due date and time indicated in the bid document.



1. Open drop box located at City Hall.



2. Insert SEALED BID here.



I hereby state that all of the information I have provided is true, accurate and complete. I hereby state that I have the authority to submit this bid which will become a binding contract if accepted by the City of Kalamazoo. I hereby state that I have not communicated with nor otherwise colluded with any other bidder, nor have I made any agreement with nor offered/accepted anything of value to/from an official or employee of the City of Kalamazoo that would tend to destroy or hinder free competition.

The firm's identification information provided will be used by the City for purchase orders, payment and other contractual purposes. If the contractual relationship is with, or the payment made to, another firm please provide a complete explanation on your letterhead and attach to your bid. Please provide for accounts payable purposes:

Tax Identification Number (Federal ID): _____

Remittance Address: _____

I hereby state that I have read, understand and agree to be bound by all terms and conditions of this bid document.

SIGNED: _____ NAME: _____
(Type or Print)

TITLE: _____ DATE: _____

FIRM NAME: _____
(if any)

ADDRESS: _____
(Street address) (City) (State) (Zip)

PHONE: _____ FAX: _____

EMAIL ADDRESS: _____

FOR CITY USE ONLY - DO NOT WRITE BELOW

REFERENCE QUESTIONNAIRE

Please answer the following questions completely.

1. Firm name: _____
2. Established: Year _____ Number of Employees: _____
3. Type of organization:
 - a. Individual: _____
 - b. Partnership: _____
 - c. Corporation: _____
 - d. Other: _____
4. Former firm name(s) if any, and year(s) in business:

5. Include at least 3 references of contracts for similar work performed over the last five (5) years. Include: owner, contact person and phone number and description of work performed.
 - 5.1 Company Name: _____
Address: _____
Phone: _____
Contact: _____
Type of work or contract: _____
 - 5.2 Company Name: _____
Address: _____
Phone: _____
Contact: _____
Type of work or contract: _____
 - 5.3 Company Name: _____
Address: _____
Phone: _____
Contact: _____
Type of work or contract: _____

I hereby certify that all of the information provided is true and answered to the best of my ability.

Signed: _____ Name: _____
(type or print)

Title: _____ Date: _____

**SECTION III
CITY OF KALAMAZOO
INDEMNITY AND INSURANCE**

Contractor, or any of their subcontractors, shall not commence work under this contract until they have obtained the insurance required under this paragraph, and shall keep such insurance in force during the entire life of this contract. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to the City of Kalamazoo within ten (10) days of the Notice of Award. The requirements below should not be interpreted to limit the liability of the Contractor. All deductibles and SIR's are the responsibility of the Contractor.

The Contractor shall procure and maintain the following insurance coverage:

Workers' Compensation Insurance including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.

Commercial General Liability Insurance on an "Occurrence Basis" with limits of liability not less than \$1,000,000 per occurrence and aggregate. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included and (E) XCU coverage if the nature of the contract requires XC or U work.

Automobile Liability including Michigan No-Fault Coverages, with limits of liability not less than \$1,000,000 per occurrence, combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.

Additional Insured: Commercial General Liability and Automobile Liability, as described above, shall include an endorsement stating that the following shall be *Additional Insureds*: The City of Kalamazoo, all elected and appointed officials, all employees and volunteers, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof. It is understood and agreed that by naming the City of Kalamazoo as additional insured, coverage afforded is considered to be primary and any other insurance the City of Kalamazoo may have in effect shall be considered secondary and/or excess.

To the fullest extent permitted by law the Contractor agrees to defend, pay on behalf of, indemnify, and hold harmless the City of Kalamazoo, its elected and appointed officials, employees, agents and volunteers, and others working on behalf of the City of Kalamazoo against any and all claims, demands, suits, or loss, including all costs connected therewith, and for any damages which may be asserted, claimed, or recovered against or from the City of Kalamazoo, by reason of personal injury, including bodily injury or death and/or property damage, including loss of use thereof, which arises out of, or is in any way connected or associated with this contract.

Cancellation Notice: All policies, as described above, shall include an endorsement stating that it is understood and agreed that thirty (30) days, or ten (10) days for non-payment of premium, Advance Written Notice of Cancellation, Non-Renewal, Reduction, and/or Material Change shall be sent to: City of Kalamazoo, Purchasing Division, 241 W. South Street, Kalamazoo, MI 49007.

Proof of Insurance Coverage: The Contractor shall provide the City of Kalamazoo at the time that the contracts are returned by him/her for execution, or within 10 days of Notice of Award, whichever is earlier, a Certificate of Insurance as well as the required endorsements. In lieu of required endorsements, if applicable, a copy of the policy sections where coverage is provided for additional insured and cancellation notice would be acceptable. Copies or certified copies of all policies mentioned above shall be furnished, if so requested.

INDEMNITY AND INSURANCE
Continued

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and/or policies to City of Kalamazoo at least ten (10) days prior to the expiration date.

Scope of Coverage: The above requirements and conditions shall not be interpreted to limit the liability of the Contractor under this Contract but shall be interpreted to provide the greatest benefit to the City and its officers and employees. The above listed coverages shall protect the Contractor, its employees, agents, representatives and subcontractors against claims arising out of the work performed. It shall be the Contractor's responsibility to provide similar insurance for each subcontractor or to provide evidence that each subcontractor carries such insurance in like amount prior to the time such subcontractor proceeds to perform under the contract.

SECTION IV
SPECIAL REQUIREMENTS

1. BID BOND/GUARANTEE

The bid must be accompanied by a bid bond which shall not be less than five (5%) percent of the total amount of the bid. No bid will be considered unless it is accompanied by the required guarantee. The bid guarantee shall ensure the execution of the bid and award, and the furnishing of a performance bond and a labor and material bond (A and B below) by the successful bidder. (Contractors Note: A cashier's or certified check in lieu of a bid bond is **NOT** acceptable.)

A. PERFORMANCE BOND

A performance bond shall be furnished in the full amount of the contract ensuring the City of faithful performance of all the provisions of the contract, and the satisfactory performance of any equipment required hereunder. The bond shall also ensure the City against defective workmanship and/or materials.

B. LABOR AND MATERIAL (PAYMENT) BOND

A labor and material (payment) bond shall be furnished for the period covered by the contract, in the full amount of the contract for the protection of labor and material suppliers and sub-contractors.

Bonds shall be secured by a guaranty or a surety company listed in the latest issue of the U.S. Treasury, circular 570, and licensed to do business in the State of Michigan and written in favor of the City of Kalamazoo. The amount of such bonds shall be within the maximum amount specified for such company in said circular 570. The bonds shall be accompanied by a power of attorney showing authority of the bonding agent to sign such bonds on behalf of the guaranty or surety company. The cost of the bonds shall be borne by the Contractor.

Failure of the Contractor to supply the required bonds within ten (10) days after Notice of Award, or within such extended period as the Purchasing Agent may agree to, shall constitute a default and the City of Kalamazoo may either award this contract to the next lowest bidder or re-advertise for bids and may charge against the Contractor for the difference between the amount of the bid and the amount for which a contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the bid bond. If a more favorable bid is received by re-advertising, the defaulting bidder shall have no claim against the City of Kalamazoo for a refund.

2. WAIVERS OF LIEN

Upon completion of all work and request for final payment, the Contractor shall furnish a 100% waiver of lien from each supplier and sub-contractor covering all items of the work. Failure to supply waivers of lien for the entire job upon completion and final payment request will be considered grounds for withholding final payment.

3. SUBCONTRACTORS

- A. Contractors shall state on the Bid and Award page any and all subcontractors to be associated with their bid, including the type work to be performed. Any and all subcontractors shall be bound by all of the terms, conditions and requirements of the contract; however, the prime contractor shall be responsible for the performance of the total work requirements.
- B. The Contractor shall cooperate with the City of Kalamazoo in meeting its commitments and goals with regard to maximum utilization of minority and women business enterprise, and shall use its best efforts to ensure that minority and women business enterprises have maximum practicable opportunity to compete for subcontract work under this agreement.

4. PREVAILING WAGES

The successful bidder will be required to comply with Section 2-125 of the Code of Ordinances of the City of Kalamazoo regarding prevailing wages and Appendix B attached, incorporated herein by reference. Special note: This provision applies only to projects in excess of \$100,000 for City (\$2,000 federal) funded projects.

The City's requirements as it relates to prevailing wages includes a meeting with the City's Purchasing Division **prior** to work and payroll and work monitoring during the duration of the contract. Please contact Purchasing at (269) 337-8020 if you have any questions regarding Davis-Bacon provisions.

SECTION V
GENERAL PROVISIONS

1. INTENT

It is the intent of these plans and specifications to seek bids for entering into a contract for all direction, management, labor, materials, tools and equipment necessary to perform the LaCrone Splash Pad Improvements as specified herein.

2. SCOPE OF WORK

The scope of work involves site work for Splash Pad Improvements at LaCrone Park as stated in the attached specifications.

3. INSPECTION OF WORK

The City may maintain inspectors on the job who shall at all times have access to work.

4. PROJECT MANAGER'S STATUS

4.1 The Deputy Director or his/her duly authorized representative shall be the City's Project Manager and shall have the duties and responsibilities as provided in the contract.

4.2 The Project Manager shall have the authority to reject any work or materials which do not conform to the contract and to decide questions or interpretations which may arise from the contract documents.

4.3 The Contractor shall immediately report to the Project Manager any questionable or obvious error or omission which may be apparent in the contract documents and shall not proceed with work until the Deputy Director or his/her representative has resolved the error or omission.

5. LAYING OUT WORK

Before submitting a bid, the Contractor shall verify all measurements and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of differences between actual dimensions and the measurements indicated on the drawings. Any difference that may be found shall be submitted to the Architect for consideration before proceeding.

6. SUPERVISION

The Contractor shall employ an experienced superintendent or foreperson on the job at all times.

7. SITE SECURITY

The Contractor shall be responsible for job site security of all materials and tools provided by him/her and no claim for loss or damage will be considered by the City.

8. CONTRACTOR COORDINATION

- 8.1 The Contractor shall make every effort to coordinate every aspect of his work with that of other contractors on the site to assure an efficiently managed and proper installation. Special attention shall be given by the site contractor to the coordination with the splash pad equipment installation contractor and vice versa.
- 8.2 Consideration shall be given to timing of construction, maintaining adequate construction access, and construction staging. Any costs associated with this coordination shall be included in the contract.

9. PROTECTION OF WORK

The Contractor shall maintain adequate protection of all his/her work from damage and shall protect all public and private abutting property from injury or loss arising in connection with this contract.

10. PROTECTION OF PROPERTY

- 10.1 The Contractor shall confine his/her equipment and operations to those areas of the work site necessary for the completion of the work, or as authorized by the Project Manager. The Contractor shall protect and preserve from damage any facilities, utilities or features including trees, shrubs and turf which are not required to be disturbed by the requirements of the work.
- 10.2 The Contractor shall be responsible to determine the location of and to protect from damage any utilities or other improvements.

11. MATERIALS INSPECTION AND RESPONSIBILITY

- 11.1 The Project Manager shall have the right to inspect any materials to be used in carrying out the terms of the contract.
- 11.2 The City does not assume any responsibility for the contracted quality and standard of all materials, equipment, components or completed work furnished under this contract.
- 11.3 Any materials, equipment, components or completed work which does not comply with contract specifications, MDOT, or state codes may be rejected by the City, and shall be replaced by the Contractor at no cost to the City.
- 11.4 Any materials, equipment or components rejected shall be removed within a reasonable period of time from the premises of the City at the entire expense of the Contractor after written notice has been mailed by the City to the Contractor that such materials, equipment or components have been rejected.

12. TARDINESS

Construction delays resulting from tardiness on the part of the Contractor will be reviewed by the City in the event of any request for contract extension by the Contractor.

13. CONSTRUCTION SCHEDULE AND COORDINATION

- 13.1 The Contractor shall supply the City with an agreeable construction schedule before commencing work on this contract. This schedule shall detail beginning and completion dates for each major component of the project.
- 13.2 The Contractor shall coordinate and cooperate with all other contractors who may be working on the site in order to allow for the orderly progress of work being done.
- 13.3 The Contractor is required to keep the Project Manager fully informed of any proposed work which will tend to interfere with the existing operations at the site.
- 13.4 The Contractor shall schedule all work to accommodate the City's schedule. In the event Contractor's schedule falls on weekends, nights or overtime work is required, no additional compensation will be allowed. All work shall be part of this contract without regard to when it is done.

14. MAINTAINING TRAFFIC

- 14.1 This work shall be in accordance with the requirements of Section 6.31 of the MDOT 2003 Standard Specifications for Construction and contractor is directed to the Special Provision for Maintaining Traffic, and as specified herein. The Contractor is advised that the current Michigan Manual of Uniform Traffic Control Devices is hereby established as governing all work in connection with traffic control devices, barricade lighting, etc. required on this
- 14.2 The Contractor shall furnish, erect, maintain and, upon completion of the work, remove all traffic control devices and barricade lights within the project and around the perimeter of the project for the safety and protection of through and local traffic. This includes, but is not limited to: Advance, regulatory and warning signs; barricades and channeling devices at intersecting streets on which traffic is to be maintained; barricades at the ends of the project and at right-of-way lines for intersecting streets which are to be closed with the first usable street on each side of the project
- 14.3 Where the existing pavement or partial widths of new pavement are to be utilized for the maintenance of through and local traffic, drum type barricades will be required at 50' intervals or as directed by the Engineer for channeling and directing traffic through the construction area. Where barricades are to be placed in a trench, Type II barricades may be required at the discretion of the Engineer. These barricades shall be lighted with Type C (steady burning) warning lights if they are used after dark.
- 14.4 The requirements for the maintenance of through traffic as described in the Standard Specifications shall also apply to the maintenance of local traffic.
- 14.5 Protection of all pedestrian traffic shall be maintained at all times.

15. ADDITIONS

15.1 Any modification to the contract shall be subject to prior approval by the Purchasing Agent. City Commission approval may also be required.

15.2 Prices for additional work required are not requested in the itemized listing contained herein for the base project. Should additional work be authorized, compensation shall be made on the basis of price or prices to be mutually agreed upon. Such additional work shall not begin until a Change Order has been approved.

16. REMOVAL OF RUBBISH

The Contractor shall daily remove all rubbish and accumulated materials due to his/her construction.

17. SITE ACCESS

The City will provide fair and reasonable access to the job site within the working schedules of both parties.

18. GUARANTEE

The Contractor shall guarantee all of his/her work for a period of one (1) year following the date of final acceptance of the completed work and shall repair, replace or make good any materials or work which fail to function or perform or be found defective, without cost to the City.

19. SAFETY

The Contractor shall comply with all applicable OSHA and MIOSHA regulations.

20. PAY ESTIMATES

The Contractor shall be responsible for the generation of invoices for payment. Payment will be generated by the City based upon an approved invoice. Recommended frequency of payment is monthly; however, frequency of payment will not exceed bi-weekly.

21. INSPECTION AND TESTING

The Contractor shall give the Project Manager timely notice of readiness of the work for all required inspections, tests or approvals, and shall cooperate with inspections and testing personnel to facilitate required inspections or tests.

22. SUBSURFACE CONDITIONS

Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Document 00800 - Supplementary Conditions as provided in paragraph 4.2. of Document 00700 - General Conditions. Bidder accepts the determination set forth in paragraph SC-4.2.1 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which Bidder is entitled to rely as provided in paragraph 4.2 of Document 00700 - General Conditions. Bidder acknowledges that such reports are not Contract Documents and may not be complete for Bidder's purposes. Bidder acknowledges that OWNER and ARCHITECT do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Existing Site Conditions and Underground Facilities at or contiguous to the Site. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning existing site conditions, including surface, subsurface and Underground Facilities at or contiguous to the Site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relates to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by

Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

23. PRODUCT/SYSTEM SUBSTITUTIONS

Submit a written request, to be received not later than 10 days prior to scheduled bid opening, for Substitution of any Product not named. If no substitutions are submitted, it will be reasonably concluded by the Owner and Landscape Architect that the specified product will be incorporated into the Work and the Bidder will be committed to supplying the specified product.

1. Describe in detail any variance to the Product specified. All proposed substitution for specified items shall be substantially the same size (height, length, width, diameter, etc.), type, color, construction quality and shall meet the design intent to be considered for substitution for the Product specified.
2. Document each request with complete data substantiating compliance of proposed Substitution with Product specified including written certification that Product conforms to or exceeds all requirements of the Product specified.
3. Document all coordination information, including a list of changes or modifications needed to the Contract Documents or other parts of the Work and to construction performed by the Owner and Separate Contractors that will become necessary to accommodate the proposed substitution.
4. Provide name, address and telephone number of manufacturer's authorized representative.
5. Submit three copies of all documents for each request for Substitution for consideration.
6. Approval of the Substitution request, if given, will be in the form of an addendum issued prior to scheduled opening date and hour at local time.

24. REMOVAL OF PERMANENT SIGNS AND POSTS

The Contractor shall notify the Project Manager one (1) working day in advance of the time permanent signs must be removed to accommodate the construction. The City's forces shall remove and salvage any permanent signs that must be removed for construction.

25. PERMANENT PARK SIGN STAKING

The City shall stake the field locations for the new permanent park signs that the Contractor shall install under this contract. The Contractor shall call MISS DIG to arrange for staking prior to sign installation.

26. BRAND NAMES

If and wherever in the specifications a brand name, make, name of any manufacturer, trade name, or vendor catalog number is mentioned it is for the purpose of establishing a grade or quality of material only. Since the City does not wish to rule out other competition and equal brands or makes, the phrase OR EQUAL is added. However, if a product other than that specified is bid, it is the vendor's responsibility to name such a product within his/her bid and to prove to The City that said product is equal to that specified and to submit brochures, samples, and/or specifications merits of bids submitted.

27. SAMPLES AND DEMONSTRATIONS

Evidence in the form of samples may be requested. Such samples are to be furnished after the date of bid opening only upon request of The City unless otherwise stated in the bid proposal. If samples should be requested, such samples must be received by The City no later than seven (7) days after formal request is made. When required, The City may request full demonstrations of any unit(s) bid prior to the award of any contract. Samples, when requested, must be furnished free of expense to The City and if not used in testing or destroyed, will upon request within thirty (30) days of bid award be returned at the bidder's request.

28. ACCEPTANCE OF MATERIAL

The material delivered under this proposal shall remain the property of the seller until a physical inspection and actual usage of the material and/or services is made and thereafter accepted to the satisfaction of The City and must comply with the terms herein, and be full in accord with specifications and of the highest quality. In the event the material and/or service supplied to The City is found to be defective or does not conform to specifications, The City reserves the right to cancel the order upon written notice to the seller and return the product to seller at the seller's expense.

29. VARIATIONS TO SPECIFICATIONS

For purposes of evaluation, the bidder **MUST** indicate any variances from our specifications, terms and/or conditions, no matter how slight. If variations are not stated in the proposal, it will be assumed that the product or service fully complies with our specifications, terms and conditions.

30. SAFETY STANDARDS

The bidder warrants that the products supplied to The City conform in all respects to the standards set forth in the Occupational Safety and Health Act of 1970 and its amendments and the failure to comply with this condition will be considered a breach of contract.

31. MANUFACTURER'S CERTIFICATION

The City reserves the right to request from bidder's separate manufacturer certification of all statements made in the bid.

32. QUESTIONS

Bidders shall address questions regarding the specifications to Sean Fletcher, Parks & Recreation Director at (269) 337-8568 and Melinda Whitten, MCSA Group, Inc. at mwhitem@mcsagroup.com or (616) 451-3346. (This does not relieve the requirements of Page 1, Item 3.) Questions regarding terms, conditions and other related bid requirements may be addressed to Monica Johnson, Buyer at johnsonm2@kalamazoocity.org or (269) 337-8603.

**SECTION VI
TERMS AND CONDITIONS**

1. AWARD OF CONTRACT

- A. This contract will be awarded to that responsible bidder whose bid, conforming to this solicitation, will be most advantageous to the City, price and other factors considered. The City reserves the right to accept or reject any or all bids and waive informalities and minor irregularities in bids received. Other factors include, as an example but not limited to, delivery time, conformance to specifications, incidental costs such as demurrage and deposits, etc.

Notification of award will be in writing by the Purchasing Agent. Upon notification, the Contractor shall submit to the Purchasing Division all required insurance certificates (if required) and such other documentation as may be requested or required hereunder. Upon their receipt and subsequent approval by the City, the Purchasing Agent will forward to the Contractor a written **NOTICE TO PROCEED**. Work shall **NOT** be started until such **NOTICE TO PROCEED** is received by the Contractor.

- B. Unilateral changes in bid prices by the bidder shall not be allowed. However, the City, at its sole option, reserves the right to negotiate with bidders in the event of, but not limited to:
- 1) No bids received;
 - 2) A single bid being received; or
 - 3) Prices quoted are over budget and/or unreasonable.

2. COMPLETE CONTRACT

This bid document together with its addenda, amendments, attachments and modifications, when executed, becomes the complete contract between the parties hereto, and no verbal or oral promises or representations made in conjunction with the negotiation of this contract shall be binding on either party.

3. SUBCONTRACTORS - NON-ASSIGNMENT

Bidders shall state in writing any and all sub-contractors to be associated with this bid, including the type of work to be performed. The Contractor shall cooperate with the City of Kalamazoo in meeting its commitments and goals with regard to maximum utilization of minority and women-owned business enterprises.

The Contractor hereby agrees and understands that the contract resulting from this solicitation shall not be transferred, assigned or sublet without prior written consent of the City of Kalamazoo.

4. TAXES

The City of Kalamazoo is exempt from all federal excise tax and state sales and use taxes. However, depending upon the situation, the vendor or contractor may not be exempt from said taxes and the City of Kalamazoo is making no representation as to any such exemption.

5. INVOICING

All original invoice(s) will be sent to the Finance Division, 241 W. South Street, Kalamazoo, MI 49007 or via email at apinvoice@kalamazoocity.org . Faxed copy of invoice(s) will not be accepted, unless it is to replace an original invoice that was lost in the mail. The Finance Division processes payments after receipt of an original invoice from the Contractor and approval by the department.

The City of Kalamazoo policy is to pay invoice(s) within 30 days from the receipt of the original invoice, if the services or supplies are satisfactory and the proper paper work and procedures have been followed. In order to guarantee payment to the vendor on a timely basis, the vendor needs to receive a purchase order number before supplying the City of Kalamazoo with goods or services. All original, and copies of original invoice(s), will clearly state which purchase order they are being billed against.

The City of Kalamazoo is a government municipality and therefore is tax exempt from all sales tax. Our tax-exempt number is 38-6004627.

The vendor is responsible for supplying the Finance Division with a copy of their W-9 if they are providing a service to the City of Kalamazoo.

6. PAYMENTS

Upon issuance of certificates of Payment by the Architect/Engineer for labor and material incorporated in the work and the materials suitably stored at the site payment shall be made up to ninety (90%) percent of the value thereof.

When the cumulative total of payment is equal to fifty (50%) percent of the contract sum, subsequent payments will be made in the full amount for labor and material certified by the Architect/Engineer.

The amount retained shall be held until final acceptance of the work, receipt of all payrolls, releases, and waiver of liens.

7. CHANGES AND/OR CONTRACT MODIFICATIONS

The City reserves the right to increase or decrease quantities, service or requirements, or make any changes necessary at any time during the term of this contract, or any negotiated extension thereof. Price adjustments due to any of the foregoing changes shall be negotiated and mutually agreed upon by the Contractor and the City.

Changes of any nature after contract award which reflect an increase or decrease in requirements or costs shall not be permitted without prior approval by the Purchasing Agent. City Commission approval may also be required. **SUCH CHANGES, IF PERFORMED IN ADVANCE OF PURCHASING AGENT APPROVAL, MAY BE SUBJECT TO DENIAL AND NON-PAYMENT.**

8. LAWS, ORDINANCES AND REGULATIONS

The Contractor shall keep himself/herself fully informed of all local, state and federal laws, ordinances and regulations in any manner affecting those engaged or employed in the work and the equipment used. Contractor and/or employees shall, at all times, serve and comply with such laws, ordinances and regulations.

Any permits, licenses, certificates or fees required for the performance of the work shall be obtained and paid for by the Contractor.

This contract shall be governed by the laws of the State of Michigan.

9. RIGHT TO AUDIT

The City or its designee shall be entitled to audit all of the Contractor's records, and shall be allowed to interview any of the Contractor's employees, throughout the term of this contract and for a period of three years after final payment or longer if required by law to the extent necessary to adequately permit evaluation and verification of:

- A. Contractor compliance with contract requirements,
- B. Compliance with provisions for pricing change orders, invoices or claims submitted by the Contractor or any of his payees.

10. HOLD HARMLESS

If the acts or omissions of the Contractor/Vendor or its employees, agents or officers, cause injury to person or property, the Contractor/Vendor shall defend, indemnify and save harmless the City of Kalamazoo, their agents, officials, and employees against all claims, judgments, losses, damages, demands, and payments of any kind to persons or property to the extent occasioned from any claim or demand arising therefrom.

11. DEFAULT

The City may at any time, by written notice to the Contractor, terminate this contract and the Contractor's right to proceed with the work, for just cause, which shall include, but is not limited to the following:

- A. Failure to provide insurance and bonds (when called for), in the exact amounts and within the time specified or any extension thereof.
- B. Failure to make delivery of the supplies, or to perform the services within the time specified herein, or any extension thereof.
- C. The unauthorized substitution of articles for those bid and specified.
- D. Failure to make progress if such failure endangers performance of the contract in accordance with its terms.
- E. Failure to perform in compliance with any provision of the contract.

DEFAULT (cont.)

- F. **Standard of Performance** - Contractor guarantees the performance of the commodities, goods or services rendered herein in accordance with the accepted standards of the industry or industries concerned herein, except that if this specification calls for higher standards, then such higher standards shall be provided.

Upon notice by the City of Contractor's failure to comply with such standards or to otherwise be in default of this contract in any manner following the Notice to Proceed, Contractor shall immediately remedy said defective performance in a manner acceptable to the City. Should Contractor fail to immediately correct said defective performance, said failure shall be considered a breach of this contract and grounds for termination of the same by the City.

In the event of any breach of this contract by Contractor, Contractor shall pay any cost to the City caused by said breach including but not limited to the replacement cost of such goods or services with another Contractor.

The City reserves the right to withhold any or all payments until any defects in performance have been satisfactorily corrected.

In the event the Contractor is in breach of this contract in any manner, and such breach has not been satisfactorily corrected, the City may bar the Contractor from being awarded any future City contracts.

- G. All remedies available to the City herein are cumulative and the election of one remedy by the City shall not be a waiver of any other remedy available to the City.

12. TERMINATION OF CONTRACT

The City may, at any time and without cause, suspend the work of this contract for a period of not more than ninety days after providing notice in writing to the Contractor. The Contractor shall be allowed an adjustment in the contract price or an extension of the contract times, or both, directly attributable to the suspension if Contractor makes an approved claim.

The City may, without prejudice to any other right or remedy of the City, and with or without cause, terminate the contract by giving seven days written notice to the Contractor. In such case the Contractor shall be paid, without duplication, for the following items:

- A. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such work;
- B. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the contract documents in connection with uncompleted work, plus fair and reasonable sums for overhead and profit on such expenses;
- C. All documented claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and
- D. Reasonable expenses directly attributable to termination.

The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

13. INDEPENDENT CONTRACTOR

At all times, the Contractor, any of his/her employees, or his/her sub-contractors and their subsequent employees shall be considered independent contractors and not as City employees. The Contractor shall exercise all supervisory control and general control over all workers' duties, payment of wages to Contractor's employees and the right to hire, fire and discipline their employees and workers. As an independent contractor, payment under this contract shall not be subject to any withholding for tax, social security or other purposes, nor shall the Contractor or his/her employees be entitled to sick leave, pension benefit, vacation, medical benefits, life insurance or workers' unemployment compensation or the like.

14. PROJECT SUPERVISOR

The Contractor shall employ an individual to act as Project Supervisor. The Project Supervisor shall be available to the Contractor's workers and the Project Manager at all times by use of a beeper or other reliable means. The Project Supervisor shall prepare daily work plans for the employees, monitor employee performance, attendance and punctuality; and work closely with the City's Project Manager in assuring contract compliance.

15. MEETINGS

The Contractor and/or Project Supervisor shall be available to meet with the Department Head or Project Manager at a mutually agreeable time to discuss problems, issues or concerns relative to the contract. Either party may call a meeting at any time. When such a request for a meeting is made, the meeting date shall, in no case exceed five (5) working days after the request; and, if in the sole opinion of the Department Head, the severity of the circumstance warrants, no more than one (1) working day.

APPENDIX A
NON-DISCRIMINATION CLAUSE FOR ALL CITY OF KALAMAZOO CONTRACTS

The Contractor agrees to comply with the Federal Civil Rights Act of 1964 as amended; the Federal Civil Rights Act of 1991 as amended; the Americans With Disabilities Act of 1990 as amended; the Elliott-Larson Civil Rights Act, Act. No. 453, Public Act of 1976 as amended; the Michigan Handicappers Civil Rights Act, Act No. 220, Public Act of 1976 as amended, City Ordinance 1856 and all other applicable Federal and State laws. The Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, age, height, weight, marital status, physical or mental disability, family status, sexual orientation or gender identity that is unrelated to the individual's ability to perform the duties of the particular job or position. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment advertising, layoff or termination; rates of pay or other forms of compensations; and selection for training, including apprenticeship.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, age, height, weight, marital status, physical or mental disability family status, sexual orientation or gender identity that is unrelated to the individual's ability to perform the duties of the particular job or position.
3. If requested by the City, the Contractor shall furnish information regarding practices, policies and programs and employment statistics for the Contractor and subcontractors. The Contractor and subcontractors shall permit access to all books, records and accounts regarding employment practices by agents and representatives of the City duly charged with investigative duties to assure compliance with this clause.
4. Breach of the covenants herein may be regarded as a material breach of the contract or purchasing agreement as provided in the Elliott-Larsen Civil Rights Act and City Ordinance 1856.
5. The Contractor will include or incorporate by reference the provisions of the foregoing paragraphs 1 through 4 in every subcontract or purchase order unless exempted by the rules, regulations or orders of the Michigan Civil Rights Commission* and will provide in every subcontract or purchase order that said provision will be binding upon each subcontractor or seller.
6. The Contractor will not preclude a person with a criminal conviction from being considered for employment unless otherwise precluded by federal or state law. (for contracts over \$25,000)

The Elliott-Larson Civil Rights Act, Sec. 202 of Act. No. 453 of 1976 reads in part as follows:

Sec. 202. (1) An employer shall not:

- (a) Fail or refuse to hire, or recruit, or discharge or otherwise discriminate against an individual with respect to employment, compensation, or a term condition or privilege of employment because of religion, race, color, national origin, age, sex, height, weight or marital status.
- (b) Limit, segregate or classify an employee or applicant for employment in a way which deprives or tends to deprive the employee or applicant of an employment opportunity or otherwise adversely affects the status of an employee or applicant because of religion, race, color, national origin, age, sex, height, weight or marital status.
- (c) Segregate, classify or otherwise discriminate against a person on the basis of sex with respect to a term, condition or privilege of employment, including a benefit plan or system.

* Except for contracts entered into with parties employing less than three employees.

APPENDIX B - PREVAILING WAGES

Prevailing wages are applicable to this contract, therefore, rates will apply as follows:

- (XX) Project is funded by City of Kalamazoo monies and is estimated to be in excess of \$100,000.00. The applicable prevailing wage rates are attached.

Specifications for projects in which the City of Kalamazoo is party for construction, alterations and/or repair including painting and decorating of public buildings or public works in or for the City of Kalamazoo and which requires or involves the employment of mechanics and/or laborers shall contain the following provisions stating the minimum wages to be paid the various classes of laborers and mechanics for the project. Prevailing wage rates determined by the U.S. Department of Labor under Davis Bacon and related acts will be used for City of Kalamazoo construction projects.

By the incorporation of prevailing wage rates within this specification, the City of Kalamazoo stipulates that:

- ✓ Contractor or his/her subcontractor shall pay all mechanics and laborers employed directly upon the site of the work, unconditionally and not less than once a week and without subsequent deduction or rebate on any account the full amount, accrued at the time of payment, computed at wage rates as incorporated herein regardless of any contractual relationship which may be alleged to exist between the contractor or subcontractor and such laborers and mechanics;
- ✓ The scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work;
- ✓ The Prime Contractor and all subcontractors shall submit weekly certified payrolls documenting the hours worked and wages paid by work classification. **NOTE: Contactor shall not include Social Security numbers of employees on certified payrolls.**
- ✓ There may be withheld from the contractor's accrued payments the amount considered necessary by the City's Contracting Official to pay to laborers and mechanics employed by the contractor or any subcontractor on the work for the difference between the rates of wages required by the contract and the rates of wages received by such laborers and mechanics except those amounts properly deducted or refunded pursuant to the terms of the Davis-Bacon Act (USC, Title 40, Sec. 276a) and interpretations thereof.

Special Note: The City's requirements as it relates to prevailing wages **includes a meeting with the City's Purchasing Agent prior to starting work and the submission of weekly certified payrolls by prime contractors and all subcontractors.** The City will monitor certified payrolls, work progress, and conduct interviews with the mechanics and labors employed directly upon the site during the duration of the contract Please contact the Purchasing Department at (269) 337-8020 if you have any questions regarding prevailing wage provision.

The overtime pay to which a laborer or mechanic is entitled under this contract shall be that overtime pay to which he/she is entitled by any agreement made with the contractor or subcontractor or by any applicable provision of law; but in no event shall such amount be less than the prevailing wage in the Kalamazoo community for such overtime.

Revised 4-08



PREVAILING WAGES

LaCrone Splash Pad Improvements

Bid Reference #: 91244-011.0

September 2020

"General Decision Number: MI20200061 09/04/2020

Superseded General Decision Number: MI20190061

State: Michigan

Construction Type: Heavy

County: Kalamazoo County in Michigan.

Heavy, Includes Water, Sewer Lines and Excavation (Excludes Hazardous Waste Removal; Coal, Oil, Gas, Duct and other similar Pipeline Construction)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	02/21/2020
2	08/07/2020
3	09/04/2020

* CARP0525-006 06/01/2020

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 24.46	20.59

 ELEC0131-006 05/27/2019

	Rates	Fringes
ELECTRICIAN.....	\$ 34.36	16.48

 ENGI0325-009 09/01/2019

POWER EQUIPMENT OPERATORS: Underground Construction (Including Sewer)

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 1.....	\$ 32.92	24.35

GROUP 2.....	\$ 28.03	24.35
GROUP 3.....	\$ 27.53	24.35
GROUP 4.....	\$ 27.25	24.35

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Backhoe/ Excavator, Boring Machine, Bulldozer, Crane, Grader/ Blade, Loader, Roller, Scraper, Trencher (over 8 ft. digging capacity)

GROUP 2: Trencher (8-ft digging capacity and smaller)

GROUP 3: Boom Truck (non-swinging, non- powered type boom)

GROUP 4: Broom/ Sweeper, Fork Truck, Tractor, Bobcat/ Skid Steer /Skid Loader

ENGI0326-025 06/01/2020

EXCLUDES UNDERGROUND CONSTRUCTION

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1.....	\$ 40.38	24.85
GROUP 2.....	\$ 37.08	24.85
GROUP 3.....	\$ 34.43	24.85
GROUP 4.....	\$ 32.72	24.85
GROUP 5.....	\$ 32.72	24.85
GROUP 6.....	\$ 26.86	24.85
GROUP 7.....	\$ 24.38	24.85

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane operator with main boom and jib 400', 300', or 220' or longer.

GROUP 2: Crane operator with main boom and jib 140' or longer, tower crane, gantry crane, whirley derrick

GROUP 3: Backhoe/Excavator; Boring Machine; Bulldozer; Crane; Grader/Blade; Loader; Roller; Scraper; Tractor; Trencher

GROUP 4: Bobcat/Skid Loader; Broom/Sweeper; Fork Truck (over 20' lift)

GROUP 5: Boom truck (non-swinging)

GROUP 6: Fork Truck (20' lift and under for masonry work)

GROUP 7: Oiler

FOOTNOTES:

Crane operator with main boom and jib 300' or longer: \$1.50 per hour above the group 1 rate.

Crane operator with main boom and jib 400' or longer: \$3.00 per hour above the group 1 rate.

IRON0340-004 06/19/2017

	Rates	Fringes
IRONWORKER, STRUCTURAL AND REINFORCING.....	\$ 24.43	24.67

LABO0334-011 09/01/2018

SCOPE OF WORK:

OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

	Rates	Fringes
LABORER		
(1) Common or General.....	\$ 20.97	12.85
(2) Mason Tender-Cement/Concrete.....	\$ 21.10	12.85
(4) Grade Checker.....	\$ 21.28	12.85
(5) Pipelayer.....	\$ 21.40	12.85

LABO0355-010 06/01/2018

EXCLUDES OPEN CUT CONSTRUCTION

	Rates	Fringes
LABORER		
Common or General; Grade Checker; Mason Tender - Cement/Concrete.....	\$ 23.02	12.85
Pipelayer.....	\$ 20.34	12.85

PAIN0312-014 06/12/2014

	Rates	Fringes
PAINTER		
Brush & Roller.....	\$ 21.75	11.94
Spray.....	\$ 22.75	11.94

PLAS0016-020 04/01/2014

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 22.31	12.83

PLUM0333-026 06/01/2019

Fort Custer

	Rates	Fringes
PLUMBER.....	\$ 38.19	22.33

PLUM0357-012 07/01/2019

Excluding Fort Custer

	Rates	Fringes
PLUMBER.....	\$ 34.20	21.35

* TEAM0007-011 06/01/2020

Rates	Fringes
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TRUCK DRIVER		
Lowboy/Semi-Trailer Truck...	\$ 28.05	.50 + a+b
Tractor Haul Truck.....	\$ 27.80	.50 + a+b

FOOTNOTE:
a. \$470.70 per week.
b. \$68.70 daily.

SUMI2010-059 11/09/2010

	Rates	Fringes
LABORER: Landscape.....	\$ 12.25	0.00
TRUCK DRIVER: Dump Truck.....	\$ 18.00	6.43
TRUCK DRIVER: Off the Road Truck.....	\$ 20.82	3.69

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example:

PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour

Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"



SPECIFICATIONS

LaCrone Splash Pad Improvements

Bid Reference #: 91244-011.0

September 2020

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

Site

Technical Specifications General Conditions	GC-1 - GC-8
General Site Conditions	02050-1 - 02050-2
Removal Items	02100-1 - 2100-2
Earthwork and Grading	02200-1 - 2200-3
Bituminous Concrete Paving	02513-1 - 2513-2
Concrete Work	02514-1 - 2514-6
Joint Filler and Sealant.....	02515-1 - 2515-2
Water Distribution and Piped Utilities.....	02666-1 - 2666-6
Colored Concrete	02750-1 - 2750-4
Site Amenities	02760-1 - 2760-2
Splashpad Equipment Installation	02765-1 - 2765-2
Chain Link Fence	02830-1 - 2830-4
Project Sign	02840-1
Landscaping	02900-1 - 2900-15
Lawn Seeding	02910-1 - 2910-4
Sanitary Sewer	03340-1- 03340-11

Electrical

Electrical Basic Materials and Methods	16050 -1 – 16050-4
Conduit	16111 -1 – 16050-8
Wire and Cable	16120 -1 – 16120-4
Boxes	16138 -1 – 16138-4
Electrical Identification	16195 -1 – 16195-4
Secondary Grounding	16450 -1 – 16450-2

Appendix

Appendix A – Shade Drawings and Specifications
Appendix B – Presidio Bench Installation Guide
Appendix C – Geotechnical Evaluation Report, August 9, 2010
Appendix D – Geotechnical Evaluation Report, June 10, 2020

**TECHNICAL SPECIFICATIONS
GENERAL CONDITIONS**

1.00 TERMS DEFINED:

Wherever in the bid or contract documents the term "LANDSCAPE ARCHITECT" appears, it shall refer to M. C. Smith Associates and Architectural Group, Inc., Landscape Architects and Architects, or his authorized representative. Wherever the term "OWNER" is used, it shall refer to City of Kalamazoo as "Party of the First Part" in the Proposal Agreement and Contract. The term "CONTRACTOR" shall refer to the "Party of the Second Part" in the Proposal Agreement and Contract.

2.00 APPROVED EQUAL:

References to the term "equal" or "approved equal" shall mean that alternate or substitute items shall be equal to or greater in every respect than the item specified. All such substitutions shall be proposed to the Landscape Architect in writing prior to bidding. The Contractor shall receive written notice of approval prior to committing himself in any way to the item. The Contractor will be proceeding at his own risk in the absence of a written approval and shall be fully responsible for all removal, replacement and restoration necessary to conform to the Contract and shall incur all costs directly or indirectly related to such activities.

3.00 TIMELY DEMAND FOR INSTRUCTIONS:

The Contractor shall provide reasonable and necessary opportunities and facilities for review. He shall not proceed until he has made timely demand upon the Landscape Architect for, and received from him, such instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such instruction. The Contractor shall furnish the Landscape Architect, from his force, sufficient and competent help for any field work in connection with the project which the Landscape Architect may require. The Contractor shall employ diligence and care in protecting all points and stakes approved by the Landscape Architect. The Contractor shall be responsible also for the failure to follow stakes given him by the Landscape Architect as well as failure to conform to other directions or instructions of the Landscape Architect, and shall rectify any work which does not conform to the Landscape Architect's directions, at his own expense.

4.00 REPORT ERRORS AND DISCREPANCIES:

If the Contractor, in the course of the work, finds any discrepancy between the plans and the physical conditions of the locality or any errors or omissions in plans or in the layout as given by said instructions, it shall be his duty to immediately inform the Landscape Architect, in writing, and the Landscape Architect shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

5.00 **COMPLIANCE:**

All construction shall conform to all aspects of the State of Michigan Building Code (MBC), Uniform Federal Accessibility Standards (UFAS), the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG) and the Americans with Disabilities Act (ADA). All work by the Contractor for complete execution of this project shall meet or exceed laws, guidelines, and statutes in every situation. In the event the Contractor believes that any portion of the work is inconsistent with the MBC, UFAS, ADAAG, and ADA they must immediately inform the Landscape Architect. Per the State of Michigan MNRTF Grant Requirements, all work must be in compliance with 1976 PA 453 Elliott-Larsen Civil Rights Act and 1976 PA 220 Persons with Disabilities Civil Rights Act.

6.00 **DEFECTIVE WORK OR MATERIALS:**

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as herein prescribed, and defective work shall be made good and unsuitable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Owner and accepted or estimated for payment. If the work or any part thereof shall be found defective before the final acceptance of the work, the Contractor shall forthwith make good such defect, without compensation, in a manner satisfactory to the Landscape Architect as unsuitable or not in conformity with the specifications, the Contractor shall forthwith remove them from the site. If the Contractor shall fail to replace any defective work or materials after reasonable notice, the Landscape Architect may cause such defective work or materials to be replaced and the expense thereof shall be deducted from the amount to be paid the Contractor. It is further expressly agreed that the granting of any progress certificate, the signing of any periodic estimate, or the payment of any money hereunder shall not be considered an acceptance of all or part of the work and shall in no way lessen the liability of the Contractor to replace defective work, though the same may not have been detected prior to the time that such money was paid. All periodic estimates are to be made merely on approximate quantities and shall be subject to correction at the time or before final estimate or final payment is made. However, nothing in this Contract shall be construed to mean that the Owner or its Landscape Architect waives or forfeits any right it or he has or had to later complain about defective materials or workmanship.

7.00 **SETTLEMENT FOR WAGES AND MATERIALS:**

If at any time during the progress of said work, said Contractor shall fail or neglect to pay for any labor performed, transportation charges, materials furnished, or tools, machinery, appliances, fuel, provisions or supplies of any sort or kind used or consumed in, upon, or on account of said work, for ten (10) days after payment for same shall become due, then the Owner shall have the power to pay for such labor, or for such transportation charges, materials, tools, machinery, appliances, fuel, provisions or supplies, and the amount so paid shall be retained out of the money due or to become

due to said Contractor, and said Owner may refuse to make the payment hereinafter mentioned to the extent of such indebtedness until satisfactory evidence in writing has been furnished and said indebtedness has been discharged. In any case, said Owner is hereby authorized and empowered by said Contractor to ascertain by the Landscape Architect the amount due or owing from said Contractor, to any laborer, or laborers, or to any person or persons or corporations for labor, transportation charges, materials, tools, machinery, appliances, fuel, provisions or supplies of any sort or kind used or consumed upon, in or on account of work covered by this Contract in such manner upon such proof as the Landscape Architect may deem sufficient.

8.00 **ORDER AND DISCIPLINE:**

The Contractor shall at all times enforce strict discipline and good order among his employees, and any superintendent, foreman or other employee of the Contractor who shall appear to be incompetent, disorderly, or in any way disqualified or unfaithful to the work entrusted to him, or whom the Landscape Architect may consider prejudicial to the prosecution of the work, shall be discharged immediately upon the request of the Landscape Architect, and shall not again be employed on the work without the Landscape Architect's written consent.

9.00 **AUTHORITY OF LANDSCAPE ARCHITECT:**

The Landscape Architect shall have the authority to reject or condemn all work or materials which does not conform to this contract; to direct application of forces to any portion of the work, which, in his judgement requires it; to order forces increased or diminished, and to decide questions which arise between the parties relative to the execution of the work. All questions or controversies which may arise between the Contractor and Owner under or in reference to this contract shall be subject to the decision of the Landscape Architect, and his decision shall be final and conclusive upon both parties, except in cases where time and/or financial considerations are involved; which, if no agreement in regard thereto is reached, shall be subject to arbitration.

10.00 **AUTHORITY OF OWNER:**

The Owner shall advise the Landscape Architect of changes in their financial capability, changes in their understanding of the intent of the plans, concerns for progress or quality of the work or of any other comment or concern related to the work in any way. The Owner shall not directly administer alterations to the work nor direct or supervise any employee or representative of the Contractor in any way at any time without the written consent of the Landscape Architect to both parties.

11.00 **UNCLASSIFIED WORK:**

In case any work shall be required to be furnished whether specified herein or indicated on the plans or not, or whether or not such work is typical work listed in the proposal which, in the opinion of the Landscape Architect, is not susceptible of classification under the Schedule of Unit Prices, the Contractor shall and will, if ordered by the Owner, do and perform such work and furnish such materials as may be required. If possible, an agreement as to the cost and payment for said additional work will be

reached and agreed upon by the Owner and Contractor. In the event of failure to reach such satisfactory agreement, the Contractor may be ordered by the Owner to proceed with such work and furnish such materials on a cost plus basis, on which basis the contractor shall receive the cost of any materials which he may be required to purchase plus ten percent (10%) and the cost of any labor which may be required to supply plus fifteen percent (15%). The ten percent (10%) and fifteen percent (15%) of such net cost are for profit, the use of the plant, tools, superintendence, overhead costs, and all other expenses incidental to the performance of such work and the furnishing of such materials, and the Contractor shall have no further claim in excess of the above; but this method of payment shall not apply to the performance of any work or the furnishing of any materials which, in part or in whole, is in the opinion of the Landscape Architect, susceptible of classification under such schedule which work or material shall be paid for in part or in whole as the case may be, at the Unit Price given in such schedule, except as herein otherwise expressly provided.

In case any work or material is required to be done or furnished under the provisions of this article for cost plus ten percent (10%) and fifteen percent (15%) as stipulated above, the Contractor shall at the end of each day, during the progress thereof, furnish to the Landscape Architect daily time slips showing the name and/or number of each workman employed thereon, the character of work his workmen are doing the wage paid or to be paid to therefore. If required, the Contractor shall produce any books, vouchers, records or memoranda showing the work and materials actually paid for the actual prices therefore. Such daily time slips and memoranda shall not, however, be binding upon the Owner and if any question or dispute shall arise as to the correct cost of such work or material, the determination of the Landscape Architect upon such question or dispute shall be final and conclusive.

12.00 UNAVOIDABLE DELAYS - EXTENSION OF TIME:

If the Contractor shall be delayed in the performance of the work from any natural or unavoidable cause or for which the Owner or his authorized representative is responsible, he shall, upon written application to the Landscape Architect at the time of such delay, be granted such extension of time as the Landscape Architect shall deem equitable and just.

13.00 SUSPENSION OF WORK:

Should the Landscape Architect deem it necessary to suspend operations on the work due to severity of the weather, he may notify the Contractor in writing to suspend operations on the entire project or any part thereof, and in the event of such right being exercised, the Landscape Architect shall grant to the Contractor an extension of the work. The Contractor shall on not less than ten (10) days notice, again resume the work if ordered to do so by the Landscape Architect. The Owner shall also reserve the right to suspend operations for any reason that it may deem necessary for a period not longer than ten (10) days, at any one time in which event the Contractor will be allowed an extension of time equivalent to the time that the work has been suspended. Should such a suspension be deemed necessary by the Owner, the Contractor shall have no claim for damage due to such suspension.

14.00 **EXPEDITING WORK:**

(A) **Correcting Imperfections:** If the Landscape Architect or the Owner shall at any time be of the opinion that the Contractor is neglecting to remedy any imperfections in the work, or is not progressing with the work as fast as necessary to insure its completion within the time and as required by the contract, or is otherwise violating any of the provisions of this contract, said Landscape Architect, on behalf of the Owner, shall have the power, and it shall be his duty to notify the Contractor to remedy such imperfections and/or proceed more rapidly with said work, or otherwise comply with the provisions of this contract.

(B) **Annulment:** In such case the Owner may give the Contractor ten (10) days written notice, and at the end of that time, if the Contractor continues to neglect the work, the Owner may provide labor and materials and deduct the cost from any money due the Contractor under this agreement and may terminate the employment of the Contractor under this agreement and take possession of the premises and of all materials, tools, and appliances thereon, and employ such forces as may be necessary to finish the work. In such case the Contractor shall receive no further payment until the work shall be finished, when, if the unpaid balance that would be due under this Contract exceeds the cost to the Owner of finishing the work, such excess shall be paid to the Contractor; but if such cost exceeds such unpaid balance, the Contractor shall pay the difference to the Owner.

(C) **Owner May Do Part Of Work:** Upon failure of the Contractor to comply with any notice given in accordance with the provisions hereof, the Owner shall have the alternative right, instead of assuming charge of the entire work, to place additional forces, tools, equipment, and materials on parts of the work for the purpose of carrying on such parts of the work and the costs incurred by the Owner in carrying on such parts of the work shall be payable by the Contractor and such work shall be deemed to be carried on by the Owner on account of the Contractor, and the Contractor shall be allowed therefore, the contract price. The Owner may retain the amount of the cost of such work, with seven percent (7%) added for any such sum or sums due or to become due the Contractor under this agreement.

15.00 **ACCEPTANCE:**

The Landscape Architect shall inspect the work for acceptance within ten (10) days of receipt of written notice from the Contractor that he is ready for such inspection. The listing of items to be completed on a "Certificate of Substantial Completion" or "Punch List" does not constitute a final acceptance of the work and the Contractor shall not submit a final billing on that basis.

30.00 **INSURANCE:**

The Contractor shall comply with the laws of the State of which the work is performed regarding employment and payment of employees, and shall maintain insurance satisfactory to the Owner to protect both himself and the Owner from claims under workmen's compensation acts and from any other damages for personal injury, including deaths, which may arise from operations under this Contract, whether such operations by

himself or by any subcontractor or anyone directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Landscape Architect and shall be subject to his approval for adequacy of protection.

If the acts or omissions of the Contractor/Vendor or its employees, agents or officers, cause injury to person or property, the Contractor/Vendor shall defend, indemnify and save harmless the City of Kalamazoo, and MCSA Group, Inc., their agents, officials, and employees against all claims, judgments, losses, damages, demands, and payments of any kind to persons or property to the extent occasioned from any claim or demand arising therefrom.

The Contractor shall furnish the Owner Certificates of Insurance evidencing such protection. The Contractor shall provide and maintain Workmen's Compensation Insurance for all of his employees employed at the site of the work; General Liability and Contingent or Protective Insurance as shall protect himself and the Owner from any and all claims that may arise from damage for personal injury, including accidental death as well as for claims for property damage which may arise from operations under this Contract. For the purpose of this agreement, the contractor shall carry the following types of insurance in at least the limits as specified by the City of Kalamazoo.

All policies affording the various coverages required by this section shall be endorsed to provide for a thirty (30) day prior written notice to be delivered to the Certificate Holder before any of the coverages afforded by these policies are either reduced or canceled.

The General Liability Policy shall name MCSA Group, Inc. and the City of Holland as additional insured for the length of the agreement.

The name of the project should be listed on the Certificate of Insurance.

The Contractor is advised that the Owner is not liable for the safety, security, or condition of his equipment or materials.

16.00 **TIME AND RESPONSIBILITIES:**

The work under this agreement shall be inspected by the firm of M. C. Smith Associates and Architectural Group, Inc., Landscape Architects and Architects, 529 Greenwood Avenue S.E., East Grand Rapids, Michigan 49506, herein called the Landscape Architects. The Contractor shall be responsible to said firm as agents of the Owner, as well as the Owner, for proper execution of said agreement. The Contractor shall notify the Landscape Architect, in writing, of concerns about the Contractor's ability to conform to work progress schedules outlined at the pre-construction of any other work related items in ample time to avoid unnecessary delays or alterations to the Contract.

17.00 **DAMAGES FOR NONCOMPLETION:**

The Owner shall withhold the aforesaid amount of not less than \$500.00 per day for each day of suitable working weather, except for Sundays and legal holidays, that the Contractor exceeded the specified date for completion of the work as compensation for liquidated damages and additional costs suffered by the Owner due to the Contractor's

failure to complete the work as specified.

In the event the Landscape Architect is required to provide construction administration for inspection services after the specified completion date, the cost of this work shall be paid by the Contractor. The cost of these services shall be \$100.00 per hour, including: all travel time; all on-site time; and all office administration time. These costs shall be deducted from outstanding retainage and paid by the Owner to the Landscape Architect. Additionally, the Contractor shall pay for travel expense to and from the site at \$.50 per mile. The cost of these services shall be deducted from the contract retainage and paid by the Owner to the Landscape Architect. If the cost of these additional services exceeds retained amount, payment shall be responsibility of the contractor.

18.00 **MAINTENANCE:**

The Contractor shall provide maintenance, as specified, on all landscape materials during and after construction through the one (1) year guarantee period, which begins on the date of certification of final acceptance or as herein specified.

19.00 **CONTRACTORS IDENTIFICATION SIGN:**

The Contractor shall furnish and install a contractors identification sign which lists all construction contractors and design and engineering firms by name and type of work. Sign layout shall be approved by the Landscape Architect prior to installation. Location on the site shall be as directed by the Owner. The Contractor shall furnish this sign as part of the contract with no additional cost to the project.

20.00 **SHOP DRAWINGS:**

The Contractor shall submit electronic copies of all shop drawings for any manufactured or fabricated item of work for review and approval by Landscape Architect prior to commencement of that work. Subcontractor shop drawings shall be submitted through the prime Contractor and shall be checked and approved by the Contractor prior to submission to the Landscape Architect.

Shop drawings shall clearly and accurately illustrate every aspect of the item of work and include dimensions, types of materials, fasteners, finishes, space requirements, performance and quality ratings and approvals and all other relevant information.

Shop drawings shall be required for all work items that are not totally described in the plans and specifications or for items that require unusual or specialized fabrication, whether or not it is so stated.

Submit shop drawings via email. Approved shop drawings shall be signed by the Contractor and the Landscape Architect. The Landscape Architect will electronically return to the Contractor for subcontractor distribution in a timely manner.

21.00 **MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS:**

All product materials, equipment and site furnishings of any kind shall be installed as

specified and recommended by the manufacturer. The Contractor shall obtain from each manufacturer their comprehensive specifications and recommendations for utilization of their product. All assembly, installation and utilization shall be in conformance with the manufacturer's specifications and recommendations. In the event that any portion of these specifications and related plans and details vary from the manufacturer's specifications and recommendations, it shall be the Contractor's responsibility to immediately notify the Landscape Architect prior to any construction for clarification and directions on product utilization and installation.

22.00 **RECORD DOCUMENTS: (AS-BUILTS)**

Record documents are defined to include those documents or copies relating directly to performance of the work, which Contractor is required to prepare or maintain for Owner's records, recording work as actually performed. In particular, record copies show changes in work in relation to work in which shown or specified by original contract documents; and show additional information of value of Owner's records, which was not indicated in original contract documents. Record copies include marked-up product data submittals, record samples, field reports for variable miscellaneous record information on work which is otherwise recorded only schematically or not at all.

a. At the time of substantial completion, Contractor shall submit record drawings to Landscape Architect for Owner's records. These shall be organize into sets, bind and label sets for Owner's continued use.

23.00 **OPERATING AND MAINTENANCE DATA: (MANUALS)**

"Operating and Maintenance Manuals" are to be prepared for the Owner and the Owner's personnel. These manuals contain information necessary for the safe and efficient operation and maintenance of equipment and operating systems, and information relative to the inspection, care and maintenance or repair of products and finishes.

Each manual shall include the following:

- General system or equipment description.
- Copies of applicable shop drawings and product data.
- System equipment identification, including name of manufacturer, model number and serial number of each component.
- Operating instructions.
- Emergency instructions.
- Wiring diagrams.
- Inspection and test procedures.
- Maintenance instructions and procedures.
- Precautions against improper use and maintenance.
- Copies of Warranties.
- Repair instructions including spare parts listing.
- Names and addresses of sources of required maintenance materials and related services.

TECHNICAL SPECIFICATIONS

GENERAL SITE CONDITIONS - SECTION 02050

PART I - GENERAL

1.01 Maintenance of Survey Information

The Contractor shall be responsible for maintaining all layout information, elevations, benchmarks, and general site information provided or approved by the Owner and/or Landscape Architect. Survey or layout information lost or displaced or in any way disturbed through neglect or any construction activity by the Contractor or any of his employees or representatives shall be restored by the Contractor at his expense.

1.02 Layout and Staking

The Contractor shall be responsible for layout staking, grade staking and for getting approvals for all work for himself and/or his sub-contractor. The Contractor shall employ a Registered Land Surveyor who shall establish and maintain all lines and levels required for laying out and constructing the work. The Contractor agrees to assume all responsibility due to inaccuracy of any work of said Surveyor, and including incorrect benchmarks, their loss or disturbance.

The Contractor shall provide on-site assistance for any work specified to be laid out by the Landscape Architect. The Contractor shall also be responsible for any additional staking required for field adjustments by the Landscape Architect.

1.03 Soil Testing

The General Contractor shall be responsible for all soil testing throughout the course of the project on a daily basis or as required. Testing shall be done to ensure the stability of all graded areas and proposed items of work. All testing shall be conducted by a professional soil testing specialist. Results of all testing shall be delivered to the Landscape Architect on a weekly basis, upon completion of the testing.

1.04 Sub-Contractor Layout Verification

Each sub-contractor shall verify layout stakes, grades and other information as it pertains to his particular work and report any errors or inconsistencies to the Landscape Architect before commencing work. Starting the work shall imply sub-contractor's acceptance and willingness to correct any errors at sub-contractor's expense.

1.05 Protection of Existing Features

The Contractor shall save and protect, to the highest degree possible, all areas and features of the site that are not identified as construction items. Unnecessary disturbances or damage shall be considered the responsibility of the Contractor for complete restoration to satisfaction of Owner/Landscape Architect at no additional expense to the Owner.

1.06 **Water, Power, and Sanitary Sewer**

The Contractor shall provide all water, electrical, mechanical and toilet services and facilities as may be required to properly execute the Contract and provide proper maintenance throughout the guarantee period.

1.07 **Miss Dig**

The Contractor shall be responsible for notifying MISS DIG, one number utility alert (1-800-482-7171), for location of public utility service lines where digging or deep excavation operations could disturb or sever such lines. The Contractor shall pay for all repairs, restoration and damages resulting from failure to properly fulfill such notification and location requirements.

TECHNICAL SPECIFICATIONS

REMOVAL ITEMS - SECTION 02100

PART I - GENERAL

1.01 Description

This work shall consist of the complete removal of all items called for in the plans and specifications or as otherwise implied in a safe and orderly manner creating as little disturbance as possible.

Unless otherwise specified all areas indicated for construction of any kind shall be cleared of any debris, undergrowth, weeds, stumps, roots, and marked trees which might interfere with the progress of that work. Unmarked trees or any plant materials indicated to be saved by the Landscape Architect shall be given special protection as specified.

PART II - PRODUCTS (Not Applicable)

PART III - EXECUTION

3.01 Protection of Items to Remain

Extreme care shall be utilized when removing any item adjacent to structures, utilities, paving, vegetation or any item not indicated for removal or relocation. These items shall be properly protected as required to keep them from damage or other disturbance of any kind during the course of the work.

Care should be taken to work from open areas when working around plants that are to be saved to avoid unnecessary soil compaction and other damages that might occur. Only hand methods shall be utilized for removal of roots and debris under the drip line of trees that are to remain.

3.02 Plant Damage Compensation

Damage inflicted to any trees or plant materials by the Contractor shall be compensated for at a rate established by the American Society of Consulting Arborists, Inc.

3.03 Removal Responsibility

All debris, trees, stumps, or soil to be cleared and removed from the project area shall be disposed of off the site at an approved disposal area at the arrangement and expense of the Contractor.

No materials may be stockpiled on site for future disposal nor will any excavation areas be left in unsafe or unsightly conditions at day's end. The Contractor shall be responsible for all transportation and disposal fees associated with this work. Burning of cleared, grubbed, or construction waste materials is not permitted on the Owner's property.

Owner would like wood chips if removed trees are chipped on site. Contractor shall coordinate stock piling and pick up with Owner. Contractor shall dispose of all other removal items off-site unless otherwise noted.

3.04 **Utility Shut-Off**

The Contractor shall ascertain the location of all existing utilities and accept total responsibility for shut-off and avoidance of all such utilities during construction. All utilities to be disconnected, plugged, and capped, or otherwise taken out of service shall be the responsibility of the Contractor and shall be properly executed with skilled tradesmen in accordance with the standards and practices of the trade.

TECHNICAL SPECIFICATIONS

EARTHWORK AND GRADING – SECTION 02200

PART 1 - GENERAL

1.01 Description

The work consists of all work as called for by the plans and/or proposal form and may include: rough and finish grading to approved grade stakes; excavation of organic or unstable soils; excavation, stockpiling and redistribution of topsoil; placement of subbase for construction items not covered by sub-contractors; placing and grading supplemental topsoil; and all other grading and excavation operations, unless otherwise called for in the plans and specifications, all in conformance to Act 347, Soil Erosion and Sedimentation Control, as locally administered and enforced.

1.02 Submittals

Provide product data or test and Evaluation reports for each type of product indicated.

- A. Sub base materials indicated on drawings.
- B. Topsoil.

PART II - PRODUCTS

2.01 Fill Materials

Fill and backfill materials shall be MDOT Class II or approved clean, porous granular materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetation or other deleterious matter.

2.02 Subbase Materials

Subbase materials shall be the specified properly graded mixture of natural or crushed gravel, crushed stone, crushed slag or natural processed sand that will readily compact to the required density and remain in that state under normal conditions.

2.03 Topsoil

Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth. It shall be reasonably free from subsoil and stumps, roots, brush, stones (1 inch or more in any dimension), clay lumps or similar objects. Existing vegetation including brush and noxious weeds shall be removed from the soil surface and disposed of prior to stripping of the topsoil. Ordinary sod can be thoroughly broken up and intermixed with the soil during handling operations. Topsoil shall be classifiable as a loam, silt loam, silty clay loam, or clay loam, as determined from the Bureau of Plant Industrial, Soils and Agricultural Engineering, USDA triangular soil texture chart. The topsoil, unless otherwise specified or approved, shall have a ph range of

approximately 5.5 to 7.5, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall not be less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction) test.

2.04 **Screened Imported Topsoil**

Prior to obtaining additional material to be used for imported topsoil, the Landscape Architect shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements of well drained soil specified and to determine the depth to which stripping will be permitted. At this time, the Contractor shall be required to take representative soil samples from several locations within the area under consideration to the proposed stripping depths for testing purposes as specified above, and shall have them professionally tested by a laboratory approved by the Landscape Architect prior to approval of the soil. Topsoil must be screened to remove all debris.

PART III - EXECUTION

3.01 **Stripping Topsoil**

Topsoil in areas that are to be graded shall be stripped to the depth designated and stockpiled in an area approved by the Landscape Architect outside of the construction work areas. Stockpiles shall be graded and shaped to ensure proper drainage and minimize wind erosion.

3.02 **Removal of Unsatisfactory Materials**

All organic, unstable or otherwise unsatisfactory soils shall be excavated to stable soil and replaced with an approved sand or gravel compacted as specified.

3.03 **Excavation for Structures**

Grading for structures shall be to the tolerances specified and shall extend sufficient distances from footings and foundations to permit placing and removal of formwork, installation of services, other construction operations and inspection.

3.04 **Placing Fill**

During grading and filling operations, all fill shall be placed in ten inch (10"), or less, layers and compacted by operating heavy track or rubber tired equipment over it.

3.05 **Compaction of Soil**

Soil compaction for all graded or fill materials shall be at least 95% ASTM D 1557 or Proctor Density and shall be achieved under optimum moisture conditions unless otherwise specified.

3.06 **Grade Tolerance**

All earthwork grading shall be within one inch (1" or 0.083') of the elevations called for on the plans. All pavement and surface grading; and curb and gutter elevations shall be within one quarter inch (1/8" or 0.0104') of the elevations called for in the plans. All grading shall drain uniformly to designated low points and all changes in elevation and transition areas shall be with gentle, rounded gradients.

No horizontal walk grades will exceed 5% (1 in 20) with the exception of curb ramps which may be up to 8.33% (1 in 12) for a distance of not over 6 feet. No walk cross slopes shall exceed 2% (1 in 50). No barrier free parking spaces and/or loading aprons shall exceed 2% (1 in 50) in any direction.

The Landscape Architect may check finished grades with a smart level to ensure compliance with the plans, Americans with Disabilities Act (ADA) and the requirements stated above. All paving not meeting these requirements shall be removed and replaced by the Contractor at no cost to the Owner.

3.07 **Maintenance of Graded Areas**

Recently completed sub and finished grade work areas shall be protected from erosion, traffic and accumulation of debris. The Contractor shall scarify, regrade and otherwise restore settled, eroded, and/or rutted areas to the specified grades and approval of the Landscape Architect.

TECHNICAL SPECIFICATIONS

BITUMINOUS CONCRETE PAVING - SECTION 02513

PART I - GENERAL

1.01 Description

This work shall consist of the placing of bituminous concrete as called for in the plans and details.

1.02 Weather Limitations

Apply bituminous prime and tack coats only when the ambient temperature in the shade is above 50° F. and when the temperature has not been below 35° F. for 12 hours immediately prior to application. Also, do not apply when the base surface is wet or contains an excess of moisture, which would prevent uniform distribution and the required penetration.

Construct asphalt concrete and patching surface course only when atmospheric temperature is above 40° F., when the underlying base is dry, and when weather is not rainy. Base course may be placed when air temperature is not below 30° F. and rising, when acceptable to the Landscape Architect.

1.03 Grade Control

Establish and maintain the required lines and grades, including crown and cross-slope for each course during construction operations.

1.04 Submittals

Provide product data for each type of product indicated.

- A. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: For each job mix proposed for the work.

PART II - PRODUCTS

2.01 Materials

- A. Bituminous Mixtures shall conform to the requirements of the current Michigan Department of Transportation's Standard Specifications for Construction and as noted herein. The base course will generally be Bituminous Base Mixture No. 13A; the leveling course, Bituminous Mixture No. 13A, and the top (wearing) course, Bituminous Mixture No. 36A or 43A otherwise specified in the proposal or on the plans.

The bituminous material for base mixtures shall have a PG Binder Grade of PG64-22 and the bituminous material for surface mixtures (wedging, leveling, and top course) shall have a PG Binder Grade of PG64-22 for 13A and 36A.

Bituminous Mixtures shall be prepared in a bituminous mixing plant which has been pre-qualified by the Michigan Department of Transportation or as approved by the Landscape Architect and shall be in accordance with the current Michigan Department of Transportation's Standard Specifications for Construction.

PART III - EXECUTION

3.01 Construction Methods

Construction methods to be used for placing bituminous mixtures shall conform to the requirements of the current Michigan Department of Transportation's Standard Specifications for Construction, except as noted herein.

All existing paved surfaces to be newly paved shall be thoroughly cleaned of loose and foreign materials and dry and shall be tack coated prior to placement at a minimum rate of .02 gal/sy. Prime coat cut surfaces to receive asphalt patch and between asphalt. All paving operations shall cease when the surface to repave is wet.

Joint and crack cleanout covers the work of removing existing joint sealant and foreign materials, to a depth of up to 1" from transverse and longitudinal joints and cracks prior to resurfacing. The work is usually done with a hooked device, not unlike a stove poker. The pay item is "Joint and Crack, Cleanout", measured in feet of joints and cracks so treated. Cleaned cracks 1" wide and greater shall be filled with hand patching.

All mixing, spreading, finishing, compacting, constructing joints and joint and crack cleanout shall meet Michigan Department of Transportation's Standard Specifications for Construction

3.02 Equipment

Equipment to be used for placing bituminous pavements shall conform to the requirements of the current Michigan Department of Transportation's Standard Specifications for Construction.

TECHNICAL SPECIFICATIONS

CONCRETE WORK - SECTION 02514

PART I - GENERAL

1.01 Description

This work shall consist of all labor, equipment, and materials necessary for complete installation of site concrete work as called for in the plans and details.

1.02 Testing

Standard 6-inch cylinders for compression tests of the concrete shall be prepared from each pour. Concrete for test specimens and assistance for making them on the project will be furnished by the Contractor. The furnishing of molds, the actual making of the test cylinders and all testing will be performed by the Contractor.

The sample shall be tested in accordance with the specification of the American Society for Testing Materials, Serial Designation C-31 or the current Michigan Department of Transportation Specifications. If the average results from test specimens cured at an average temperature of 70° F are below the 28 day required compressive strength it will be sufficient reason for rejecting for further use the materials entering into the concrete.

PART II - PRODUCTS

2.01 Concrete

Concrete shall be Type A, air-entrained concrete with a slump of not less than 3 inches nor more than 4 inches unless otherwise specified.

Portland Cement shall conform to the requirements of the current ASTM Specifications for Air-Entraining Portland Cement.

Fine Aggregate shall conform to the requirements for "Natural Sand, 2NS" of the current Standard Specifications of the Michigan Department of Transportation.

Course Aggregate shall conform to the requirements for Course Aggregate, 6 A (limestone) of the current Standard Specifications of the Michigan Department of Transportation.

Textural indicators shall be as per plans and detail. Provide full size sample for

approval of Landscape Architect.

Water for mixing and curing the concrete shall be from Municipal Potable Water Supply, unless otherwise specified.

2.02 **Reinforcing**

Steel Reinforcement Materials shall conform to the requirements of current Standard Specifications of the Michigan Department of Transportation.

2.03 **Additives**

Curing of the concrete shall be performed by one of the appropriate methods as specified for "Concrete Curing Agents" in the current Standard Specifications of the Michigan Department of Transportation. Only clear curing agents or other methods that will not affect the natural colorations of the concrete will be permitted. Care shall be taken to avoid using agents or methods that affect the future use of specified sealants. If inappropriate curing agents are used: Contractor shall remove and replace concrete.

Calcium chloride shall not be used in any concrete without written approval from the Landscape Architect.

Ready mix concrete shall conform to the requirements of ASTM C 94. Batch plants must meet the requirements of ACI 304. Hand mixing will not be permitted except in emergencies or for very small quantities.

Air entraining admixtures shall conform to ASTM C 260 and shall be constituted so that the total air content is not less than 5% nor more than 8%.

2.04 **Synthetic Fiber Reinforcing**

Synthetic fiber reinforcing shall be 100% virgin homo polymer polypropylene fibrillated fibers as manufactured by the Fibermesh Company, 125 Meridan, Dearborn, Michigan, (313) 278-7205, by Forta Corporation, 100 Forta Drive, Grove City, Pennsylvania 16127 (1-800-245-0306), or approved equal.

Synthetic fibers shall be incorporated into all concrete whether indicated on the drawings or not. The incorporation of said fibers shall be documented on the delivery ticket from the ready-mix producer.

Fibers shall be added to the concrete in strict accordance with manufacturer's printed instructions. Synthetic fibers shall be 3/4" in length and shall be added at a rate of 1-1/2 lbs./cubic yard of concrete.

PART III - EXECUTION

3.01 **Concrete Mixing**

The proportioning of aggregates and cement shall be weight in accordance with the current Michigan Department of Transportation "Mortar Voids" theory with the quantities of each shown on the delivery tickets for each batch.

Concrete shall be mixed only as required for immediate use and any concrete which has developed initial set shall not be used. Concrete which has partially hardened, shall not be retempered or remixed. The use of a fractional sack of cement will not be permitted unless the fractional part is measured by weight. The mixer shall be cleaned thoroughly each time when out of operation for more than 30 minutes.

Concrete mixes shall be measured as described in the current "Method of Slump Test for Consistency of Portland Cement Concrete" of the ASTM Designation C-143. The concrete shall at all times be of such consistency and workability, that it can be puddled readily into corners and angles of the forms and around joints, dowels, tie bars and reinforcement without excessive spading, segregation or undue accumulation of water or laitance on the surface.

The mixing of concrete in truck mixers enroute from the batching plant to the site of the work will be permitted only for mixers equipped with an approved revolution counter which will either record the number of revolutions of the mixer drum at mixing speeds and the number of revolutions at agitating speeds, for each batch, or will record the revolutions of the mixer drum only when the mixer is operating at mixing speeds. Truck mixers not so equipped shall mix the concrete at the batching plant site. The mixing shall be done on a reasonable level area, sloping not more than 2 percent in any direction.

The concrete shall be discharged within a period of one hour after the introduction of the mixing water with the dry materials or within a period of 1-1½ hours after the cement has been placed in contact with the aggregates, and it shall be within the specified limits for consistency and air content and it shall not be segregated.

3.02 **Forming**

Concrete which is improperly formed, is out of alignment or level or displays surface defects shall be removed and replaced by the Contractor at no additional cost to the Owner unless patching or other corrective measures are approved by Landscape Architect. Approved permission to patch or otherwise correct such defects does not waive the Owners Agent's right to require complete removal of the defective work if the corrective measures do not adequately restore the quality and appearance of the concrete in the opinion of the Landscape Architect.

Forms shall be metal or wood, straight and free from distortion, and of sufficient strength to resist springing during the process of depositing and finishing the concrete. Wood forms or flexible steel forms shall be used on circular curb or special sections and shall be defined as any curved section of curb or wall

constructed on a radius of 150 feet or less. They shall be of an approved section with a flat surface on top. The forms shall be of the full depth of the structure and shall be well built, substantial and unyielding. They shall be securely staked, braced, and tied to the required line and grade and sufficiently tight to prevent leakage of mortar. The inside surface of the forms shall be oiled with a light, clear paraffin-base oil which will not discolor or otherwise injuriously affect the concrete as on the walls to be treated with Thoroseal or equal.

Placing concrete shall not be permitted until the subgrade and forms have been approved by the Landscape Architect. The subgrade shall be wetted and the concrete deposited to the proper depth. The concrete shall be spaded sufficiently to eliminate all voids and tamped to bring the mortar to the surface, after which it shall be floated smooth and even by means of a wooden float.

3.03 **Reinforcement**

All steel reinforcement shall be accurately placed in the position shown on the approved plans and firmly held during the placing of concrete. When placed in the work, it shall be free from dirt, rust, mill scale, paint, oil or other foreign material. Bars shall be placed with a variation in spacing between adjacent bars of not more than one-sixth of the spacing shown on the plans, and the clear distance from the near surface of the concrete to the reinforcement shall not vary from the distance shown on the plans by more than one-fourth the plan distance. Bars shall be tied at all intersections except where the spacing is less than one foot in each direction in which case alternative intersections shall be tied. Supports for reinforcement which are to remain in the work shall be either precast concrete blocks of Landscape Architect approved shape and dimensions, or Landscape Architect approved preformed steel bar-chairs.

Bars shall not be spliced except as provided on the plans or as authorized by the Landscape Architect.

3.04 **Finishing**

Edges on all concrete shall be rounded to a radius of 1/4 inch with an approved finishing tool unless otherwise specified. All joints shall be rounded with an approved double edging tool having a radius of 1/4 inch on each side and the surface shall then be brushed lightly to produce a slightly roughened surface and remove the finishing tool marks except where otherwise specified.

All Portland Cement Concrete shall be finished with a light broom finish in the direction indicated on the plans, unless otherwise specified.

Location of control joints are subject to Landscape Architect's approval.

Exposing Aggregate: Begin exposing aggregate when paving will bear weight of cement mason on knee boards without indentation. Brush with bristle broom and fine water spray to remove excess mortar until exposure of aggregate is uniform and at proper depth as approved by the Landscape Architect.

3.05 **Protection**

Protection of Concrete shall be performed in the following manner:

Sealant for curing shall be applied immediately in accordance with manufacturer's recommendations. (See part 3.05a)

Protection Against Rain - The Contractor shall take such precautions as are necessary to protect the concrete from damage.

Hot Weather Limitations - Casting of concrete during hot weather shall be limited by the temperature of the concrete at the time of placing. Concrete shall not be cast when the temperature of the concrete is above 90° F. Care shall be taken to properly wet and protect all concrete placed in direct sun or in hot weather.

Cold Weather Limitations - No concrete shall be placed unless the temperature of the air in the shade and away from artificial heat is at least 25° F. and rising unless specifically approved.

Protection from Cold Weather - The Contractor shall be responsible for the concrete placed during cold weather and any concrete injured by frost action shall be removed and replaced at his expense.

3.05a **Sealant**

Sealant for curing shall be Kure-N-Seal 25 LV by Sonneborn. Sealant shall be applied at a coverage rate of 250 square feet per gallon. For application, proper surface preparation and drying time, consult the coatings manufacturer for more instructions. Sealant must comply with ASTM C 1315-96 Type I, Class A. Kure-N-Seal 25 LV by Sonneborn is available from S. A. Morman & Co. ph. 1.800.968.8012.

Sealant for curing of exposed aggregate and sandblasted concrete shall be Kure-N-Seal 30 by Sonneborn. Sealant shall be applied at a coverage rate of 250 square feet per gallon. For application, proper surface preparation and drying time, consult the coatings manufacturer for more instructions. Sealant must comply with ASTM C1315-96, Type 1, Class A. Kure-N-Seal 30 by Sonneborn is available from S. A. Morman & Co. ph. 1.800.968.8012.

For subsequent coating applications, use Sonosil Curing aid, hardening and dustproofing compound for concrete. For application, proper surface preparation and drying time, consult the coatings manufacturer for more instructions. Sonosil by

Sonneborn is available from S. A. Morman & Co. ph. 1.800.968.8012.

3.06 **Curing**

Forms shall be left in place for a period of not less than 12 hours. Immediately after they have been removed, all porous or honeycomb areas thus uncovered shall be filled smooth with mortar consisting of one part cement and two parts fine aggregate. Also, the ends of all expansion joints shall be cut open to the full width of the expansion joint material.

The main supporting forms, including all shoring and bracing shall remain in place for a period of not less than seven (7) days, and for such longer period as the Landscape Architect may direct.

3.07 **Expansion Joints**

Contractor to indicate the layout of the proposed expansion joints required in all concrete areas if not shown on construction documents.

Expansion joints to be placed at a minimum of 30' intervals to correct elevation and profile.

Contractor to align curb, gutter; and sidewalk expansion joints.

Place joints between paving components and building or other appurtenances.

Location of expansion joints is subject to approval of the Landscape Architect.

TECHNICAL SPECIFICATIONS

JOINT FILLER AND SEALANT - SECTION 02515

PART I - GENERAL

1.01 Description

This work shall consist of the complete installation of specified expansion joint filler and joint sealant as called for in the plans and details.

1.02 Submittals

Sealant manufacturer's instructions, including limitations for application and priming. Indicate on the brochure or by transmittal which primers will be used or submit printed statement from sealant manufacturer that no primers are required for maximum adhesion.

Sealant manufacturer's standard color range for color selection. Color will be selected by the Landscape Architect.

PART II - PRODUCTS

2.01 Expansion joint material shall be pre-molded, non-staining and compatible with sealant and primer, and of a resilient nature such as closed cell resilient foam or sponge rubber. SPEED-E-JOINT Zip Strip available from W. R Meadows, Inc 1-800-342-5976 or approved equal by Landscape Architect shall be used. Materials impregnated with oil, bitumen, or similar materials shall not be used. Provide back-up materials only as recommended by sealant manufacturer in writing. Joint material shall be 33% to 50% larger than joint width.

2.02 Expansion joint cap shall be white cap or snap-cap premolded P.V.C. expansion joint cap.

2.03 Joint sealant shall be Sonolastic SL 1 self-leveling polyurethane sealant as manufactured by Sonneborn Building Products and available from Ersco Corporation, Wyoming, Michigan.

PART III - EXECUTION

3.01 Joint Preparation

All joint surfaces shall be dry and thoroughly clean. Remove all loose particles, dirt, paint, foreign matter, or curing compound by means not injurious to the material to be sealed and that will not change the appearance of the exposed surfaces adjacent to the sealant joint.

3.02 **Sealant Application**

All joints shall be neatly finished to assure proper filling of voids, elimination of air pockets and maximum contact at joint interfaces.

After surfaces of joints are cleaned, joint interfaces shall be primed and then joint sealant installed over expansion joint material. Sealant shall be brought close to the surface without overflowing and form a slightly concave joint seal.

Where required because of excessive slope, a non-sag variety of the same joint sealant shall be installed with a caulking gun and the joints tooled. Where required to avoid smearing exposed surfaces of a joint, use masking tape and remove after installation.

No sealant shall be applied to a joint at temperatures other than those per manufacturer's recommendations.

Wherever possible, sealant application shall be scheduled for seasonal periods (medium temperature) when joints are at their normal size.

Sealant SHALL NOT be applied over incompatible materials, oil base or asphaltic products, any migratory saturant or any other materials or sealant in which the bonding properties and adverse effects resulting from the combination are not known.

Modification of a sealant by the addition of liquids or powders to alter its flow properties SHALL NOT be permitted.

A sealant SHALL NOT be used if the date of manufacture indicates that the sealant is more than 12 months old. Where a lesser period is recommended by the manufacturer, the lesser period shall govern.

3.03 **Quality**

Any sealed joint not completely filled or properly finished shall be reopened and replaced as directed and sealed as specified. No rough or unsightly work shall be accepted as determined by Landscape Architect.

TECHNICAL SPECIFICATIONS

WATER DISTRIBUTION AND PIPED UTILITIES - SECTION 02666

PART I - GENERAL

1.01 Description

This work consists of all labor, equipment, and materials necessary for the complete construction of all water mains, new waterlines, distribution lines including permits, connections to existing lines, valves, pits, meters, lines, trenching, hangers, valves, fittings and hydrants; sewer lines and structures; adjustment of existing structures and abandonment of existing sewers and structures as called for in the plans and all related fittings and hardware, and testing as called for in the plans, specifications, codes, and ordinances.

1.02 General Considerations

All work shall be performed in strict accordance with codes, rules and regulations of all public authorities having jurisdiction. Standards for quality of performance and materials shall conform to the most current of the American National Standard Institute (ANSI) and the American Society for Testing Materials (ASTM) whether stated or not.

The drawings show the general arrangement. It is not intended to show every offset, valve and fitting, or every structural difficulty that may be encountered, but the piping and appurtenances shall be installed to suit and to avoid interference with, the installation, operation and maintenance of fixtures, equipment, or other piping. All measurements shall be verified at the job site.

The Contractor shall verify the location of all existing utilities through the MISS DIG 48 hour Utility Communication System, 800: 482-7171 prior to commencement of any excavations. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

Construction of any kind shall in no way affect the performance of existing systems. The Contractor shall be completely responsible for the proper and timely execution of the work and shall repair and/or restore, at no cost to the Owner, any damages occurring during or as a result of his actions.

All costs incurred in the installation of sheeting or bracing shall be incidental to the price bid for the furnishing and laying of the pipe, and no extra compensation will be allowed. Note: All Shoring and bracing shall comply with the State of Michigan Construction Safety Code.

Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Landscape Architect immediately for directions as to procedure. Cooperate with the Owner and public and private utility companies in keeping the

respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

Demolish and completely remove from the site underground utilities indicated to be removed. Coordinate with local utility companies for shut-off of services if lines are active. Underground utilities which are indicated to remain permanently are to be closed with sufficiently strong closures to withstand pressures which may result after closing.

Unsatisfactory soil materials encountered that extend below the required elevations shall be excavated, to the additional depth directed by the Landscape Architect and removed from the site.

Such additional excavation, provided it is not due to the fault or neglect of the Contractor, will be measured as directed by the Landscape Architect and paid for as a change in the work.

1.03 Testing

All lines shall be tested in accordance with the local requirements at the rated pressure of the pipe and all leaks shall be repaired and retested until approved by the Owner's agent and commencement of backfilling.

PART II - PRODUCTS

2.01 Storm Sewer Pipe

Storm sewer pipe shall be one of the following unless otherwise specified.

- a. High density corrugated polyethylene smooth interior wall pipe - ADS N-12 or Hancor Hi-Q.
- b. Reinforced concrete pipe – ASTM C 76 Class III.

2.02 Catch Basins and Manholes shall have an inside diameter of 4', except as otherwise noted. They shall be made of precast concrete pipe conforming to ASTM C-478 or of 6" thick concrete manhole blocks with an exterior plaster coat of 1/2" thick mortar. The tops shall be tapered to receive the frame and cover specified. The bases shall be 6" thick concrete minimum.

2.03 Catch Basin Castings shall be East Jordan Iron Works as specified in the drawings, or approved equal.

2.04 Water Line Pipe: Cement-lined ductile iron pipe – AWWA C150 Thickness Class 52 or Pipe and fittings for Water line shall be 5 type K annealed seamless copper water tubing with compression type fittings or HDPE. See plans and provide product data.

- 2.05 Water Line Valves: Resilient Seated Gate Valves with non-rising stems and o-ring stem seals – AWWA C515.
- 2.06 Water Line Fittings: Ductile-iron, cement-lined, pressured rated at 350 psi, standard per AWWA C110 or Compact per AWWA C153.
- 2.07 Water Line Joints: Mechanical or push-on. All fittings, valves and hydrant leads shall be fully restrained with EBBA Iron Works Mega-Lug retaining glands, Field-Lok Gripper Gaskets, or equal as approved for use by the City of Muskegon Heights.
- 2.08 Hydrants: East Jordan Iron Works Model 5-BR.
- 2.09 Water Line Valves: Resilient Seated Gate Valves with non-rising stems and o-ring stem seals – AWWA C515.
- 2.10 Water Line Fittings: Ductile-iron, cement-lined, pressured rated at 350 psi, standard per AWWA C110 or Compact per AWWA C153. See plans and provide product data.
- 2.11 Water Line Joints: Mechanical or push-on. All fittings, valves and hydrant leads shall be fully restrained with EBBA Iron Works Mega-Lug retaining glands, Field-Lok Gripper Gaskets, or equal as approved for use by the City of Kalamazoo.
- 2.12 Hydrants: East Jordan Iron Works Model 5-BR.
- 2.13 **Valves**

Control valves shall be 150 pound rated all brass globe valves with neoprene disc and non-rising stem or Nibco "Husky" bronze "U" valve with Binaca - N plunger. Model T - 22 as manufactured by Nibco, Inc.

Drain valves shall be 150 pound rated all brass gate valves with wedge disc and non-rising stem as approved by the Owner's agent.

Valves shall conform to Federal Specifications as follows:

<u>TYPE</u>	<u>FED. SPEC. NO.</u>
a. Bronze Check and Globe Valves:	WW - V - 51a
b. Brass Gate Valves:	WW - V - 51a
c. Cast Iron Gate Valves:	WW - V - 58

Valves 2 inches and smaller shall be brass or bronze.

- 2.14 Hose bibs shall be 3/4" cast bronze with bronze operating parts of an approved model

and manufacturer.

- 2.15 Corporation stops shall be of type and manufacture as approved by the Landscape Architect prior to installation.
- 2.16 Ceiling hangers for the piping, where required, shall consist of iron and steel, or brass and copper rods, and pipe rings or clamps around the pipes, of a type of material to match the pipe to be supported. The exact details of all hangers shall be submitted by the Contractor and approved for installation.
- 2.17 Sleeves shall be schedule 40 P.V.C. and installed wherever any pipes pass through partitions, floors, walls or foundation walls.

PART III - EXECUTION

- 3.01 All pipe shall be installed with a minimum slope of 6 inches in 100 lineal feet to low points.
- 3.02 All galvanized steel pipe threads shall be neatly cut with sharp tools and the joining procedure shall conform to the best practice.
- 3.03 Pipe supports shall be provided and installed in such numbers and in such locations as to prevent all buckling, while making ample provision for expansion.
- 3.04 Caulk between pipes and pipe sleeves in all areas where piping penetrates walls, floors or partitions.
- 3.05 Chrome or nickel-plated steel floor plates shall be installed around all exposed pipes passing through walls and floors. The plates shall be of such design that they will clamp tightly to the pipes.
- 3.06 All lines shall be vigorously flushed to remove all foreign matter from the lines. All backfilling shall be placed and compacted in 6 inch layers by tamping.
- 3.07 Excavation of the trench shall begin at the outlet end and proceed toward the upper end true to line and grade. The maximum width of the trench shall be 36" but of sufficient space for bracing and supporting sides of trenches and for pumping and draining of ground water and sewage.

Fire Hydrants and other utilities shall be kept operative and accessible for immediate use at all times.

Where existing underground conduits and structures are encountered, the Contractor shall provide and install adequate supports and protection for all sewer and water pipes, and other utilities extending into or crossing the trench. Where gas mains or electric cable or conduits into or cross the trench, the Contractor shall notify the Owner at once and provide such supports and protection as may be required by the Owner.

Where mains, cables or conduits are parallel to the contractor's trench opening, the Contractor shall so carry on his work at all times as not to cause damage to the paralleling structure or structures.

Where gas, water or sewage service connections to occupied buildings must be temporarily disconnected, the Contractor shall give at least one (1) weekday notice to the Owner of the time and duration of the anticipated cut-off.

When pipes, conduits or sewers are removed from the trench leaving "dead" ends in the ground, such ends shall be fully plugged or bulkhead with brick and mortar by the Contractor without additional compensation.

Removal or replacement of existing drainage structures, if required, shall be incidental to furnishing and laying of pipe, and no extra compensation will be allowed.

Temporary conduits shall be installed by the Contractor without additional compensation, to divert and control water and sewage that may flow along or across the site of the work.

The Contractor shall remove by pumping, bailing or otherwise, any water, which may accumulate or be intercepted or be found in the trenches and in any other excavation made under this contract. He shall form all dams, flumes or other work necessary to keep the trenches entirely clear of water and sewage while the structures and their appurtenances are being constructed. The Contractor shall at all times have sufficient pumping equipment on the job ready for immediate use.

Water from the trenches and excavations shall be disposed of in such a manner as will not cause injury to the public health, not to public or private property, not to the surface of the streets, nor cause any interference with the use of the streets by the public. No additional payment will be made to the Contractor for this work.

Backfill materials shall be placed on sections of the sewer only after such sections have been approved by the Landscape Architect, and/or testing laboratory for backfilling. Michigan Department of Transportation Class II Material shall be placed under and around the barrel of the sewer until the sewer is completely covered to a depth of at least one (1) foot. This portion of the backfill shall be placed in layers not more than (6) six inches in thickness, and each layer thoroughly compacted, without damaging or displacing the sewer. The balance of the backfill, including that around manholes, catch basins, and other structures, shall be Michigan Department of Transportation Class II and shall be placed in layers not more than 12" thick, each layer being fully compacted, using vibrators or other mechanical means as approved by the Landscape Architect. Flooding of trenches as a method of compaction will not be permitted; however, addition of water may be required to reach a desired moisture content of backfill materials. All utility backfill shall be placed to 95% Modified Proctor.

Soil, which is unsuitable for backfill, such as clay or other unsuitable materials, shall be removed to a depth of six (6) inches below the bottom of the pipe and shall not be used

to backfill the trench, but shall be disposed of as directed by the Landscape Architect. The trench shall be backfilled with a granular material. Material which is unsuitable for backfill shall include rock excavation, boulders of one cubic foot or more, broken structures of any kind, frozen material, clay, tree roots and other vegetable or organic materials and debris or refuse of any kind.

Removal of clay and replacement of granular fill in sewer, and sewer lateral trenches, where required, shall be incidental to price bid for furnishing and laying of pipe, and no extra compensation will be allowed.

All pipes shall be carefully laid in the prepared trench, bells up grade, with spigot end fully entered into the adjacent bell, each section having a firm bearing throughout its entire length and true to line and grade required.

Lay all tile with a smooth and uniform invert grade.

Any pipe which is not in true alignment or which shows any settlement shall be taken up and relayed.

No broken or cracked pipe shall be used.

No pipe shall be laid on loose materials, clumps of material, or on debris of any kind.

The Contractor shall provide all necessary barricades and sheet piling to protect the public, his employees and the work.

Adjust existing sewer frames as required for new paving. Provide temporary closures over openings until completion of rolling operations. Remove closures at completion of the work. Set cover frames to grade, flush with surface of adjacent pavement.

The Contractor shall make an accurate record of all buried fittings and stub ends installed, noting exact locations, depth, direction of flow and where applicable, slope. Final "As-Builts" shall be turned over to the Owner and Landscape Architect upon final acceptance.

TECHNICAL SPECIFICATIONS INTEGRALLY COLORED CEMENT CONCRETE PAVING - SECTION 02750

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Integrally colored concrete sidewalks utilizing Davis Colors.

Related specifications for other concrete work are:

- B. Related Sections:
1. Section 02514 – Concrete Work: Coordination of sample submittal and color selection.
 2. Section 02515 – Joint Filler and Sealant.

1.02 REFERENCES

- A. American Concrete Institute:
1. ACI 305 - Hot Weather Concreting.
 2. ACI 306 - Cold Weather Concreting.
- B. American Society for Testing and Materials:
1. ASTM C979 - Pigments for Integrally Colored Concrete.

1.03 SUBMITTALS

- A. Submit product data and manufacturer's instructions for:
1. Color additives.
 2. Curing compounds.
- B. Samples:
1. Samples for Color Verification:
 - a. Submit sample chips of specified color indicating color additive numbers and required dosage rates.
 - b. Submit samples of colored sealants.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 316.
- B. Conform to ACI 305 during hot weather.
- C. Conform to ACI 306 during cold weather.

- D. Obtain each material from same source and maintain high degree of consistency in workmanship throughout Project.
- E. Installer Qualifications: Concrete work shall be performed by firm with five years experience with work of similar scope and quality.
- F. Provide Colored Concrete Mock-Up:
 - 1. At location on Project selected by Landscape Architect, place and finish 2 each, 3'x3'. Demonstrate methods of obtaining consistent visual appearance, including materials, workmanship, and curing method to be used throughout Project.
 - 2. Retain samples of cements, sands, aggregates and color additives used in mock-up for comparison with materials used in remaining Work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Color Additives: Comply with manufacturer's instructions. Deliver color additives in original, unopened packaging. Store in dry conditions.

1.06 PROJECT CONDITIONS

- A. Colored Concrete Environmental Requirements:
 - 1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
 - 2. Avoid placing concrete if rain, snow, or frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.
- B. Schedule delivery of concrete to provide consistent mix times from batching until discharge.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Color Additives for Integrally Colored Concrete:
 - 1. Manufacturer:
 - a. **Davis Colors** manufactured by Davis Colors; phone 800-356-4848, e-mail info@daviscolors.com, or internet www.daviscolors.com.
 - 2. Materials:
 - a. Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete and complying with ASTM C979. Color to be as per plans.
 - b. Color additives containing carbon black are not acceptable.

Concrete suppliers may use Mix-Ready® disintegrating bags or the Chameleon™ bulk handling system to add color to concrete.

Admixtures: Do not use calcium chloride admixtures.

2.02 ACCESSORIES

Use only curing compounds specifically recommended for use with colored concrete use W-1000 Clear Cure & Seal.

- A. Curing Compound for Colored Concrete: Sealant for curing shall be Kure-N-Seal 25 LV by Sonneborn. Sealant shall be applied at a coverage rate of 350 square feet per gallon. For application, proper surface preparation and drying time, consult the coatings manufacturer for more instructions. Sealant must comply with ASTM C 1315-96 Type I, Class A. Kure-N-Seal 25 LV by Sonneborn is available from S. A. Morman & Co. ph. 1.800.968.8012.

For subsequent coating applications, use Sonosil Curing aid, hardening and dustproofing compound for concrete. For application, proper surface preparation and drying time, consult the coatings manufacturer for more instructions. Sonosil by Sonneborn is available from S. A. Morman & Co. ph. 1.800.968.8012.

- B. Sealants: Joint sealers shall be type specified in Section 02515. Provide in color to match colored concrete.

2.03 MIXES

A 4" slump is recommended. If greater workability is required, redesign mix to use water-reducing or super-plasticizing admixture instead of adding water.

- A. Color Additives: Mix in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed throughout mixture and disintegrating bags, if used, have disintegrated.
- B. Do not retemper mix by adding water in field.

2.05 CONCRETE COLORS

- A. Concrete Color[s]:
 1. Cement: Color shall be white.
 2. Sand: Color shall be locally available natural sand.
 3. Aggregate: As per Section 02514.
 4. Color Additives: Dosage rate shall be based on weight of portland cement, fly ash, silica fume, lime and other cementitious materials but not aggregate or sand in accordance with manufacturer's specifications.

- B. Concrete Color[s]: Match colors selected by Landscape Architect from color additive manufacturer's premium color line[s].
- C. Dosage rate of color additive shall not exceed 10 percent of weight of cementitious materials in mix.

PART 3 EXECUTION

- Protect adjacent finished surfaces from splatters.
- Do not add water to concrete at job site, fog or spray surface with water, or put into pumps or onto tools or brooms.
- Do not apply Davis Colors or color additives meant for integral coloring to surface of concrete.

3.01 FINISHING OF COLORED CONCRETE

Finish shall be broomed: Pull broom across freshly troweled concrete to produce medium texture in straight lines perpendicular to main line of traffic. Do not dampen brooms.

3.04 CURING

Curing with water, membranes, or non-approved compounds is not acceptable.

- A. Colored Concrete: Apply curing compound for colored concrete in accordance with manufacturer's instructions. Apply curing compound at consistent time for each pour to maintain close color consistency.

TECHNICAL SPECIFICATIONS

SITE AMENITIES - SECTION 02760

PART I - GENERAL

1.01 Description

The Contractor shall furnish, assemble, and completely install all site amenities called for in the plans and specifications unless otherwise called for to be furnished or furnished and installed by the Owner. This work consists of procuring, storing, unpacking, assembly, and erection of all site amenities, in accordance with the plans, specifications, and manufacturer's recommendations.

1.02 Site Equipment by Owner (where indicated)

Site equipment that is to be purchased by the Owner and installed by the Contractor shall be received and stored by the Owner until the contractor is ready to install it. The Contractor shall pick up the equipment at the Owner's location, at which time he becomes entirely responsible for the condition, quantity, and protection of all items necessary for a complete and finished installation. The pick-up time shall be scheduled at least 24 hours in advance.

PART II - PRODUCTS

2.01 General

All site amenities shall be as designated on the plans or approved equals.

PART III - EXECUTION

3.01 Installation

All site amenities shall be assembled and set in/on the ground in accordance with the manufacturers instructions unless otherwise specified or detailed.

3.02 Assembly

The Contractor shall clean, uncrate, and assemble all site amenities shipped directly to him or furnished by the Owner (where indicated) in knock-down and shipping containerization conditions as necessary to install a complete and usable item.

3.03 **Securing Hardware**

Whether stated on the manufacturer's installation instructions or included in the furniture hardware, the Contractor shall be responsible for trimming all bolts and other similar fastener items to within one-half inch (1/2") of the nuts/fasteners and securing the nuts in a manner that will prevent removal; such as peening, x-spreading, double nutting or tack welding, which shall be approved by the Owner's agent prior to commencement of the work.

3.04 **Manufacturer's Installation Instructions**

Manufacturer's installation instructions follow, which support related information found elsewhere in the plans and specifications. The Contractor shall secure any other instructions required for proper installation from the specific manufacturers, which may not be included but required.

TECHNICAL SPECIFICATIONS

FURNISH AND INSTALL SPLASHPAD - SECTION 02765

Part 1: GENERAL CLAUSES

The aquatic play products shall be suitable for installation in municipal and commercial aquatic facilities and public play areas.

Products shall be specifically designed for the use by children and adults and follow the ASTM F2461-09 norm. The manufacturer should have an ISO 9001:2015 Certified Quality Management System. In addition, products shall be manufactured by a company that has at least five (5) years of experience in the design and engineering of children's aquatic play areas.

Any aquatic play product belonging to a new product line or series should demonstrate meeting the effective norm or show the conformity and resistance of the prescribed materials if it is proposed equivalency. The contractor or manufacturer must demonstrate meeting specifications by providing technical documents and drawings to be included in their bid proposal.

1.1 PRODUCT CONSTRUCTION

- A. Play Products:** All aquatic play products installed above and below grade shall be manufactured from 304/304L stainless steel. The anchoring system shall be manufactured from 304/304L stainless steel. Rigid centricast fiber reinforced (FRP) and/or molded fiberglass, PVC, filament wound tubing, Galvanized Steel, or Aluminum shall **not** be utilized for any above or below grade play product structures.
- B. Mounting and Assembly Hardware:** All hardware and anchoring systems shall be 304/304L or 316 stainless steel. All Play Products and Ground Spay systems shall include an integrated anchoring and leveling system facilitating installation and a flush surface finish. Exposed and accessible hardware shall be tamper resistant, requiring a special tool for removal to deter vandalism and theft.
- C. Spray nozzles, caps and heads:** Shall be manufactured from lead free brass, UHMWPE or Polyurethane and shall use tamper resistant tools for installation and removal. PVC, Nylon, and Delrin™, shall not be utilized. All grade level play products are to be furnished with appropriate winterization caps.
- D. Painted Finish:** Shall be a polyester smooth glossy heat-cured powder coat that is UV and chemical resistant and suitable for public spaces.
- E. Material for Paneling, Signage, Water Deflection, and Toe Guards:** All Polyethylene, Polyurethane, Elastomers and Seeflow Polymers used for paneling, signage or water deflection shall be resistant to chlorinated water and be ultraviolet stabilized to inhibit sunlight fading.
- F. Safety & Craftsmanship:** All accessible edges shall be machined to a rounded finish. All welds shall be watertight, buffed smooth or polished to a non-visible finish and

factory pressure tested. Accessible nozzles and spray heads shall be recessed to ensure a completely safe play environment with no pinch points, head entrapments or protrusion hazards. All products shall be designed in accordance with ASTM F1487, ASTM F-2461 and CSA Z614-98 regulations for public playgrounds.

G. Lexan Polymer: The Lexan Polymer shall be specially selected for aquatic play products and shall have the following characteristics: translucent, highly resistant to shock and impact vandalism and must be non-flammable. The polymer shall present dimensional stability a high resistance towards chemical products, ultra violets rays and be transparent presenting crystal clear surface throughout.

1.2 SEE FLOW POLYMER

The Seeflow Polymer shall be specially selected for aquatic play products and shall have the following characteristics: translucent, highly resistant to shock and impact vandalism and must be non-flammable. The polymer shall present dimensional stability a high resistance towards chemical products, ultra violets rays and be transparent presenting crystal clear surface throughout.

PLAY PRODUCT INSTALLATION

- A. Safeswap Anchoring and leveling Systems:** The Stainless Steel Safeswap Anchoring System shall provide the ability to add/remove/interchange select play products without having to incur any additional infrastructure costs. The anchoring system shall have an integrated leveling system facilitating installation and a flush finished to the activity deck surface without any protruding bolts or hardware. The Play Product shall be fastened directly to the Safeswap Anchoring system. The dead and live loads shall be distributed onto the Safeswap Anchoring system flange plate. A neoprene sealing gasket shall provide a water tight seal between the play product flange and Safeswap flange. Mechanical fastening of the Play Products to the activity deck slab shall be prohibited unless used on elevation with Toe Guards.
- B. Embedded Anchoring and leveling Systems:** The anchoring system shall have an integrated leveling system facilitating installation, ensuring product is plumb and installed at the desired height.
- C.** When applicable, templates shall be supplied to facilitate the installation of embedded anchoring equipment.
- D.** All play products shall have electrical grounding studs incorporated into their associated anchoring equipment. All play products shall be grounded by the installer per local codes.
- E.** All installation conduit wiring including electrical supply panel, PVC connections, piping, elbows, tees, play product assembly if required and other items relating to the installation shall be supplied by the general contractor.
- F. Drawings and Instructions:** Product drawings and installation manuals shall be supplied by the manufacturer for ease of installation

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A.** All aquatic play products and associated equipment must be properly wrapped and secured in place while in transport to the project site. Care shall be observed during offloading and handling to prevent excessive stress and abrasions.
- B.** At the site, the play products and associated equipment are to be stored in safe areas, out of the way of traffic and other construction activities, until the actual time of installation. If required, safety barricades or other like precautions must be taken for the protection of public and adjacent property.
- C.** Protective wrapping on the aquatic play features must be left in place until construction work for the Splashpad is complete.

1.4 INSTALLATION

Vortex Certified Installer or experience with this manufacturer on at least five (5) similar installations is required.

1.5 COMMISSIONING OF THE SPLASHPAD

Upon completion of construction, the general contractor shall provide the owner/operator adequate training on facility operations and maintenance. The contractor may request that the equipment manufacturer and/or manufacturer's representative provide on-site start-up and training for the owner/operator.

1.6 SPLASHPAD QUALITY ASSURANCE

Provide evidence of commitment of quality craftsmanship as demonstrated by the following:

Splashpad Manufacturer Qualifications:

- A.** The products shall be designed and produced at a facility owned and directly supervised by the supplier.
- B.** All products shall be shipped from a single source.
- C.** A full time licensed engineer must be on-staff
- D.** A full time quality control manager must be on-staff

1.7 EQUIVALENCIES CLAUSES

To enable all tenders to be judged equitably, they shall be based on the specified products in this document and shown on the drawings.

- A. The proposal for any substitute products must be attached to the bid or tender separately, identifying the substitute product by its trade name along with any savings it may represent for the client.
- B. Following the opening of the bid or tender, only those substitutes proposed by the lowest bidder of the specified products, will be considered.
- C. All substitute approval requests shall be accompanied by manufacturing drawings, including spray zones, sequencing, plumbing and electrical schematics and complete salt spray resisting testing data produced by an independent laboratory for coatings and a written warranty from the manufacturer.

No substitution or equivalency submitted will be considered if products to be considered are not part of manufacturer standard existing product line or a written proof that product has manufactured previously by the substitute manufacturer. Please refer to General Clauses 1.1

- D. Each substitute sample must be presented to the owner/consultant within seven days following the opening of tenders. The sample must be completely operational. After this time period, the bidder will be required to supply the original specified product.
- E. The owner/consultant reserves the right to grant or deny approval for proposed substitutions without prejudice to his rights and his decision shall be final. The above conditions apply to this section independently of any other clauses on the subject found in this document.
- F. If applicable the products must be interchangeable and of equivalent quality to the materials already installed.

1.8 SPLASHPAD EQUIPMENT WARRANTIES

Minimum Warranty periods

Splashpad Play Events/Products & Skid Mounted Water Quality Management System Equipment

- A. A 25 Year Warranty on stainless steel Play Events/Products, stainless steel anchoring systems and aluminum spheres.
- B. A 10 Year Warranty on the reinforced fiberglass skid, sand filter fiberglass tank and cartridge filter fiberglass tank.
- C. A 5 Year Warranty on brass components including; spray nozzles, spray caps and spray heads. High-density polyethylene components, polyurethane components, and ultra high molecular weight polyethylene components. The Subterranean vault (enclosure and access

hatches), stainless steel automated water distribution manifold, drain boxes, strainers, electrical enclosures, and chemical controllers.

- D.** A 2 Year Warranty on color coatings, stainless steel hardware & moving parts, fiberglass products, Seeflow Polymers, Soft Touch Elastomers (Toe Guards), subterranean water containments system, circulation pumps, chemical injection pumps, chlorinator systems, acid feed systems, polyvinyl chloride (PVC); piping, fittings, ball valves, check valves, cartridge elements, pressure gauges, chemical sensing probes, motor starters, electrical relays, terminal blocks, actuated valves, programmable logic controller (PLC controller), time switches, manual switches, transformers, breakers, electrical wiring and connections.
- E.** All warranties are to be managed by the equipment supplier.

TECHNICAL SPECIFICATIONS

CHAIN LINK FENCE - SECTION 02830

PART I - GENERAL

1.01 Description

The following specifications are for materials and complete fence and gate erection and include all posts, fabric, rails, stretcher bar/rods, brace rods/pipes, gate assemblies, tie wires, caps, couplings and all other related hardware as herein listed or as understood to be standard to the industry.

PART II - PRODUCTS

2.01 Fence Posts

Fence posts and rails shall be manufactured in accordance with ASTM F669 Table 2 unless otherwise specified. Posts shall be standard outside dimension (O.D.) class 1C unless otherwise specified. Size and weight of steel frame as follows:

Size	SS40 <u>o.d.</u>	<u>wgt/ft.</u>	<u>thick- ness</u>
Line Post – 6' or less	2"	2.280	0.120"
Line Post – over 6'	2½"	3.12	0.130"
Terminal, Corner & Pull	3"	4.64	0.160"

2.02 Post Caps

Pressed steel or cast iron designed to fit snugly over posts to exclude moisture. Supply cone type caps for terminal posts and loop type for line posts. All fittings to conform to ASTM F-626.

2.03 Rails

Top, middle or bottom rails as required on drawing shall be 1-5/8" o.d. pipe weighing 1.84 lbs. per lineal foot minimum with a wall thickness of .111". Unless otherwise indicated, there shall be top and bottom rail on all fence and middle rail on fence higher than eight feet (8').

2.04 Rail and Brace Ends

Pressed steel or cast-iron cup-shaped to receive rail and brace ends.

2.05 Top Rail Sleeves

Tubular steel, 0.051 thickness x 6" long, expansion type.

2.06 **Fence Fabric - Aluminized**

Aluminized Fabric shall be manufactured in accordance with ASTM A-491 in its entirety and coated before aluminized weaving with a minimum of 0.4 ounces of aluminum per square foot of surface area. The steel wire and coating shall conform to ASTM A-817 including minimum breaking strength. Amount of coating to be determined by the strip test method as defined in ASTM A-428-87. Fabric to be 9 gauge woven in a 2" diamond mesh, unless otherwise indicated on the drawings. Top and bottom selvage to be knuckled. Fabric shall be supplied with manufacturers' 30 year factory warranty.

2.07 **Fabric Ties**

Fabric shall be attached to posts and rails with 9 gauge aluminized steel tie wire spaced twenty-four inches (24") on center maximum on the rails and fourteen inches (14") on center maximum on posts. Use hook shape wire, confinement to diameter of pipe to which attached, clasping pipe and fabric firmly, with both ends double twisted. Bend wire to minimize hazard to persons clothing.

2.08 **Tension Bars**

Steel strip, 5/8" wide x 3/16" thick.

2.09 **Tension Bands**

Pressed steel, 12 gauge thickness x 7/8" wide. Bands shall be beveled.

2.10 **Brace Bands**

Pressed steel, 12 gauge thickness x 7/8" wide. Bands shall be beveled.

2.11 **Truss Rods**

Steel rod, 3/8" diameter merchant quality with turnbuckle.

2.12 **Tension Wire**

Marcelled 7-gauge steel wire with minimum coating of 0.40 ounces of aluminum per square foot of wire surface and conforming to ASTM A-824.

2.13 **Hog Rings**

Steel wire, 11 gauge, with a minimum zinc coating of 0.80 ounces per square foot of

wire surface.

2.14 **Miscellaneous Fittings**

All fittings necessary to make a complete installation of the fence specified shall be of a quality consistent with the items described and shall be properly bagged and labeled and in accordance with ASTM F-626.

PART III - EXECUTION

3.01 **General**

Installation to conform to ASTM F-567.

3.02 **Post Setting**

Set terminal, gate and line posts plumb in concrete footing as shown on drawings. Top of footing to be ½" above grade and sloped to direct water away from posts for standard installations. Footings to be 4" below finish grade for installation in stonedust areas. Space posts evenly 10' o.c. maximum unless otherwise noted.

3.03 **Bracing**

Brace gate and terminal posts back to adjacent line posts with horizontal brace rails and diagonal truss rods. (Do not need truss rods if middle rail is supplied.)

3.04 **Top Rail**

Install through line post loop caps connecting sections with sleeves and form a continuous rail between terminal posts.

3.05 **Top Tension Wire**

When top rail is omitted, stretch tension wire through loop caps and fasten to terminal posts.

3.06 **Bottom Tension Wire**

Stretch between terminal posts 4" above grade and fasten to outside of line posts with tie wires. (When specified)

3.07 **Fabric**

Pull fabric taut with bottom selvage 2" above grade. Fasten to terminal posts with tension bars threaded through mesh and secured with tension bands at maximum 15" intervals. Tie to line posts and top rails with tie wires spaced at maximum 14" on posts and 24" on rails. Attach to bottom tension wire with hog rings at maximum 24"

intervals.

3.08 **Gates**

Install gates plumb, level and secure for full opening without interference. Keepers in concrete. Gates shall be in accordance with ASTM F900.

3.09 **Fasteners**

Install nuts for fittings, bands and hardware bolts on inside of fence.

3.10 **Completion**

The area of installation shall be left free of debris caused by the installation of the fence.

TECHNICAL SPECIFICATIONS PROJECT SIGN - SECTION 02840

Part I

The Contractor shall furnish and install a project sign which shall be as shown on the following page. Sign shall be constructed of 3MM white/ white dibond aluminum composite. Prime and paint with exterior oil base (gloss) enamel front and back, colors as indicated.

Part II

All lettering shall be Pressure Sensitive Vinyl, colors as directed. Lettering to be produced by Handicap Sign Inc, 1142 Wealthy St. SE, Grand Rapids, MI 49506 Phone: (616) 454-4916 <http://www.hsisign.com/>

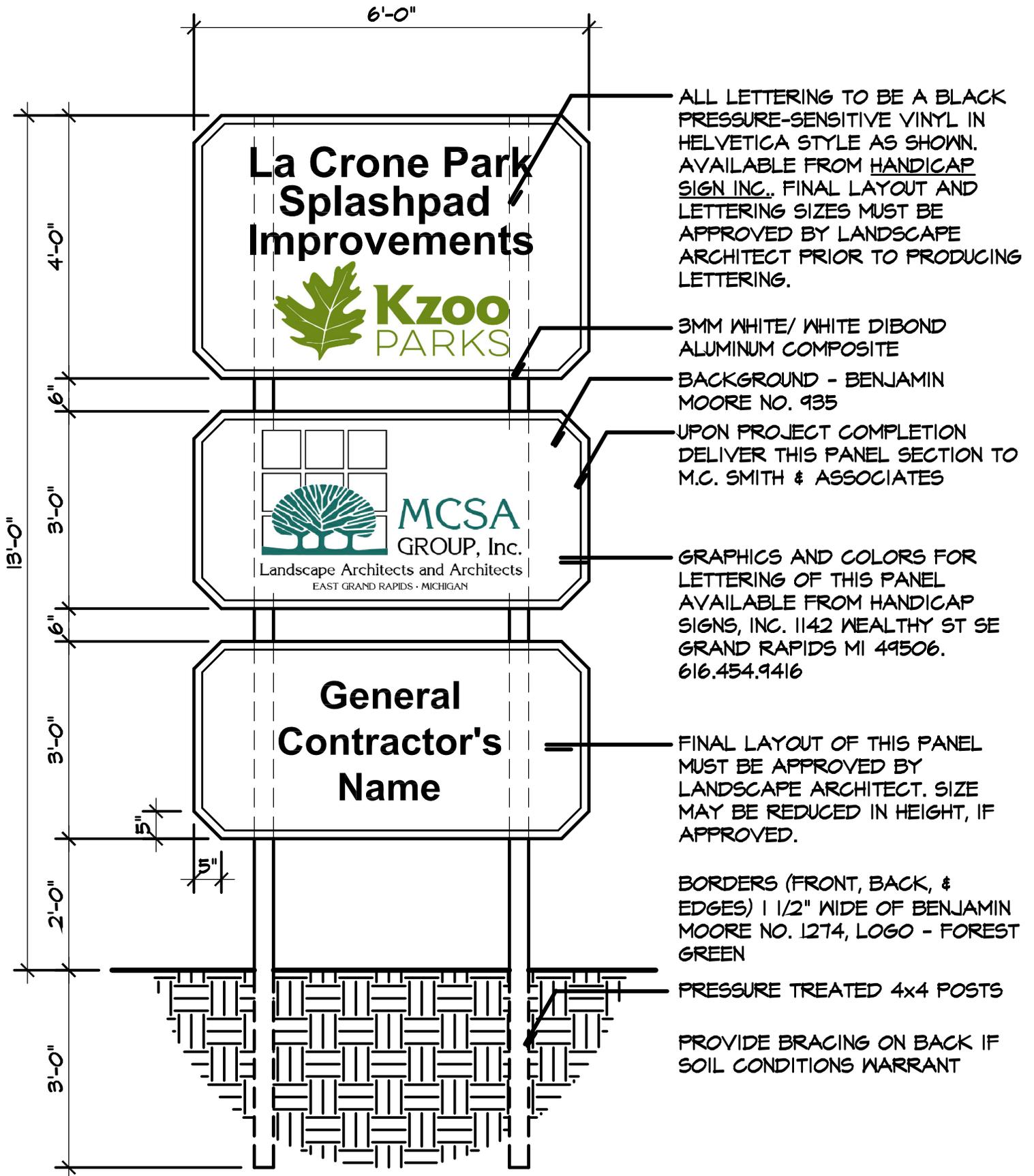
Part III

Layout for the M. C. Smith Associates and Architectural Group, Inc. panel to be as shown with Pressure Sensitive Vinyl logo art and lettering available from Handicap Sign Inc. This panel is to be delivered to M. C. Smith Associates and Architectural Group, Inc. upon project completion.

Layout and lettering sizes of other panels shall be reviewed for approval by the Landscape Architect. Project sign shall be incidental to the project with no additional cost.

Location on the site shall be as directed by the Landscape Architect.

Contractor shall install the sign within 15 days of the contract signing and remove sign 120 days after completion of project or as directed by Landscape Architect. No invoices will be certified or payments made until sign is in place.



Project Sign

SCALE: NTS

TECHNICAL SPECIFICATIONS LANDSCAPING - SECTION 02900

PART I - GENERAL

1.01 Work Included

The work included under these specifications consists principally of all landscape related work which is shown on the accompanying plans and details and which is itemized within the Proposal Form section of these contract documents. This work may typically include, if shown on the plans, supplying and planting plant materials, preparing and placing all topsoil required in plant pits and planting beds, and sodding of lawns, installation of edging, and supplying all fertilizer, mulch, bracing materials and related items; and furnishing all other organization, supervision, labor, equipment and materials necessary to complete the work and for maintenance in accordance with the plans and specifications. Other work may be included if shown on the plans and/or the Proposal Form.

1.02 General Requirements

Each bidder affected by the work to be performed under these specifications shall thoroughly examine the site and satisfy himself as to the conditions under which he will be obliged to operate or that will in any manner affect the work under this agreement.

1.03 Storage of Materials and Equipment

The Contractor shall discuss at the start of the contract with the Owner or Prime Contractor, and Landscape Architect establishing an area to be used for temporary storage of /contractor's materials and equipment. The Contractor shall assume all responsibility for loss or damage to Contractor's materials and equipment. Upkeep of the storage area must meet the approval of the Landscape Architect.

1.04 Guarantee Period

The guarantee period for all plantings shall begin at the date of written Acceptance by the Owner, and shall continue for the length of time specified as follows: 1 year for all plantings.

PART II - MATERIALS

2.01 Topsoil

Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth. It shall be reasonably free from subsoil and stumps, roots, brush, stones (1 inch or more in any dimension), clay lumps or similar objects. Existing vegetation including brush and noxious weeds shall be removed from the soil surface and disposed of prior to stripping of the topsoil. Ordinary sod can be thoroughly broken up and intermixed with the soil during handling operations. Topsoil shall be classifiable as a loam, silt loam, silty clay loam, or clay loam, as determined from the Bureau of Plant Industrial, Soils and Agricultural Engineering, USDA triangular soil texture chart. The topsoil, unless otherwise specified or approved, shall have a ph range of approximately 5.5 to 7.5, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitations of bids. The organic content shall not be less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction) test.

Prior to obtaining additional material to be used for topsoil, the Landscape Architect shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected by Landscape Architect to determine if the selected soil meets the requirements specified and to determine the depth of which stripping will be permitted. At this time, the Contractor shall be required to take representative soil samples from several locations within the area under consideration to the proposed stripping depths for testing purposes as specified above, and shall have them professionally tested by the laboratory approved by the Landscape Architect prior to approval of the soil.

2.02 Peat

Peat shall be peat moss. It shall be finely shredded, consist of 90 percent organic moss, be brown in color and suitable for horticultural purposes. Shredded particles shall not exceed ¼ inch in diameter. Peat shall be measured in air-dry condition, containing not more than 35% moisture by weight. Ash content shall not exceed 10%. Before purchasing peat, complete information to include brand name, the source and a representative sample in a one-quart jar shall be submitted to the Landscape Architect for approval.

2.03 Sand

Sand shall be medium textured, screened and washed. Before purchasing the sand, the source and a sample of the material in a one-quart jar shall be submitted to the Landscape Architect for approval.

2.04 Planting Soil

Planting soil shall be that soil which is a mixture of equal parts of the following materials: One Third (1/3) Topsoil; One Third (1/3) Peat Moss; and One Third (1/3)

Sand, or alternative special mixes if shown on details. The mixture must be thoroughly ground up and mixed so that there is no visible segregation of material, acceptable to the Landscape Architect. Site soil shall not be used in planting areas.

2.05 **Planting Tablets**

Planting tablets shall be commercial fertilizer plant food tablets, Agriform 20-10-5, or equal, approved by the Landscape Architect. The tablets shall be tightly compressed, long-lasting, slow release fertilizer tablets weighing between 5 and 25 grams, as specified.

2.06 **Granular Plant Food**

Granular plant food shall be commercial fertilizer, a complete fertilizer of organic base containing in available form by weight 5-10-5; five (5) percent of nitrogen, ten (10) percent of phosphoric acid, and five (5) percent of potash or equal ratio. Before delivery of any fertilizer is made under this Contract, the Contractor shall submit a sample in a one-quart jar with the manufacturer's statement of analysis of the fertilizer, and the availability of the plant food. The fertilizer shall be delivered to the site in the original containers unopened and bearing a guaranteed analysis.

2.07 **Plant Bed Edging**

Plant bed edging, if indicated on the plans, shall be the type as called for on the plans. Edging shall be installed as detailed and shall be installed with no kinks or irregular alignment.

2.08 **Hardwood Bark**

Hardwood bark for mulching shall be finely shredded hardwood bark, free of sticks and foreign material with no pieces greater than 5" in length. Before purchasing, a one-pound sample of the material shall be submitted to the Landscape Architect for approval.

2.09 **Preemergence Herbicide**

Preemergence herbicide shall be a nationally recognized brand which shall be submitted to the Landscape Architect for approval.

2.14 **Anti-desiccant**

Anti-desiccant shall be an emulsion which provides a protective film over plant surfaces, sufficiently permeable to permit controlled transpiration, delivered in sealed manufacturer's containers, and shall be mixed according to the manufacturer's directions.

Anti-desiccant shall be "Wiltpruf" as manufactured by Nursery Specialty Products, Inc., Stubbins Road, Broton Falls, New York, or approved equal.

2.15 **Water**

Water shall be clean, fresh, free of harmful substances and suitable in every way for the execution and maintenance of this work. The Contractor shall be responsible for the supply and distribution of the water including hoses, hose connections, water wagons and vehicles necessary to assure healthy, growing plantings.

2.16 **Plant Materials**

Plants shall be selected which are free of diseases and contamination. The Contractor shall notify the Landscape Architect of the source of his materials and the Certificate of Inspection required for their transportation of the job site, prior to digging said materials.

Certificates of Inspection shall accompany the invoice for each shipment of plants as may be required by law for transportation. The Contractor shall file copies of all certificates with the Landscape Architect prior to acceptance of the material. Inspection of Federal or State Governments at place of growth does not preclude rejection of the plants at the site.

Plant Material Selection and Tagging

The Contractor shall acquire all plants from reputable sources known and established in the nursery industry. The Contractor will select the plant materials at their source and tag the plants for inspection by the Landscape Architect. The Contractor shall accompany the Landscape Architect on all plant inspection and selection trips to all nursery sources.

The Contractor will be responsible for all expenses of the Landscape Architect involved in inspecting and selecting plant materials at their source including all travel expenses, the Landscape Architect's time at his current hourly rate, and cost of meals and lodging incurred while selecting plant materials.

After delivery and prior to installation all material is subject to the approval of the Landscape Architect. If any material is found unacceptable, for any reason, the Contractor shall provide acceptable material in a timely manner and in no way delay the progress of the work. The Contractor shall assume complete responsibility for the quality of material shipped and shall in no way be compensated for any plant material that is rejected. The Landscape Architect's opinion shall be final and conclusive for all rejected materials.

Applicable Specifications and Standards

Guideline standards shall be as follows:

"STANDARDIZED PLANT NAMES", 1942 Edition, American Joint Committee on Horticultural Nomenclature.

"AMERICAN STANDARD FOR NURSERY STOCK", Current Edition, American Association of Nurserymen.

PLANT HARDINESS ZONE MAP, Current Edition Publication No. 814 Agricultural Research Service, U.S. Department of Agriculture.

Hardiness - Plants shall be nursery grown in accordance with good horticultural practices and grown in the same plant hardiness climate zone as the planting site or from zones north of the planting site for at least two years. The plant shall have been grown under proper cultivation with appropriate wide spacing of the plants to produce healthy, well-balanced and thickly rooted, well-branched and foliated plants.

Plants shall be freshly dug vigorous plants. No healed-in plants or plants from cold storage will be accepted.

Quality - Unless specifically noted otherwise, all plants shall be of specimen quality, exceptionally heavy, symmetrical, thickly branched, tightly knit plants, so trained or favored in their development and appearance as to the unquestionably of first quality in form, number of branches, buds, fruits, compactness and symmetry.

Disease and Damage - All plants shall be free of disease, insect pests, eggs or larvae, and shall have healthy, well-balanced and thickly developed root systems. They shall be free from physical damage or adverse conditions that would prevent thriving with the desired quality appearance and growth characteristics.

Plants shall be true to species and variety and shall conform to measurements specified in the Plant Lists except that plants larger than specified may be used if approved by the Landscape Architect prior to planting. Use of such plants shall not increase the Contract Price. If larger plants are approved, the ball of roots and plant pits shall be increased in proportion to the size of the plant.

Plants shall be measured when branches are in their normal position. Height and spread dimensions when specified refer to the main body of the plant and not from branch tip to tip.

Plant Characteristics - All plants shall be matched specimens from a single block source. All plants that meet the measurements specified but do not possess a normal balance between height and spread shall be rejected.

Caliper measurement shall be taken at a point on the trunk 6 inches above natural ground line for trees up to and including 4 inches caliper size and at a point 12 inches above the natural ground line for larger size trees.

Range of Sizes - If a range of sizes is given, no plant shall be less than the minimum size and not less than 50% of the plants shall be smaller than the largest size specified.

Plants shall not be pruned before delivery. Trees which have a damaged or crooked

leader, or multiple leaders, unless specifically specified, will be rejected. Damaged trees such as trees with abrasions of the bark, sunscald, disfiguring knots, or cuts of limbs over ¼ inch, which have not completely calloused, will be rejected.

Substitutions - No change in quality, quantity, species, variety, or sex of plants from those specified will be permitted without the prior written approval of the Landscape Architect. When requesting permission to substitute, the Contractor shall submit in writing evidence from a minimum of six competent sources acceptable to the Landscape Architect that the plants specified are not available and Contractor shall suggest plants which conform to the requirements of the Contract as to size, type and function. Contractor shall indicate a substitution. In no case shall the price for the substitution exceed the bid price of those replaced. The Landscape Architect reserves the right to delete plant items from the Contract in lieu of approving substitutions.

Labeling - The Contractor shall label for shipment and planting operations all trees, shrubs in each group of a similar species and variety, and ground cover plants in each planting bed. Plant material labels shall be durable, legible labels stating the correct plant name (botanical and common name from the documents) and size in weather-resistant ink or embossed process capable of remaining readable at least two years. They shall be labels which can be tied securely to all plants in a manner that normal growth will not be restricted.

Growth Conditions - No plant material shall be dug or transported after the leaf buds are open unless special conditions exist which may warrant a variance, subject to approval by the Landscape Architect.

Digging and Handling - Plants shall be adequately balled and burlapped with firm and natural earth balls not less than the dimensions specified in AAN Standards and of sufficient depth to incorporate all fibrous and feeding roots. Container grown plants of specified quality and proper size of balls may be used, as approved by the Landscape Architect. No plants shall be accepted when the ball of earth surrounding its roots has been cracked or broken or become excessively wet or mushy before to or during the process of planting, or when the burlap or ropes have been removed. All balled and burlapped plants that cannot be planted immediately on delivery shall be set on the ground or in a trench and the balls well covered with soil or other acceptable material to prevent freezing, drying or over-watering conditions. Plants shall be so handled that the roots are protected at all times.

Anti-desiccant - Immediately before digging, spray all evergreen or deciduous plant materials in full leaf with anti-desiccant, applying an adequate film over trunks, branches, twigs, and foliage. Exceptions to this procedure must be proposed in writing to the Landscape Architect for his approval prior to digging the plants.

Delivery - The Contractor shall notify the Landscape Architect at least 48 hours in advance of the anticipated delivery date of any plant material. A copy of the current Certificate of Nursery Inspection must accompany each shipment of plant material.

Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles and covered shipments shall be adequately ventilated to prevent overheating of the plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be just cause for rejection. All plants shall be kept moist, fresh and protected at all times. Such protection shall encompass the entire period during which the plants are being handled in transit or in temporary storage.

No plant shall be so bound with rope or wire at any time as to damage the bark, break branches, or destroy its natural shape.

2.17 **Or Equal**

Any materials recommended by the Contractor as substitutions for specified materials shall be submitted to the Landscape Architect in writing for his approval prior to the digging and/or planting operations. The opinion of the Landscape Architect shall be final and conclusive.

PART III - PLANTING OPERATIONS

3.01 **Time of Planting**

The time of planting operations shall take place within the following time schedule:

Ground Cover Plants shall be planted during the period of September 15 to October 15 or April 1 to June 10

When considered advisable and in keeping with proper horticultural procedures, the Contractor may request in writing permission to plant and transplant out of these seasons. The Landscape Architect shall take under advisement the needs and requirements of the Owner, weather factors, planting conditions and other factors to alter the planting seasons. Holes may be dug prior to these planting seasons as approved by the Landscape Architect.

3.02 **Progress and Coordination Meetings**

Work and Planting Schedule - The Contractor shall submit to the Landscape Architect, for approval by the Owner at the beginning of each planting phase, a proposed work schedule which outlines the areas in which work will commence, the types of work, and the time table for their completion. The Owner reserves the right to alter the proposed schedule as necessary.

3.03 **Plant Location Layout**

Location for all plants and outlines for planting areas shall be staked on the ground by the Contractor and shall be approved by the Landscape Architect before any excavation

is made. The Contractor shall accompany the Landscape Architect to review and approve all plant staking. Adjustments in locations and outlines shall be made as directed by the Landscape Architect.

3.04 **Obstructions**

Underground Utilities - The Contractor shall secure at his own expense all information and assistance needed to identify the location of all utilities; electrical lines and conduits; steam conduits; water lines; sewer and gas lines; telephone lines; cable-TV lines; etc. The Contractor shall be solely responsible for the location and confirmation of all utility locations. It shall be the Contractor's responsibility if he elects to use the service, for forty-eight (48) hour notification to MISS DIG, one number utility alert, for location of public utility service lines where digging operations could disturb or sever such lines. The Contractor shall pay for all repairs, restoration and damages resulting from his damage to any and all utilities. Care shall be taken when excavating plant pits and placing stakes and anchors in the proximity of such utilities to avoid damaging them and to adjust the planting, if required, in harmony with each other.

In the event obstructions are encountered, the Contractor shall immediately notify the Landscape Architect and the Owner so that arrangements may be made for adjusting the planting locations.

Other Obstructions - In the event that rock, tree stumps, or other obstructions are encountered in any plant pit excavation work to be done under this contract, alternate locations shall be approved by the Landscape Architect. Where locations cannot be changed, the obstruction shall be removed to a depth of not less than 3 feet below grade and no less than 24" from the edges of the plant pit.

3.05 **Protection of Existing Vegetation**

Existing plants to remain, as shown on the plans and as indicated by field inspection shall be protected from soil compaction and other damages during the planting operations. Care will be taken by the Contractor to work in and from open areas to avoid contact with the existing trees and root feeding areas. The Contractor is responsible to repair all damages and in the case of extreme damages shall replace the plant with a specimen nursery grown plant as similar in size as possible to the destroyed plant as directed by the Landscape Architect. Compaction of soils caused by these planting operations within root feeding areas will be loosened by Contractor as directed by the Landscape Architect.

3.06 **Installation of Plantings**

Excavation of Planting Areas: All individual plant pits shall be circular in outline; all pits shall have sloped sides; the bottom of all plant pits shall be dug square, except upon approval of the use of a tree spade as approved by the Landscape Architect.

Mass Planting Beds: When plants are located in a mass planting arrangement and walls

between plant holes are 12" or less in thickness after the plant holes are excavated, the intervening walls shall be removed to create one large plant hole. The plants shall be placed and planted as specified herein.

Ground cover beds shall be outlined, then the entire bed thoroughly cultivated in a criss-cross pattern with a rototiller, or equal, to a depth of six inches (6"). The planting soil shall not contain clods of soil incapable of settling closely to prevent air pockets around the plants.

Safety: The Contractor shall not leave any plant hole open or unattended when an unsafe condition exists without proper protective signals, barriers, etc., or in any manner present a hazard to pedestrians or vehicles on the site.

Setting Plants: Unless otherwise specified or detailed, all plants shall be planted in pits at such level that, after settlement, a normal and natural relationship of the crown of the plant with the ground surface will be established, i.e., the top of the ball level with finished grade.

Each plant to be planted in an individual pit shall be planted in the center thereof unless otherwise directed on the drawings on an individual plant basis. When balled and burlapped plants are set, soil mixture as specified shall be carefully placed under and around the base of each ball to fit all voids. All burlap and lashings shall be removed from the tops and upper 1/3 of the shrubs and tree balls, but no lashing or burlap shall be pulled from under the plant balls, or left exposed to the elements.

All plants shall be planted in the soil mixture as specified, backfilled in 6" layers, then thoroughly settled by deep watering. No material in frozen or muddy conditions shall be used for backfilling plant pits. Plant food tablets shall be placed as specified herein.

All ground cover plants shall be placed in rows, each being spaced in a checkerboard, i.e., alternating centers pattern, spaced as specified by the plans and details.

The finished level of the soil in newly planted areas shall be such that when the backfill is settled and the mulch applied, the top of the mulch shall be no more than one (1") inch above the surrounding finished grades, unless otherwise detailed.

Excess soil from plant pit excavations shall be disposed of as directed by the Landscape Architect.

3.07 **Plant Tablet Installation**

The Rate of Application of Planting Tablets shall be placed according to the manufacturer's instructions and as follows:

For Balled and Burlapped plant material use two 21-gram tablets per each one-half inch (1/2") of caliper.

For seven (7) gallon container grown plant material use three (3) tablets of the 21-gram size for each plant.

For five (5) gallon container grown plant material use two (2) tablets of the 21-gram size for each plant.

For three (3), two (2) and one (1) gallon container grown plant material, use one (1) of the 21-gram tablets for each plant.

Placement of the planting tablets shall be as follows: Position the plant in the hole and settle the backfill $\frac{2}{3}$ of the depth at the root ball. Place the recommended number of tablets evenly around the perimeter of, and adjacent to, the root ball at the depth which is in the upper $\frac{1}{3}$ of the settled backfill around the root area.

3.08 **Staking**

All trees shall be protected by tree stakes or by guying, as detailed on the drawings, using specified materials.

Each tree shall be staked immediately following its planting, watering and determination that it will settle to the specified grade. Plants shall stand plumb after staking.

3.13 **Fertilizer**

Granular plant food shall be applied to the surface of the plant beds including the ground cover beds. The plant food shall be spread over the root area starting six inches from the trunk and extending to the drip line of each plant or to the outer edge of the plant bed, whichever is larger, at the rate of two pounds (2 lbs.) per 100 square feet.

3.14 **Mulch**

After the plants have been watered, backfilled and allowed to settle for twenty-four hours and saucers constructed, the mulch shall be applied.

Trees shall be mulched with 3" deep layer of bark mulch, all within the saucer.

Shrubs and Ground Covers shall be bedded by creating a bed outline 6" outside the drip line of the shrub. The outline shall be continuously cleaned out with a spade, cut perpendicular to the lawn level. The grass within this bed outline shall be removed at least 4" deep to prevent grass growth. Then the bed shall be mulched with 3" deep layer of bark mulch. The saucers will be maintained as specified, within the plant beds.

3.15 **Herbicide**

The pre-emergence herbicide shall be applied evenly on the surface of the mulch at the manufacturer's recommended rate in all plant beds and tree saucers after the mulch has been applied and firmed in place. Should weed or grass growth exist within these beds

and saucers it shall be removed by the Contractor and the soil and mulch smoothed and firmed, then the herbicide shall be placed on the surface, then sprinkled thoroughly with water. The rate of application shall comply with the manufacturer's recommendations.

3.16 **Clean-up**

Constant care shall be exercised by the Contractor to maintain a safe and clean condition on the site for safe movement of pedestrians and vehicles on the site. The ground shall be cleared of all debris, of all superfluous materials and all equipment which shall be entirely removed from the public traffic ways when not being used to the satisfaction of the Landscape Architect. All paved areas shall be maintained to be free of any dirt at the end of each workday.

At the completion of the work in an area or areas, or when work is stopped for a period of time due to seasonal schedules, deliveries, etc., the work areas shall be cleaned of all superfluous soils, materials and equipment, in order to maintain a neat, clean and safe condition to the satisfaction of the Landscape Architect.

3.17 **Repairs**

The Contractor shall be responsible for the repair of any damage to lawns, paved areas, roads, walks, or underground utilities which may result from his work and such repairs shall be made swiftly in a thorough and workmanlike manner, with minimum inconvenience to the Owner and users of the site. Repairs shall be made to the satisfaction of the Landscape Architect at no additional cost to the contract.

Lawn Areas: Where lawn areas have been disturbed or damaged, the damaged lawn areas, ruts, and depressions shall be cultivated, filled with topsoil and settled to proper grades and contours upon completion of the planting operations and the replacement operations, to the satisfaction of the Landscape Architect.

3.18 **Acceptance**

The Landscape Architect shall inspect all work for Acceptance upon written request of the Contractor at the completion of the initial planting installation. The request shall be received at least ten (10) calendar days before the anticipated date of inspection.

Acceptance of plant material by the Landscape Architect shall be for general conformance to the specifications, including size and character, and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents including maintenance.

An Interim Inspection, scheduled approximately five months from the date of acceptance, shall be conducted to inspect all work. All replacements and/or repairs cited by the Landscape Architect at this time will be completed for approval by the Landscape Architect. The Contractor assumes liability for all work and materials necessary as a result of the Interim Inspection, through to the end of the guarantee period.

Upon completion of repairs and replacements by the Contractor for acceptance by the Landscape Architect, the Landscape Architect shall certify in writing to the Owner as to the completion for the initial acceptance of the project and recommendation for beginning the Maintenance and Guarantee period.

3.19 **Maintenance**

General Requirements: The operations of maintenance shall begin immediately after each plant is planted and shall continue until initial acceptance of the project and throughout the guarantee period as specified. The Contractor shall furnish all supervision, labor, material, equipment and transportation to maintain the new plantings in an attractive and vigorously healthy condition throughout the guarantee period to produce a high quality appearance. All materials used shall conform to bid specifications or shall otherwise be acceptable to the Landscape Architect.

Planting Maintenance: The Contractor shall maintain the planting in a healthy growing condition by spraying, weeding, cultivating pits and beds where needed, replacing displaced mulch basins, plant beds, resetting stakes, tightening guy wires, replacing flags, etc.

Watering shall be the Contractor's responsibility throughout the maintenance period and shall be done on a scheduled basis to assure healthy, growing plantings. The coordination of access to supply locations, irrigation systems and related water supply equipment shall be the Contractor's responsibility. The Contractor shall inspect the plantings throughout the growing season and take necessary steps to control insect and blight attack. The Contractor shall also inspect the planting after each severe storm and exercise all corrective measures required to maintain a finished, quality appearance and good plant vigor. All maintenance and remedial operations and subject to the approval of the Landscape Architect throughout the guarantee period.

Fertilizer: On March 1st and June 1st granular plant food shall be applied to the surface of the plant beds. The Plant food shall be spread over the root area starting six inches from the trunk and extending to the drip line of each plant, at the rate of two pounds (2 lbs.) per 100 square feet.

Plant beds shall be treated with preemergence herbicide, on March 1, June 1, and September 1, as required, or as recommended by the manufacturer to prevent weed or grass growth in the plant beds. No weed or grass growth shall exist in the plant beds at any time.

At the end of the maintenance period the Contractor shall remove all guys stakes, wire, hose and tree wrap. If steel stakes have been used these shall be salvaged and delivered to a location as determined by the Owner.

3.20 **Replacements**

The Contractor shall replace, without cost to the Owner, and as soon as weather conditions permit within the next 15 days or within the first 15 days of the next earliest

planting season, whichever occurs first, all dead plants and all plants not in a vigorous thriving condition, as determined by the Landscape Architect during the term of the Contract. Plants identified for replacement shall be immediately removed by the Contractor upon notification by the Landscape Architect. The plants shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements in this Specification.

During the last month of the guarantee and maintenance period, the Landscape Architect and the Contractor shall inspect the planting to determine the number of plants to be replaced. A count of the dead plants shall be made and submitted to the Contractor in writing.

Plants which have lost thirty-three percent (33%) of their branches shall be considered dead and shall be replaced unless, in the Landscape Architect's opinion, they show promise of vigorous growth and recovery.

All replacements under the guarantee shall be plants of the same kind, size and quality as specified in the Plant List; they shall be furnished, planted, and mulched as specified under "Planting Operations."

**TECHNICAL SPECIFICATIONS
LAWN SEEDING - SECTION 02910**

PART I - GENERAL

1.01 Description

This work consists of the complete construction of all lawn areas as indicated on the plans or disturbed during construction, including the finish grading, tilling and cleaning the seed bed; seeding; fertilizing; mulching; weed control; specified watering; and maintaining the seeded areas through the required mowings.

1.02 Submittals

Provide product data or test and Evaluation reports for each type of product indicated.

- A. Grass Seed
- B. Hydro-mulching
- C. Tackifier
- D. Straw/Coconut Fiber
- E. Fertilizer

PART II - PRODUCTS

2.01 Grass seed shall be applied at the rate of six pounds (6#) per thousand square feet in the following mixture.

<u>SEED</u>	<u>PERCENT/ WEIGHT</u>	<u>MINIMUM PERCENT GERMINATION</u>
Merit Kentucky Bluegrass	10%	85%
Monopoly Kentucky Bluegrass	10%	85%
Touchdown Kentucky Bluegrass	10%	85%
Manhattan II Perennial Ryegrass	25%	85%
Fiesta II Perennial Ryegrass	25%	85%
Pennlawn Creeping Red Fescue	<u>20%</u>	85%
	100%	

2.02 Mulch for hydro-mulching shall be commercially available wood cellulose fiber or wood pulp for use in spray applicators and shall be applied at a rate of 1,250 pounds per acre. All seed areas must be completely and uniformly covered.

2.03 Tackifier for mulch shall be GeoPro Matrix as available from Price & Company, Inc., telephone 1-800-248-8230.

2.04 Straw/Coconut fiber combination blanket shall be by North American Green, number SC150BN, as available from Price & Company, Inc., telephone 1-800-248-8230.

2.05 Fertilizer 10-10-10 or 12-12-12

PART III - EXECUTION

3.01 Seeding Operations

The Contractor shall till; fine grade; remove all sticks, stones, debris, clay lumps, sod clods and other undesirable materials in the top four (4") inches of soil; and have the Landscape Architect approve the seed bed before seeding.

After the seedbed has been prepared and approved by the Landscape Architect, the Contractor shall sow the specified seed mixture with a Brillion, or equal, mechanical seeder.

The Contractor shall incorporate an equal ratio, complete fertilizer such as 10-10-10 or 12-12-12 in the top two inches (2") of soil or in the hydro-slurry mix at a rate of four hundred pounds per acre (400#/acre).

After the seed is installed the entire seedbed area shall be hydro-mulched as specified. All seed areas must be completely and uniformly covered. Light and uneven areas will not be accepted. Care should be taken to prevent overspray of mulch on curbs, walks, pavement, etc. All overspray must be cleaned off by Contractor.

For slopes of 5 on 1 (20%) or greater, the contractor shall incorporate GeoPro Matrix in combination with hydroseeding at a rate of 2000 lbs per acre. GeoPro Matrix is available through Price & Company, Inc., telephone 1-800-248-8230.

For slopes of 4 on 1 (25%) or greater and all drainage swales, the contractor shall cover the entire area with the straw/coconut combination blanket in accordance with the manufacturer's recommendations.

3.02 Season of Seeding

The normal seasonal dates for seeding shall be August 20 through October 10, and April 15 to May 25. The Landscape Architect may approve seeding of irrigated areas outside of these dates. Seed at other times subject to Landscape Architect's approval. Seeding shall not be done when the ground is excessively wet, frozen or otherwise intillable.

3.03 Repairs

The Contractor shall be responsible for the repair of any damage to existing lawns, which may result from his work and such repairs shall be made swiftly in a thorough and workmanlike manner, with minimum inconvenience to the Owner and users of the site. Repairs shall be made to the satisfaction of the Landscape Architect.

Where lawn areas have been disturbed or damaged, the damaged lawn areas, ruts and depressions shall be cultivated, filled with topsoil, settled to proper grades and seeded to the satisfaction of the Landscape Architect.

3.04 **Maintenance**

This work consists of all labor, equipment, materials and means necessary to completely nurture, cultivate, sustain, care for or otherwise maintain all seeded lawn areas including additional fertilization and weed control as required to achieve as thick, healthy weed free turf.

All seeded lawn areas shall be maintained by the Contractor for a period of sixty (60) days following germination and for at least three (3) complete mowings.

A. Lawn Mowing

The first mowing shall occur when the grass is approximately 3½ inches in height. Mowings shall occur when the grass is within ¼ inch of 3 inches in height. Cut grass 2 inches to 2½ inches high. Not more than 1/3 of the height of the grass shall be removed in any single cutting.

All mowing shall be done with clean, freshly sharpened and properly adjusted rotary or reel type mowing equipment of reputable make and design. Mowing is not permitted when the grass blades are wet. Clippings shall be left if the grass is cut within the specified heights. Cuttings of more than 1/3 of the height shall have all clippings removed. Mowing direction should be varied with each mowing to change the patterns of wear and cut. All edge areas shall be cleanly trimmed to the same height as the rest of the lawn area.

All walks, ground cover beds, parking areas, drives and related areas shall be free of clippings or related mowing and maintenance waste before mowing is considered complete and before the Contractor leaves the job site.

B. Lawn Watering

Watering shall occur on a regular basis throughout the maintenance period and shall be adjusted to include natural rainfall if ½ inch or more falls in a two consecutive day period.

All lawn areas shall receive at least 1½ inches of water per week in porous soils and 1 inch of water in clay soils. One inch (1") of water is approximately 640 gallons of water per 1,000 square feet of lawn. Water shall be applied in not more than two equal applications per week in any given area to ensure complete and thorough wetting of the soil and root systems. Frequent, light waterings shall not be permitted.

If an irrigation system is available, the Contractor shall be responsible for its complete operation during the maintenance period.

Care shall be taken to water all areas equally by adjusting rates of application required for different soils and exposure conditions.

Every effort shall be made to water from early morning to approximately one (1) hour before mid-day. Watering during the mid-day period or during very high winds shall not be permitted without expressed approval by the Owner.

The Contractor shall furnish and/or arrange for with the Owner, all equipment and materials necessary to properly conduct all watering operations in a timely, efficient and orderly manner.

The Owner shall make available all equipment, facilities, access and water necessary for the Contractor to connect to, control, locate or otherwise utilize to achieve the specified rates and schedules for lawn watering.

The Contractor shall utilize all existing water services and irrigation systems in the manner they were intended, to uniformly and thoroughly water all lawn areas. Spray from watering devices shall not be directed across walks, drives or parking areas or against buildings, except by expressed approval from the Owner.

Rotation of watering areas shall be in an organized, orderly manner with every effort made to completely water physically contiguous areas.

All watering shall be by spray application at rates that permit continuous absorption without puddling or flowing off-site or into other areas. Flood watering will not be permitted.

**TECHNICAL SPECIFICATIONS
SANITARY SEWER - SECTION 03340**

1.0 DESCRIPTION

The work shall consist of installing sanitary sewer pipe of the specified size or sizes in a trench and shall include the construction of manholes, laterals connections to the abutting properties and other appurtenant work. Excavation, trenching and backfilling shall be as specified in Division 13 of these Specifications.

2.0 MATERIALS

All materials furnished by the Contractor shall conform to the specifications which follow. Where reference specifications are used, they shall be considered as referring to the current edition or the latest issue.

2.1 Sewer Pipe (Main Line) - All main line sanitary sewer pipe shall be PVC composite pipe (truss pipe) unless otherwise shown on the Drawings or specified in the Special Specifications.

All pipe and fittings shall be suitably marked to provide the manufacturer's name, date of manufacturer, pipe class and lot or production number.

Polyvinyl Chloride composite sewer pipe and fittings shall conform to the current specifications of ASTM D-2680, and shall be Contech brand or an approved equal.

Joints for composite sewer pipe shall be Type SC (solvent cement) where the water table is below the pipe, and shall be Type OR (O-Ring mechanical seal joint) where the pipe is near or below the water table. Nitrile rubber gaskets shall be used when specified on the Drawings or directed by the Engineer.

2.02 Sanitary Sewer Laterals - SDR-35 or SDR-26 PVC pipe shall be required for sanitary sewer laterals. Main line, property line risers and clean outs shall be SDR-26 or SDR-23.5

SDR-35 PVC pipe will be allowed from 0' – 10' deep.

SDR-26 PVC pipe shall be installed in applications deeper than 10'.

2.03 Wyes and Tees - Wyes and tees may be cast fittings of the same material and joints as the main sewer, or may be an approved fabricated special fitting which provides a suitable connection for the lateral to the main sewer. Solid wall fittings will be allowed. Wyes and tees shall be required as follows:

A. 6" wyes shall be used on main line sewer of 8" or 10" diameter.

B. 6" wyes or tees may be used on main line sewer of 12" in diameter or larger.

2.04 Cement Mortar - Mortar for pipe encasement, special pipe embedment, custom manhole flow channels and similar items shall consist of one (1) part Air Entrained Portland Cement, and two (2) parts of masonry sand. These proportions shall be measured by volume.

The sand and cement shall be mixed dry in a clean tight box until a mixture of uniform color is produced, after which water shall be added until the required consistency is obtained. Mortar shall be mixed only in such quantities as needed for immediate use. The retempering of mortar shall not be permitted.

- A **Cement** - Air Entraining Portland Cement shall conform to the requirements for Type 1A of the current specifications for Air Entraining Portland Cement, ASTM C-175.
- B **Masonry Sand** - shall conform to the requirements of “Masonry Sand, 2MS” of the current Michigan Department of Transportation (MDOT) Standard Specifications for Construction.
- C **Water** - for mixing mortar shall be obtained from the public water supply unless otherwise approved by the Engineer.

2.05

Concrete - Concrete for pipe encasement, special pipe embedment, manhole bases and similar items shall meet the requirements of the standard specifications of MDOT for Grade 30M concrete. Grade 30M concrete shall have the strength of 3500 PSI at 28 days.

2.06

Manhole Materials

- A **Precast Unit** - Unless otherwise specified or approved, all manholes shall be precast. shall be the same height and width as the pipe Precast reinforced concrete risers and precast reinforced concrete manhole eccentric cone sections shall conform to the requirements for reinforced concrete manhole risers and tops, ASTM C-748.

Joints for precast sections shall be premium rubber, butyl rubber composition seals, “O” ring or approved equal.

Precast manholes shall be Grand Valley Concrete Products, Kerkstra Precast,

- B **Castings** - All castings shall be gray iron castings conforming to ASTM A48, Class 35. They shall be of uniform quality, free from sand holes, shrinkage, cracks, cold shuts or other defects. All castings shall be coated with asphalt paint, unless otherwise specified.

Unless otherwise specified, manhole castings shall be East Jordan Iron Works No. 1040 with Type A solid cover (w/ SANITARY SEWER cast on the lid). Where indicated on the Drawings (outside of paved areas) a No. 1040 2-bolt casting shall be used.

Where indicated on the Drawings, watertight manhole covers shall be East Jordan Iron Works No. 1040 WT, with Type A solid cover (with SANITARY SEWER cast on the lid), or approved equal.

All bolts for manhole covers are to be (304) stainless steel, 5-sided pentagonal head bolts. All Castings shall be bolted to the Manhole cones in easements.

- C **Adjusting Rings** - Recycled rubber rings shall be used to bring the manhole casting up to plan grade. 1/2” minimum adjusting is required. 12” maximum adjustment is allowed.

All adjusting rings shall be bolted to the manhole cone in easements.

Manufacturer’s recommended urethane adhesive/sealant (PL-premium, Concrete and Masonry Sealant) shall be used between the casting and adjusting rings, between adjusting rings, and between adjusting rings to the cone section of manhole. Approved Manufacturer is GNR Technologies or approved equal.

- D **Casting Anchors** - Casting anchors shall be 5/8” (304) stainless steel rod threaded 5/8-11, unless otherwise specified, anchors shall be per standard detail. These shall be used on all castings.

- E **Manhole Steps** - Unless otherwise specified, manhole steps shall be plastic coated steel steps conforming to ASTM C-478. Plastic steps shall be M.A. Industries, Inc., Step #PS1-PF or approved equal. Steps shall be spaced 14" center to center.
- F **Flexible Manhole / Pipe Connectors** - Flexible manhole connectors (also called rubber boots) shall be "Kor-N-Seal" by National Pollution Control Systems, Inc., "P.S.X." or "Press Wedge II" by Press Seal Gasket Corporation, "Lock Joint Flexible Manhole Sleeve" by Inter Pace Corporation, "A-lok" by A-lok Products, Inc., or an approved equal. Flexible manhole connectors shall conform to the requirements of ASTM C-923, Resilient Connectors.
- G **Watertite Manhole Joint Connections** - Flexible Butyl Rubber based tape 12" wide shall be used on all manhole joints.
- H **Steel Reinforcement** - Steel reinforcement shall conform to the requirements for steel reinforcement of the current MDOT Standard Specifications for Construction.
- I **Metal Bands** - Metal bands used to secure the pipe connections shall be stainless steel (ASTM C-923).
- J **Drop Connections** – All drop connection pipe material shall be the same as mainline pipe. A minimum of 6" (thick) of concrete shall be poured around the drop to ensure stability.

2.07 **Recycled Rubber Adjustment Risers** – Rubber adjustment risers shall meet the following specifications:

- A Adjustment risers shall consist of no less than 80%, by weight, recycled rubber from tires and no less than 10%, by volume, shredded fiber.
- B Recycled Rubber Adjustment Risers shall be "Infra-Riser" as manufactured by GNR Technologies, or approved equal.

2.08 **Bore and Jack** - Steel Casing Pipe shall be 35,000 psi minimum yield strength, one-half inch (1/2") in thickness and shall conform to ASTM A-139, Grade B or as indicated on the drawings. Casing pipe should be twice the diameter of the carrier pipe unless specified otherwise.

Carrier pipe shall be ductile iron (DI) Pipe CI-52 as specified in Section 19.02.01 of these Specifications, unless specified otherwise. DI pipe shall be blocked inside casing so that it does not touch casing pipe. Restraining gaskets shall be used on DI pipe inside the casing pipe. DI pipe shall be installed from manhole to manhole. The casing pipe should be laid at the same grade as the carrier pipe. If needed the grade of the carrier pipe shall be adjusted to the proper grade by an approved method and material.

The annular space between the casing pipe and the carrier pipe shall be filled.

The DI pipe shall be filled with water to assure that it will not float. Any changes must be pre-approved by the City of Kentwood. Both ends of the casing shall be sealed with concrete (Grade 35S). Polyethylene shall be wrapped around the DI pipe as a barrier from the concrete.

3.0 **MATERIALS TESTING**

3.01 **Manufacturer's Certificates** - The Contractor shall furnish the certifications by the manufacturer of sewer pipe and other materials that these materials meet the requirements for the kind and class of materials as required.

3.02 **Sewer Pipe Testing** - If required by the Engineer, sewer pipe shall be tested in accordance with the standard ASTM procedures for the following tests:

1. Dimensions
2. Check
3. Pipe Stiffness

4.0 **INSPECTION OF MATERIALS BY CONTRACTOR**

It shall be the responsibility of the Contractor to inspect all materials for cracks, flaws or other defects before they are incorporated into the work. Any materials found to be defective or damaged, shall be promptly removed from the job site.

5.0 **LAYING PIPE**

5.01 **Alignment and Grade** - Alignment and grade of the sewer pipe shall be established by using the following method:

- A **Laser Beam** - The laser beam and related equipment shall be an approved type. It shall be operated under the supervision of a certified operator. Adequate ventilation equipment shall be used to prevent deflection of the light beam. Backfilling and compaction or other operations that might disturb the source of the beam should not be performed until the segment of sewer is completed. The grade and alignment of the pipe shall be checked, using a transit level and grade rod, at 25-foot intervals for the first 100 feet from each manhole and checked every 100 feet thereafter. Grade stakes shall be placed as required by the Engineer.
- B **Deviations** - All sewer pipes shall be laid straight between changes in alignment and at a uniform grade between changes in grade.
- C **Tolerances** - All sewer pipes shall be constructed at plan grade and alignment. Upon inspection, if sewer fails to follow grade or plan alignment, the pipe shall be re-laid, or whatever action the Inspector / Engineer deems appropriate, by the Contractor with no cost to City.

5.02 **Handling** - Pipe shall be protected during unloading and handling against impacts, shocks, and free fall. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

Bowing and warping of pipe can occur with temperature changes. The Contractor shall store the pipe with adequate foundation to minimize bowing. Pipe lengths having deviation from straight greater than 1/2 inch in 10 feet shall not be used.

An opaque covering shall be placed over PVC composite pipe if it is expected to be exposed to sunlight during storage for a period exceeding four (4) months.

Pipe walls and ends shall be protected from abrasion and damage during handling and shall be inspected just prior to placing in the trench.

Pipe shall be carefully lowered into the trench in such a way as to avoid danger to the workers or damage to the pipe.

5.03 **Direction of Laying** - Excavation of trenches and of pipe shall be at the outlet for the sewer and proceed up grade with the individual pipe being laid with the spigot end downstream.

5.04 **Placing** - The pipe shall be placed on the prepared grade and held firmly in place during subsequent pipe jointing and embedment. Successive pipes shall be carefully positioned so that when laid, they form a sewer with a uniform invert true to line and grade.

5.05 **Handling Sewer Pipe** - Due to potential damage to exterior walls of PVC composite sewer pipe, particularly during cold weather conditions, the Contractor shall carefully avoid dumping rocks, frozen material, or large objects on the pipe. (See also Section 13.03.10 (A) Pipe Embedment). Care should be taken during compaction of the bedding to avoid distorting the shape of the pipe.

5.06 **Cleaning Sewer** - The interior of the sewer shall be cleaned of all jointing material, dirt and debris as the work progresses. In small sewers where cleaning after laying may be difficult, a swab or drag may be required in the pipeline to satisfactorily complete this work. Sewer being cleaned should be isolated from existing sewer by the use of inflatable rubber balls. Before approval of sewer, the sewer shall be flushed. Care should be taken to isolate the existing sewer from this flushing process. Each line shall be flushed from the upstream manhole to the downstream manhole.

5.07 **Water Main Crossings** - Minimum vertical separation distance for crossings between new sanitary sewers and new water mains shall be eighteen (18) inches between the outside of the water main and the outside of the sewer. For existing water mains a minimum vertical distance of twelve (12) inches shall be provided. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.

When the proper horizontal and vertical separation of the sewer and the water main cannot be obtained, the sewer shall be constructed equal to the water main and shall be tested to assure water tightness prior to backfilling.

Where sewer crosses watermain, pipe shall be positioned such that the pipe crossing the main is a full pipe, and shall be centered over/under the existing watermain.

6.0 **PIPE LAYING**

Pipe jointing shall be done in strict accordance with the pipe manufacturer's recommendations unless otherwise specified herein. The manufacturer shall furnish all lubricants, gaskets, pipe cements and other materials required to make the joints. Plastic pipe cement and primer shall be kept in sealed and labeled containers. Opened containers and gaskets used in the trench shall be protected from dirt, water, and other contaminants.

Pipe layers shall be fully qualified and experienced in the work being performed and shall check each joint after it is completed to see that no part of the joint material is left on the inside of the pipe and that the joint is properly made.

Sufficient pressure shall be applied by a manufacturer approved method to each pipe as it is laid to ensure that the spigot is fully seated in the bell. Care shall be exercised to prevent joints from opening up as successive lengths of pipe are placed. The Contractor shall take the necessary precautions when using a trench box to prevent joint separation when the box is pulled ahead.

Plastic pipe with solvent weld joints shall be rotated during joint insertion to insure a complete spread of the solvent compound.

Cutting of pipe lengths, where required, shall be performed by the use of tools and equipment that shall provide a neat, perpendicular cut without damage to the walls or filler material.

7.0 LOCATION OF WYES AND TEES

The approximate location of wyes or tees shall be as shown on the Drawings. These locations may be adjusted where necessary to best serve the various properties. Exact locations shall be determined by the Engineer / Inspector before wyes or tees are installed.

The contractor shall keep an accurate record of measurements from the nearest downstream manhole to each wye or tee which is installed. These measurements shall be recorded on a mylar as-built drawing to be furnished to the Engineer by the Contractor. This mylar shall become the property of the City of Kentwood.

8.0 SANITARY SEWER LATERALS

8.01 **General** - Installation of sanitary laterals shall meet all requirements specified for sanitary sewers. The Inspector shall inspect all laterals before the trench is backfilled.

8.02 **Length** - All sanitary sewer laterals shall be laid at right angles to the street line and shall extend to a point one foot outside the street right-of-way (property line) or easement limit unless otherwise directed. No payment will be made for pipe laid beyond this point, unless specifically ordered by the Engineer / Inspector. Where impracticable to lay the lateral perpendicular to the street, appropriate bends shall be used, where specifically approved by the Inspector / Engineer, to assure that no inappropriate stress is put upon the pipe, and that minimum grade is maintained.

8.03 **Grade and Depth** - The minimum depth of house laterals at the property line or easement line should be according to the Drawings or shall be determined as follows:

- A. Standard house with basement - 11'-0" below first floor elevation. Tri-
- B. Level house - 3'-0" below the lowest basement floor elevation. House
- C. with walkout basement - 4'-0" below basement floor elevation.
- D. Commercial buildings, schools, churches, etc. - These depths will be indicated on the Drawings or will be determined in the field by the Engineer / Inspector.

In any circumstance the minimum depth at the property line shall be 8½ feet below the established street grade. Where the minimum depth cannot be obtained, the sewer lateral shall be laid with a rise of one-quarter inch (1/4") per foot (2% grade) unless otherwise directed.

Any necessary variations of these depths shall be determined by the Engineer / Inspector. It is intended that the ends of the laterals will service the lower floor of all existing buildings.

8.04 **Risers** - Where the sanitary sewer is more than twelve (12) feet deep, measured from the established street grade, a riser can be constructed in accordance with the Standard Detail S-1 or as shown on the Drawings. In any case, the riser shall extend to at least one (1) foot above the existing water table. Backfill shall be carefully placed and compacted around the riser in an approved manner, which will not damage the sewer or riser.

A property line riser shall be constructed on all laterals that are below the water table or are in excess of seven (7) feet below the lower floor of an existing building or as directed by the Engineer. Construction of the property line riser shall be per Standard Detail S-2.

When the sewer lateral is not extended, the end of the riser shall be properly sealed with a solvent weld cap.

- 8.05 **Markers and Measurements** - The location of the end of each sewer lateral, riser, stub or wye shall be marked by a 2"x2" wooden stake which shall extend vertically from the sewer pipe and shall have at its lower end a piece of lumber, 1"x2"x6" nailed horizontally. A large steel nail or a piece of steel reinforcement bar shall be placed in the upright end of each 2"x2". The Contractor shall assist the Engineer in locating the end of each lateral and in recording the location by measuring to the nearest downstream manhole.

After the as-built locations have been recorded and checked by the Engineer, the Contractor shall cut off the markers as follows: in improved areas, the markers shall be cut off two inches below grade; and in undeveloped areas, the markers shall be cut off six inches above grade.

In areas where location of markers might be difficult to locate at a later date, a steel reinforcing bar is to be placed near the marker to allow for use of a metal detector to better locate the marker.

9.0 **MANHOLES**

- 9.01 **General** - Manholes shall be constructed in accordance with the Standard Details contained as part of these Specifications and as specified herein.

- 9.02 **Precast Manholes** - Precast bases shall be installed on the subbase in such a way as to provide a uniform bearing surface under the manhole base.

Precast manholes with integral bottom and channel may be used, however, any changes to the structure due to minor field adjustments of alignment and grade required to meet construction conditions, shall be made by the contractor at no additional cost to the City of Kentwood.

- 9.03 **Stubs** - Stubs shall be provided in manholes for future connections as shown on the Drawings or as directed by the Engineer. All such stubs shall be sealed with standard watertight solvent weld caps.

- 9.04 **Castings** - Castings shall be set to the required elevation as shown on the Drawings. The use of brick or wooden wedges to hold the castings in place shall not be permitted. The adjusting rings and urethane adhesive will be allowed to set undisturbed long enough, to ensure proper stability.

Castings in pavement areas shall be adjusted to grade after the bituminous base course is laid and prior to placing the wearing bituminous course.

Where specified on Drawings, castings in easements prone to groundwater inflow shall be watertight bolt down castings.

- 9.05 **Connections** - Pipes shall be secured in the manholes using a mechanically compressed flexible joint as specified in Section 14.02.07(G) of this Specification.

10.0 **CUT-INS**

10.01 **Existing Manholes** - All openings shall be made by a concrete drilling or coring machine and shall have a mechanically compressed flexible joint connection installed, except when approved by Engineer or noted on Drawings.

All broken or surplus materials falling inside the structure shall be promptly removed.

Downstream sewer from the manhole being cored shall be protected from debris resulting from the coring process.

When cutting into an existing manhole, the opening shall be no larger than is necessary to admit the new sewer.

Flow channels and/or drop connections shall be constructed as specified or as directed to accommodate the sewer cut-ins.

10.02 **Existing Sewer** - When cutting into a larger sewer, the opening in the larger sewer shall be no larger than as necessary to admit the new sewer lateral. All cut-ins shall be made with a sewer saddle. Saddles shall be “Seal Tite” by Greneco or approved equal, unless otherwise approved by the engineer. All broken or surplus material shall be removed from both sewers.

11.0 **ADJUSTING OR RECONSTRUCTING EXISTING MANHOLES**

11.01 **General** - Where called for on the Drawings or directed by the Engineer, existing sanitary manholes shall be adjusted or reconstructed to the required line and elevation. The existing frame and cover shall be used unless otherwise directed by the Engineer. The work shall be in accordance with the requirements of Section 14.02.07 and 14.09.04

11.02 **Precast Manhole Sections** - Precast manhole sections shall be built of material and designed to ASTM Specification C-478. Riser sections shall have a minimum of five (5) inch thick walls and modified groove tongue joints with “O” ring gaskets. Where existing section joints will not accommodate the “O” ring gasket, a butyl rubber gasket conforming to ASTM C-443 shall be used between sections.

11.03 **Adjustment of Castings** – Castings shall be adjusted to meet the surface grade. Existing brick or block chimneys on Major streets shall be removed and the adjustment made with recycled rubber.

Adjustments on Local streets shall be made with reinforced concrete rigs or recycled rubber adjustment rings. Maximum chimney height, measured from top of structure to top of the casting, shall be twenty four (24) inches. If casting cannot be adjusted to grade without exceeding maximum chimney height, work shall be paid under “Rebuild Existing Structure”, Section 17.03.13.

Adjustment of castings in Major streets shall utilize all rubber adjustment risers between the precast manhole structure and the casting when located in the traveled way. Adjustments of castings in Major streets outside of the traveled way (medians and parkways) may use precast reinforced concrete adjustment rings. Any adjustment necessary to bring casting to finish grade shall be done with rubber adjustment rings. Existing rings, not disturbed or structurally compromised during casting removal may remain, with additional adjustment made with rubber rings.

11.04 **Channel Cover** - The contractor shall provide a suitable channel cover to be placed prior to construction to prevent any debris from being deposited in or on the flow channels. A metal or wooden cover with engineering cloth is acceptable. The covering shall be removed following final

adjustment and/or paving and any and all debris that may have been deposited removed from the sewer line or manhole.

12.0 **ACCEPTANCE TESTS**

12.01 **Alignment and Grade** - Each section of sewer shall be checked for alignment and grade using lights and mirrors or other similar means. The Contractor shall assist the Engineer or Inspector in the performance of these when necessary.

12.02 **Leakage Tests-** The completed sewer shall be watertight and free from leaks. Each section of the completed sewer shall be satisfactorily tested by means of an air test before it is accepted.
Sanitary sewer and laterals shall be tested for leaks by means of an approved air test.
Manholes shall be visually inspected for leakage or vacuum tested to identify leakage.
The air test shall be performed on each section of pipe between the manholes after laterals are installed and all other utilities. The section of pipe being tested shall be sealed at each manhole using inflatable balls or other approved devices.
All balls shall be adequately braced. An air supply with necessary valves or gauges shall be provided for the test. The pressure gauge shall have a 0-10 psig with minimum divisions of 0.10 psig and an accuracy of ± 0.04 PSIG.
Where the expected water table level, as determined by the soil borings, is above the sewer elevations, the pressure testing limits for a dry trench condition shall be as follows:
A. Where the expected water table level is 0' to 7' above the pipe, the test pressure limits shall be 3.5 to 2.5 PSIG.
B. Where the expected water table level is more than 7' above the pipe, the test pressure limits shall be 4.5 to 3.5 PSIG.
In a wet trench condition where the water table has risen above the pipe prior to testing, the air testing limits shall be determined by adding to the original 3.5 PSIG an additional 0.433 PSIG for each foot the water table is above the crown of the pipe, or as determined in the dry trench condition, whichever is greater.
The air pressure in the section under test shall be raised to an initial pressure 0.5 PSIG above the beginning test pressure and allowed to stabilize for a minimum five (5) minutes. Air shall be added during this stabilization period as required to maintain the pressure at or above the beginning test pressure.
The rate of air loss shall be determined by measuring the time interval required for the internal pressure to decrease 1.0 PSIG within the limits previously specified. Minimum time interval for satisfactory tests shall be in accordance with the table following this section.
In the event the Engineer determines that the results of the air test are inconclusive because of visible infiltration, unsatisfactory or incomplete records, improper application of testing methods, improper equipment or other similar reasons, the Engineer may require either an exfiltration test or an infiltration test for the section or sections of the sewer involved.

12.03 **Deflection Testing** - (Only in special cases where PVC pipe is allowed) The completed installation of PVC pipe shall at no point have out-of-round deflections in the main sewer pipe greater than 5% of the pipes average inside diameter as determined by ASTM D-3034, ASTM F-

679 (T-1), and ASTM F-679. Go/No-Go gauging tests shall be performed after the trench is backfilled and before the surface restoration is begun using an approved test gauge. Pipe with deflections greater than 5% shall be re-laid by the Contractor at no additional cost to the City, after which, the pipe shall be subject to another deflection test. Vibratory rebounding of failed pipe sections is prohibited.

Deflection testing shall apply to the following types of pipe: PVC Solid Wall Pipe (SDR-35 and SDR-26).

Mandrel Sizes (Outside Diameter) for various sizes and types of pipe - The following values were determined using a 95.51% diameter change resulting from a 5% deflection in the pipe. The values apply only to a 9-Point mandrel and may vary by manufacturer of pipe. Average inside diameter of the pipe was used to determine these values. (Note that this differs from the base inside diameter).

Nominal Size (in.)	SDR-35 Mandrel				SDR-26 Mandrel			
	Diameter		Ground To Top		Diameter		Ground To Top	
	Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches
8	0.63	7.56	0.6	7.2	0.61	7.32	0.59	7.08
10	0.79	9.48	0.77	9.24	0.77	9.24	0.74	8.88
12	0.94	11.28	0.91	10.92	0.92	11.04	0.89	10.68
15	1.15	13.8	1.12	13.44	1.12	13.44	1.08	12.96
18	1.4	16.8	1.36	16.32	1.37	16.44	1.33	15.96
21	1.65	19.8	1.6	19.2	1.61	19.32	1.56	18.72
24	1.86	22.32	1.8	21.6	1.82	21.84	1.76	21.12

In areas where pipe is installed well below the common water table, a 30-day waiting period shall be initiated. This period begins upon completion of installation, including significant backfill, of each section of pipe (manhole to manhole). At the end of the 30-day period, each section shall be mandrel tested per standard procedure. This determination will be made at the Engineer's / City of Kentwood's discretion. The Engineer / City of Kentwood can request pipe to be regauged at their discretion based on excavation procedures.

12.04 Defects - If the sewer, manholes or appurtenances fail to pass any of the previously described tests, the Contractor shall determine the location of the defects, repair using an approved method and retest the sewer. The tests shall be repeated until satisfactory results are obtained.

13.0 **MEASUREMENT AND PAYMENT**

13.0 General - All proposed construction shall be measured for payment by the Engineer in accordance with the items listed in the proposal.

The unit price bid for each Proposal item shall be payment in full for completing the work, ready for use as specified.

13.02 Sanitary Sewers - Measurement of the length of the sanitary sewers shall be in lineal feet along the centerline of the sewer from the center to center of the manhole.

Where depth classifications are provided, the depth of the sewer connecting two adjacent structures shall be considered as being the average of the depth from the existing ground elevation to the sewer invert at these structures.

- 13.03 **Manholes** - Manholes shall be paid for in accordance with the units established in the proposal.
- 13.04 **Wyes and Tees-** When a specific item is provided in the Proposal for “Furnishing and Placing Wyes or Tees” the unit price bid shall be the additional cost of furnishing and placing the wye or tee over and above the cost of furnishing and laying the sewer pipe. When no proposal item is provided, the work shall be incidental to the major items of work.
- 13.05 **Sanitary Sewer Laterals-** The length of sewer laterals (including risers where required) shall be measured horizontally from the center of the main sewer to the end of the lateral as specified.
- 13.06 **Cut-Ins** - Cut-ins shall be considered incidental to major items of work and no specific payment will be made therefore, unless otherwise stated in proposal.
- 13.07 **Stubs** - Stubs shall be considered incidental to the major items of work and no specific payment will be made therefore, unless otherwise listed in proposal.
- 13.08 **Drop Connections** - Drop connections shall be measured from the invert of the lower pipe to the invert of the upper pipe and paid for in vertical feet or as listed in the proposal.

**TECHNICAL SPECIFICATIONS
ELECTRICAL BASIC MATERIALS AND METHODS - SECTION 16050**

PART I - GENERAL

1.01 WORK INCLUDED:

- A. Electrical basic requirements.
- B. Existing work.
- C. Connection of utilization equipment.
- D. Supports.

1.02 RELATED REQUIREMENTS:

- A. General Conditions.

1.03 REGULATORY REQUIREMENTS:

- A. Conform to Michigan State Electrical Code, State Electrical Administrative Board and State Fire Marshall requirements.
- B. Conform to National Electrical Code, NFPA 70, where not in conflict with State requirements.
- C. Obtain permits, and certified inspection and approval from State Electrical Administrative Board and local authority having jurisdiction.

1.04 PROJECT CONDITIONS:

- A. Verify field measurements and circuiting arrangements are as shown on drawings.
- B. Report discrepancies to Architect/Engineer before disturbing existing installation.

1.05 QUALITY ASSURANCE:

- A. Perform work to requirements of NECA Standard of Installation.
- B. Use personnel with appropriate experience and wearing required protection to perform work on energized equipment and circuits.
- C. Review submittals for equipment furnished under other Sections, prior to installation and electrical rough-in. Verify location, size and type of connections. Coordinate details of equipment connections with supplier and installer.

- D. All Materials: Obtain approval from Architect/Engineer in writing, before order for material is placed, and conform with the standards of the Underwriters Laboratories, Inc. in every case where such a standard has been established for the type of material in question.
- E. Provide three copies of affidavits acceptable to the State Fire Marshall which provide proof from a nationally recognized testing laboratory that each fixture used on the project meets the requirements of the letter issued by the Fire Safety Board titled "Tentative Guidelines for Use of Formed Plastic Materials".
- F. At completion of the work, furnish to the Architect/Engineer, for Owner, three bound operating instructions, wiring diagrams, project record drawings, and certificates of inspection.
- G. Guarantee/Warranty:
 - 1. Guarantee products one (1) year minimum free from mechanical defects in manufacture.
 - 2. Warranty workmanship one (1) year free from defects.

1.06 SUBSTITUTIONS:

- A. No substitutions of equipment will be permitted where specific trade names or manufacturers are referenced, unless written approval is given by Architect/Engineer, such requests for approval will indicate difference in price, if any.

PART II - PRODUCTS

2.01 BASIC MATERIALS:

- A. Steel Channel: Galvanized or painted steel.
- B. Miscellaneous Hardware: Treat for corrosion resistance.
- C. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- D. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.
- E. Expansion Shields: Tapered nut type with lead alloy expansive retainer sleeve.

PART III - EXECUTION

3.01 INSTALLATION:

- A. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.
 - 1. Verify that wiring and outlet rough-in work is complete and that utilization equipment is ready for electrical connection, wiring and energization.
 - 2. Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.
 - 3. Install and connect disconnect switches, controllers, control stations, and control devices as indicated.
 - 4. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit.
 - 5. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.
 - 6. Install pre-fabricated cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain relief clamps.
 - 7. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

- B. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.
 - 1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, or other fastener approved for application.
 - 2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in wood construction.
 - 3. Do not fasten supporters to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
 - 4. Do not use powder-actuated anchors.
 - 5. Do not drill structural steel members.

6. Fabricate supports from structural steel or steel channel, rigidly welded or bolted.
 7. Install surface-mounted cabinets and panelboards with minimum of four anchors.
 8. Provide steel channel supports to stand cabinets 1" off wall.
 9. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- C. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as indicated.
1. Degrease and clean surfaces to receive nameplates and tape labels.
 2. Secure nameplates to equipment lines. Secure nameplate to inside face of recessed panelboard doors in finished locations.
 3. Use nameplates with 1/8" lettering to identify individual switches and circuit breakers, wall switches, receptacle circuits and loads served.
 4. Use nameplates with 1/4" letters to identify distribution and control equipment.
 5. Install wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connections.
 6. Use branch circuit or feeder number to identify power and lighting circuits.
 7. Use control wire number as indicated on equipment manufacturer's shop drawings to identify control wiring.

3.02 **ADJUSTING AND CLEANING:**

- A. Touch up electrical equipment finishes at completion of work.
- B. Clean lighting fixture lenses and reflecting surfaces at completion of work.
- C. Leave work in clean condition, as approved by Owner.

END OF SECTION

**TECHNICAL SPECIFICATIONS
CONDUIT - SECTION 16111**

PART I - GENERAL

1.01 WORK INCLUDED:

- A. Rigid Metal Conduit and Fittings (RGS).
- B. Electrical Metallic Conduit and Fittings (EMT).
- C. Liquid-tight Flexible Metal Conduit and Fittings.
- D. Non-metallic Conduit and Fittings.

1.02 RELATED SECTIONS:

- A. Section 01045 - Cutting and Patching.

1.03 REGULATORY REQUIREMENTS:

- A. Comply with UL Listing and labeling for grounding on all components.

1.04 PERFORMANCE REQUIREMENTS:

- A. Test and complete electrical continuity to ground from all boxes, fittings and cabinets.

PART II - PRODUCTS

2.01 MATERIALS:

- A. Rigid Metallic Conduit (RMC):
 - 1. Steel only (aluminum not acceptable)
 - 2. Hot-dipped galvanized.
 - 3. Acceptable Manufacturers:
 - a. Youngstown Sheet and Tube
 - b. Triangle Industries
 - c. Republic Steel

- d. Steelduct
 - e. Pittsburgh Standard
 - 4. Fittings and Conduit Bodies:
 - a. Threaded Type
 - b. Materials to match conduit
 - 3. Manufacturers:
 - a. Crouse Hinds Form 7
 - b. Appleton FM7
- B. Electrical Metallic Tubing (EMT):
- 1. Steel only (others not acceptable).
 - 2. Hot-dipped galvanized.
 - 3. Acceptable Manufacturers:
 - a. Youngstown Sheet and Tube
 - b. Triangle Industries
 - c. Republic Steel
 - d. Steelduct
 - e. Pittsburgh Standard
 - f. GE White
 - 4. Fittings and Conduit Bodies:
 - a. Compression type only (set screw type not acceptable).
 - b. Material to match conduit.

C. Liquid-tight Flexible Metal Conduit:

1. Flexible metal conduit with PVC jacket.
2. Acceptable Manufacturers:
 - a. Anaconda Type UA.
 - b. Appleton Liquidtite.
3. Fittings and Conduit Bodies:
 - a. Material to match conduit.
 - b. Connectors:
 1. Straight connectors only.
 2. Standard and Class 1, Division 2 areas.
 3. Appleton Series ST.
 4. 40Z Gedney Groundtite.
4. Equipment Bonding Jumper (Refer to Section 16120 - Wire & Cable).

D. Rigid Non-metallic Conduit:

1. PVC.
2. Schedule 40 and 80.
 - a. Provide schedule 80 where branch circuit is greater than 30 amps.
3. Fittings and Conduit Bodies:
 - a. Materials to match conduit
 - b. Elbows for $>3/4$ " shall be PVC coated RGS.
4. Acceptable Manufacturers:
 - a. Carlon
 - b. Robroy
 - c. Pyle-National Division

- E. Fittings:
1. Match conduit system type used.
 2. Factory elbows:
 - a. Standard 1 ¼" - 2 ½" sizes.
 - b. Long Radius: 3" and larger sizes.
 3. Couplings: Erickson type.
 4. Gaskets: Solid type for sizes 1 ½" and smaller
 5. Unions: Crouse Hinds type UNY.
 6. Corrosion Resistant Sealant: Dow Corning Sealant #3145 RTV.
 7. Bushings: Insulating type.
 8. Clamps:
 - a. Galvanized malleable iron type.
 - b. R.C. (right angle).
 - c. E.C. (edge).
 - d. P.C. (parallel).
 - e. Cable Tray: Crouse Hinds LCC series.
 9. Pipe Straps:
 - a. Galvanized malleable iron type.
 - b. One hole style for conduit sizes 1 ½" and smaller.
 - c. Two hole style for conduit sizes 2" and larger.
 10. Cable and tubing fittings: Crouse Hinds type CGB with Neoprene bushings.
 11. Drains and Breathers: Crouse Hinds ECD for Class 1, Division 2 areas.
 12. Masonry wall anchors: Lead machine bolt type.

PART III - EXECUTION

3.01 PREPARATION:

- A. Plan precise routing; drawings show conceptualized routing only.
- B. Install floor sleeves and slots.
 - 1. Steel pipe sleeves two sizes larger than conduit.
 - 2. Slots with 4" continuous toe plates.
 - 3. Allow space for 50% future use.

3.02 INSTALLATION:

- A. Sizing:
 - 1. Size conduit for conductor type installed (or for type THW conductors, whichever is larger); ¾" minimum, except for device fixture leads at ½" minimum.
- B. Routing:
 - 1. Run concealed in restroom and exterior public spaces and exposed in storage areas, except as specifically directed.
 - 2. Parallel and perpendicular to building lines.
 - 3. Provide space for 50% future conduit.
 - 4. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
- C. Clearances:
 - 1. Hot Pipes and Surfaces: 6" minimum.
 - 2. Aisleways and Passageways: 8' minimum vertically above floor.
 - 3. Covers on Fittings and Pull Boxes: Orient for ease of accessibility and maintenance.
- D. Ground at terminations.

- E. Use liquid-tight flexible metallic conduit:
 - 1. At motor connections
 - 2. At equipment subject to vibration
 - 3. Where flexibility is required.
 - 4. Minimum length: 18"
 - 5. Maximum length: 6'

- F. Provide expansion fittings where crossing expansion joints in building construction.

- G. Provide structural support to ensure rigidity.
 - 1. Arrange conduit supports to prevent distortion of alignment by wire pulling operations.
 - 2. Fasten conduit using:
 - a. Pipe straps against flat surface with ¼" back strap.
 - b. Clamps.
 - c. Lay-in adjustable hangers.
 - d. Clevis hangers.
 - e. Bolted split stamped galvanized hangers.
 - f. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction before conductors are pulled.
 - 3. Provide support within 1' of conduit fittings control stations.
 - 4. Do not support from piping or insulated equipment.

5. Fabrication of supports:
 - a. From steel bar, angle, or channel.
 - b. Uni-Strut type materials may be used in indoor, non-corrosive areas.
 - c. Do not form pockets which can hold liquids.
6. Do not cut or drill structural steel.
 - a. Exception by prior Owner approval only.

H. Fabrication:

1. Field bends:
 - a. Prevent injuries to conduit.
 - b. Prevent effective reduction in internal diameter.
 - c. Make field bends uniform throughout system.
 - d. 90° maximum.
 - e. Verify minimum cable bending radius acceptable.
2. Cut conduit ends square and deburr.
3. Threading:
 - a. Use minimum number of threads required.
 - b. Running threads are not acceptable.
 - c. Remove all cutting oil prior to installation.
 - d. Coat exposed threads with acid resistant cold galvanizing treatment to prevent corrosion.
4. Conduit joints: Draw up tight to shoulder to assure solid connection.
5. Offset bends: Two maximum between pull boxes.
6. Conduit drains: Provide wherever water is likely to collect.

7. Unions:
 - a. Locate between conduit seals and electrical devices requiring seals.
 - b. Locate at motor or equipment end of flex conduit so motor may be removed without removing bonding jumper.
8. Screw threads on fittings and boxes:
 - a. Coat for corrosion prevention with one of the following:
 1. Molykote
 2. Graphite Grease
 3. Never Seize
9. Install two locknuts and a bushing on conduits which terminate in cabinets or pressed steel boxes.
10. Install bushings and CGB type cable fittings at conduit ends where wiring or pneumatic tubing only extends to electrical device.
11. PVC Conduit:
 - a. Wipe plastic clean and dry before joining.
 - b. Apply full even coat of cement to entire area of joint.
 - c. Let joint cure 20 minutes minimum after joining.
- J. Provide suitable conduit caps to protect installed conduit against entrance of dirt and moisture at end of each work period.
- K. Provide suitable pull string in empty conduits.

END OF SECTION

**TECHNICAL SPECIFICATIONS
WIRE AND CABLE – SECTION 16120**

PART I - GENERAL

1.01 WORK INCLUDED:

- A. Building Wire.
- B. Wiring Connections and Terminations.

1.02 REFERENCES:

- A. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.03 SUBMITTALS:

- A. Submit shop drawings and product data under the provisions of General Conditions.
- B. Submit manufacturer's instructions.

PART II - PRODUCTS

2.01 MATERIALS:

- A. Building Wire:
 - 1. All wire shall be single conductor, multi-strand, copper, rated for 600 volts, with NEC insulation type as specified below:

<u>Wire Size</u>	<u>NEC Type Rating</u>	<u>Temperature Criteria</u>	<u>Selection</u>
#14-#8	AWG THWN or THHN THW or XHHW	75° C 75° C	Preferred 2 nd
For run over 200'	XHHW	75° C	Preferred
#6 - 500 MCM	XHHW THW	75° C 75° C	Preferred 2 nd

THWN or THHN

75° C

3rd

2. Wire shall be color-coded as follows:

a. 208Y/120 Volt, 3 phase, 4 wire, grounded wye

1. Neutral conductor: WHITE

2. Phase x conductor: BLACK

3. Phase y conductor: RED

4. Phase z conductor: BLUE

b. In addition, wires shall have numbers tape affixed to each conductor with lighting circuit or wire number in accordance with the drawings. The numbers shall appear at each electrical device, on the back of the associated coverplate.

B. Wire Connectors:

1. T & B Sta-kon

2. Burndy HY tape

C. Insulators for 600 volt or less:

1. Splicing

2. Terminating

3. 3M Scotch 33 Plus

4. T & B PT-66M

D. Wire Pulling Lubricant: UL Approved Required.

E. Cable Ties:

1. Indoors: Sunlight resistant Plastic T & B Ty-raps

2. Outdoors: Sunlight resistant Plastic T & B Ty-raps

F. Connectors:

1. Crimp type connectors

2. Wire nuts:
 - a. Used only in lighting fixtures
- G. Equipment Bonding Jumpers:
 1. Size per NEC-250
 2. Copper
 3. THWN type, green insulation
 4. Minimum size #12 AWG.

PART III - EXECUTION

3.01 INSTALLATION:

- A. Install wire in a single continuous length from termination to termination.
- B. Use no splices:
 1. Exception: 120 VAC and other wiring where approved.
- C. Terminations: Install maximum 3 wires per terminal.
- D. Use minimum wire sizes:
 1. Receptacles and lighting circuits: No. 12 AWG
 2. Motor and control wiring: No. 14 AWG.

END OF SECTION

BOXES - SECTION 16138

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

1.02 RELATED SECTIONS

- A. Section 16050 – Basic Electrical Requirements - Firestopping.
- B. Section 16139 (26 2716) - Cabinets and Enclosures.

1.03 REFERENCES

- A. Install per NECA (National Electrical Contractors Association)
- B. Meet NEMA (National Electrical Manufacturers Association) standard requirements
- C. Install per NFPA 70 (National Electrical Code; National Fire Protection Association)

1.04 SUBMITTALS

- A. See Section 16050 - Basic Electrical Requirements - Submittal procedures.
- B. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Provide products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Appleton Electric
- B. Arc-Co./Division of Arcade Technology
- C. Unity Manufacturing
- D. Raco.
- E. Thomas & Betts (Steel City)
- F. Hubbell
- G. Quazite

H. Wiremold

I. Substitutions: See Section 16050 – Basic Electrical Requirements: Product Substitutions.

2.02 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Nonmetallic Outlet Boxes: NEMA OS 2.
- C. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 16140 (26 2726).

2.03 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 16139 (26 2716).
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Fiberglass Handholes: Die molded fiberglass
 - 1. Cable Entrance: Pre-cut 4x4 inch cable entrance at center bottom of each side.
 - 2. Cover: weatherproof fiberglass, nonskid finish
 - 3. Cover Legend: Refer to plans and details.
 - 4. Hardware: Stainless steel inserts and bolts

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- C. Coordinate installation of outlet boxes for equipment connected under Section 16155.
- D. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
 - 1. Adjust box locations up to 10 feet if required to accommodate intended purpose, obtain approval from Architect prior to installation.

- F. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- G. Maintain headroom and present neat mechanical appearance.
- H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- I. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- J. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 16010 – Fire Stopping.
- K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- L. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan and elevations.
- M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- N. Use flush mounting outlet box in finished areas.
- O. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- P. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- Q. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- R. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- S. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- T. Use adjustable steel channel fasteners for hung ceiling outlet box.
- U. Do not fasten boxes to ceiling support wires.
- V. Support boxes independently of conduit.
- W. Use gang box where more than one device is mounted together. Do not use sectional box.
- X. Use gang box with plaster ring for single device outlets.
- Y. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Z. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- AA. Handholes:
 1. Do all excavation. Bottom of excavation shall be undisturbed earth. If earth is disturbed, backfill with sand and compact.
 2. Set per manufacturers recommendations.
 3. Backfill shall be compacted to 95% Procter density. Remove all excess material from site.
 4. Restore all disturbed surfaces to their original condition.

3.03 ADJUSTING

- A. Install knockout closures in unused box openings.
- B. Adjust handholes such that cover is 1/4" above grade.

END OF SECTION 16138

**TECHNICAL SPECIFICATIONS
ELECTRICAL IDENTIFICATION – SECTION 16195**

PART I - GENERAL

1.01 SUMMARY:

- A. Tagging Requirements:
 - 1. Temporary
 - 2. Permanent
 - a. Electrical Circuits
 - b. Instrument Circuits
 - c. Wire Identification
 - d. Electrical Equipment

1.02 DEFINITIONS:

- A. Temporary Tagging: Used during construction.
- B. Permanent Tagging: Used after construction.

PART II - PRODUCTS

2.01 MATERIALS:

- A. Temporary Tagging:
 - 1. Cardboard tags with string ties:
 - a. Hand-written notes.
 - b. Permanent ink.
 - 2. Dymo Tape Markers:
 - a. Self-adhesive tape.
 - b. 1/8" high letters

- c. Blue or red tape
 - d. May be used for permanent marking where approved by Owner.
3. Permanent Tagging:
- a. Instrument Wire Markers
 - 1. Raychem marker sleeves.
 - A. Typed characters
 - B. or approved
 - B. Electrical Wire Markers:
 - 1. Brady self-adhesive markers:
 - A. Pre-printed
 - B. Typed characters
 - C. or approved
 - 2. Ziptape Rite and Wrap Markers
 - C. Electrical Equipment Markers:
 - 1. Low pressure laminated plastic engraved nameplates.
 - 2. Dymo Tape Markers where specifically approved by Owner.
 - 3. Self-adhesive paper discs:
 - A. Red Color
 - B. ½" diameter

PART III - EXECUTION

3.01 PREPARATION:

- A. Permanent tags:
 - 1. Verify inscriptions with Owner prior to manufacture.
 - 2. Where inscriptions are not shown on drawings:
 - a. Inscribe with tag name/number of equipment.
 - b. Inscribe with individual wire designation.
- B. Surface Preparation:
 - 1. Clean surface of equipment prior to installation.

3.02 INSTALLATION:

- A. Temporary Tags:
 - 1. Tie onto wires immediately after installation.
 - 2. Eliminate if permanent tags are available.
- B. Permanent Identification:
 - 1. Wire Tagging:
 - a. Install immediately before termination.
 - b. Install at each end of wire.
 - 2. Warning Signs: Install as directed in field.
 - 3. Night Lights:
 - a. Apply paper disc to fixture exterior.
 - b. Apply disc where visible from normal walk area.

END OF SECTION

**TECHNICAL SPECIFICATIONS
SECONDARY GROUNDING - SECTION 16450**

PART I - GENERAL

1.01 WORK INCLUDED:

- A. Power system grounding.
- B. Electrical equipment and raceway grounding and bonding.

1.02 SYSTEM DESCRIPTION:

- A. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway system, grounding conductor in raceways and cables, receptacles ground connectors, and plumbing systems.

1.03 SUBMITTALS:

- A. Submit shop drawings under provisions of Section 01001.
- B. Indicate location of system grounding electrode connections, and routing of grounding electrode conductor.

PART II - PRODUCTS

2.01 MATERIALS:

- A. Materials:
 - 1. Ground Rods: Copper-encased steel, $\frac{3}{4}$ " diameter, minimum length 10 feet.

PART III - EXECUTION

3.01 INSTALLATION:

- A. Provide a separate, insulated equipment grounding conductor in feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing.

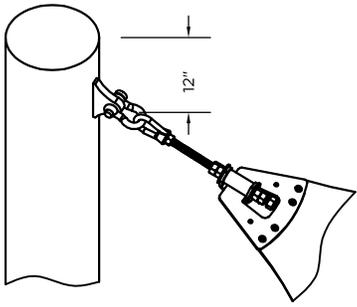
3.02 FIELD QUALITY CONTROL:

- A. Inspect installed grounding and bonding system conductors and connections for tightness and proper installation.
- B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Notify architect and owner if resistance is greater than 10 ohms.

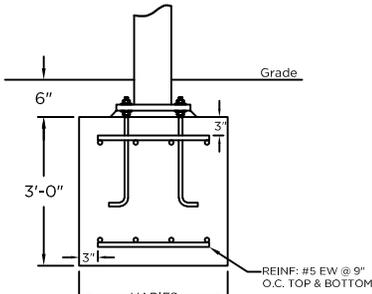
END OF SECTION

APPENDIX A

SHADE

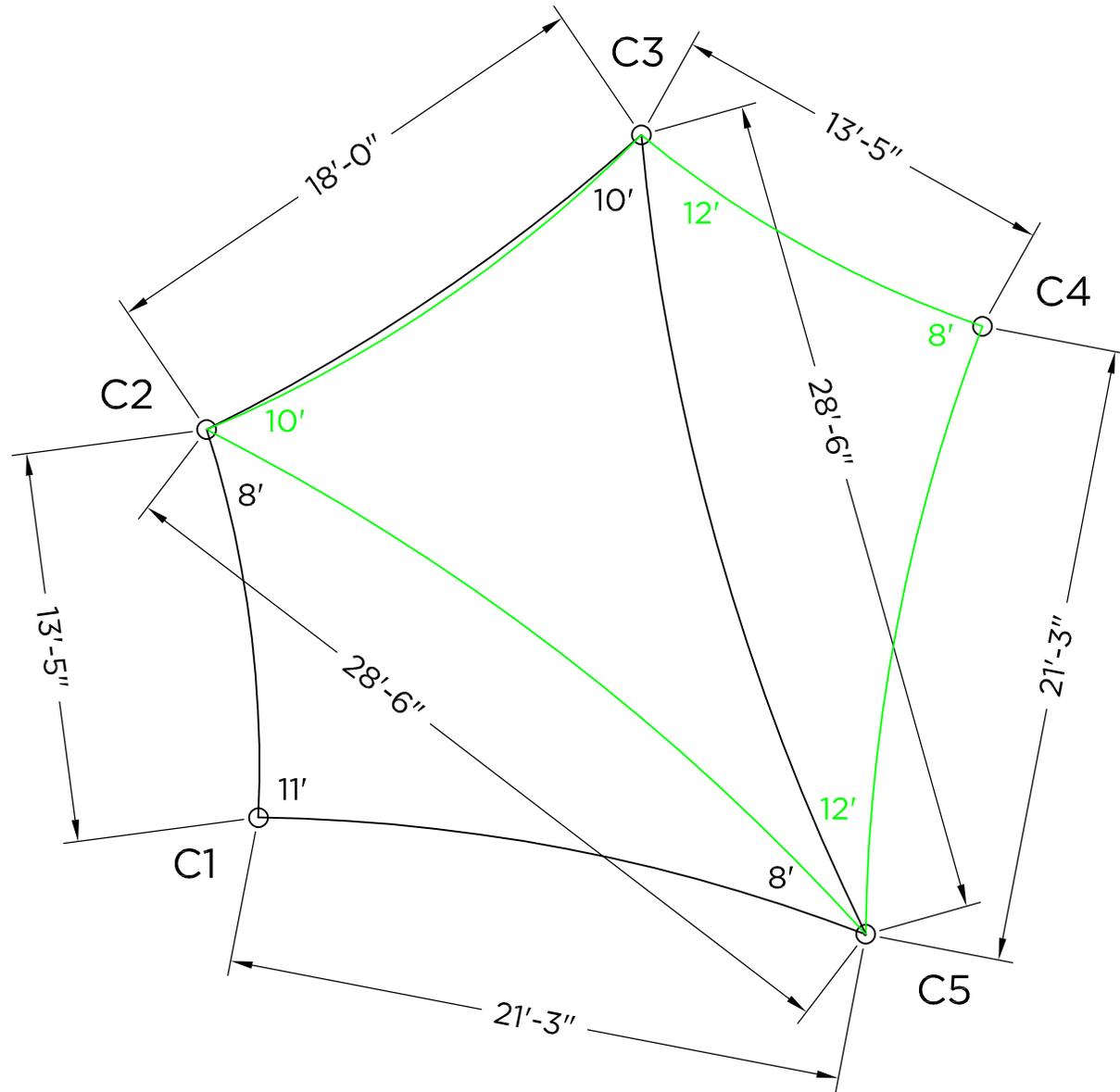


Fabric Connection



Footer Detail

FOUNDATION NOTE: ALL FOUNDATION SIZES ARE ESTIMATIONS ONLY ACTUAL SIZING SHOULD BE DETERMINED BY A LOCALLY QUALIFIED STRUCTURAL ENGINEER PRIOR TO INSTALLATION.



Column & Footing Schedule

Column ID	Column Size	Est. Footing Size
C1	06" Sch. 40	2.7' X 2.7' X 3.0'
C2	06" Sch. 40	3.7' X 3.7' X 3.0'
C3	08" Sch. 40	4.1' X 4.1' X 3.0'
C4	06" Sch. 40	2.6' X 2.6' X 3.0'
C5	08" Sch. 40	4.1' X 4.1' X 3.0'
C6	N/A	N/A
C7	N/A	N/A
C8	N/A	N/A
C9	N/A	N/A
C10	N/A	N/A

SHADE
BY SUPERIOR RECREATIONAL PRODUCTS

PROJECT NAME
LA CRONE SPLASH PAD

QUOTE
QU00209257

TITLE
Proposal

DATE
9/18/2020

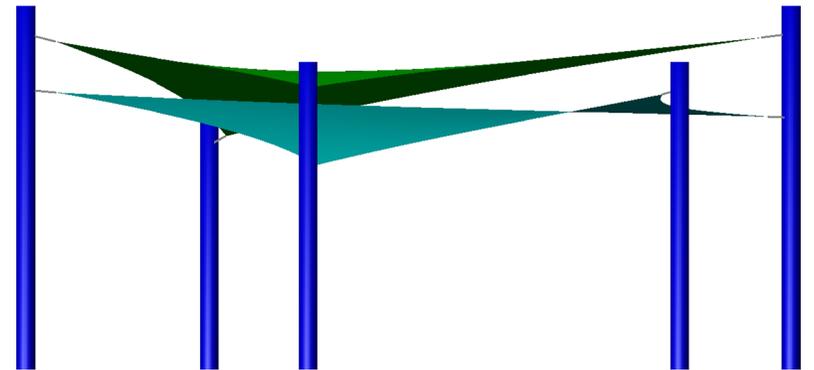
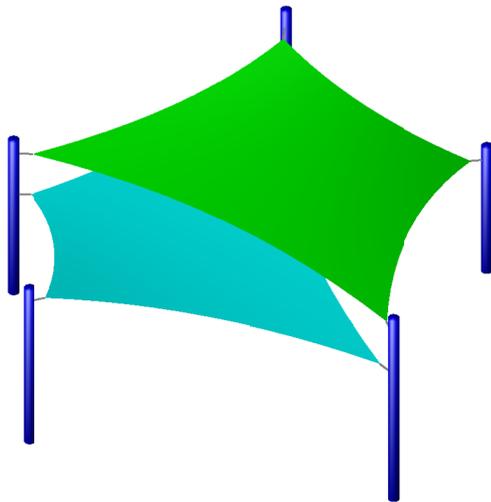
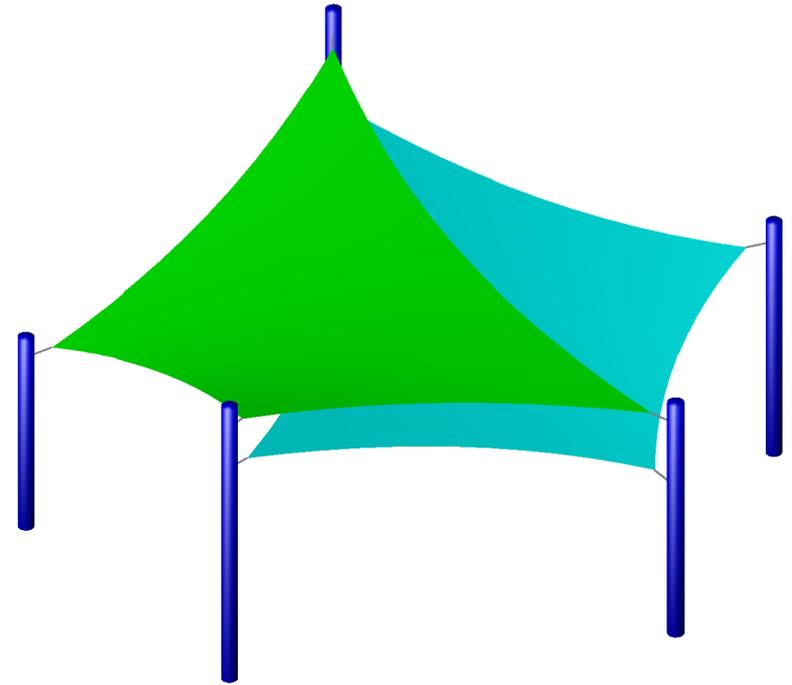
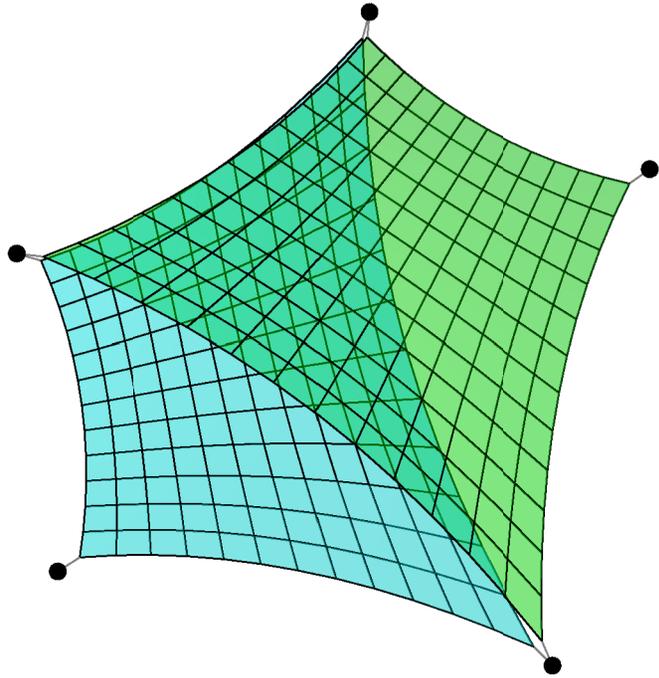
SCALE
Not to Scale

DRAWN BY
JSJ

SHEET
1 of 1

These drawings are for reference only and should not be used as construction details. They show the general character and rough dimensions of the structural features. Superior Recreation Products is not responsible for deviation of final shade dimensions. All final dimensions must be verified in the field by the customer. Exact spans, fasteners, materials, and foundations can be determined by a licensed professional engineer upon request.





SHADE
BY SUPERIOR RECREATIONAL PRODUCTS

PROJECT NAME
LA CRONE SPLASH PAD

QUOTE
QUO0209257

TITLE
Proposal

DATE
9/18/2020

SCALE
Not to Scale

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JSJ

SHEET
1 of 1

These drawings are for reference only and should not be used as construction details. They show the general character and rough dimensions of the structural features. Superior Recreation Products is not responsible for deviation of final shade dimensions. All final dimensions must be verified in the field by the customer. Exact spans, fasteners, materials, and foundations can be determined by a licensed professional engineer upon request.



SHADE

BY SUPERIOR RECREATIONAL PRODUCTS

SHADE STRUCTURE MATERIAL SPECIFICATIONS

I. FABRIC SPECIFICATIONS

- A. UV shade fabric is made of UV stabilized cloth manufactured by ALNET, or approved equal.
- B. The high density polyethylene material shall be manufactured with tensioned fabric structures in mind.
- C. The fabric knit is to be made using monofilament and tape filler which has a weight of 9.38 to 10.32 oz. sq. yd. Material to be Rachel-knitted to ensure material will not unravel if cut.
- D. Burst strength of 828 lbf (ASTM 3786).
- E. Cloth meets fire resistance tests as follows:
 - Alnet Extra Block: California State Fire Marshall Reg. #F-93501
 - Others: NFPA 701-99 (Test Method 2), ASTM E-84

- F. Fabric Properties:

Stretch/Stentored

Tear Tests (lbs/ft): WARP 44.8 and WEFT 44

Burst Tests (lbs ft): 828

Fabric Weight (oz/sqFT) Average: 1.02 to 1.07

Fabric Width: 9'-10"

Roll Length: 150'

Roll Size: 63" x 16.5"

Weight: 120 lbs.

Life Expectancy: 10 years

Fading: Minimum fading after 6 years (Note: 3 years for Red and Yellow)

Temperature: -77 degrees

Maximum Temperature: +167 degrees

II. THREAD

- A. Shall be 100% expanded PTFE fiber which carries a 10 year warranty that is high strength and low shrinkage.
- B. Shall have a wide temperature and humidity range.
- C. Abrasion resistant and UV radiation immunity.
- D. Shall be unaffected by non-hydrocarbon based cleaning agents, acid rain, mildew, rot, chlorine, saltwater, and pollution.
- E. Lockstitch thread - 1200 Denier or equal.
- F. Chain stitch thread - 2400 Denier or equal.

III. STEEL TUBING

- A. All fabricated steel must be in accordance with approved shop drawings and calculations.
- B. All steel is cleaned, degreased or etched to ensure proper adhesion of powder-coat in accordance with manufacturer's specifications.
- C. All Steel used on this project needs to be new and accompanied by the mill certificates if requested. Structural steel tubing up to 5"-7 Gage shall be galvanized per Allied Steel FLO-COAT specifications. Schedule 40 black pipe fabrications shall be sandblasted and primed as described below.
- D. All non-hollow structural shapes comply with ASTM A-36, unless otherwise noted.
- E. All hollow structural steel shapes shall be cold formed HSS ASTM A-53 grade C, unless otherwise noted.
- F. Plate products shall comply with ASTM A-36.

IV. POWDER COATING & PRIMING

- A. All non-galvanized steel shall be sandblasted and primed prior to powder coating using brown fused aluminum oxide grit and the following primer.
- B. All non-galvanized steel must be coated with rust inhibiting primer prior to applying the powder coat. Primer shall be Marine Grade Cardinal Industrial Finishes Corp. E396 - GR1372 epoxy powder coating semi-gloss smooth zinc rich primer.
- C. Welds shall be primed with rust inhibiting primer prior to applying the powder coat. Primer shall be Marine Grade Cardinal Industrial Finishes Corp E396-GR1372 epoxy powder coating semi-gloss smooth zinc rich primer.
- D. All steel parts shall be coated for rust protection and finished with a minimum 3.5 mil thick UV-inhibited weather resistant powder coating.
- E. Powder used in the powder-coat process shall have the following characteristics:
 - **N.3.1** | Specific Gravity | 1.68+/-0.05
 - **N.3.2** | Theoretical Coverage | 114+/-4 ft. 2/lb/mil
 - **N.3.3** | Mass Loss During Cure | <1%
 - **N.3.4** | Maximum Storage Temperature | 75° F
- F. Powder-coating shall meet the following tests:
 - **ASTM** | Gloss at 60° | 85-95
 - **HOI TM 10.219** | PCI Powder Smoothness | 7
 - **ASTM D2454-91** | Over-Bake Resistance Time | 200%
 - **ASTM D3363-92A** | Pencil Hardness | H-2H
 - **ASTM D2794-93** | Dir/Rev Impact, Gardner | 140/140 in./lbs.
 - **ASTM D3359-95B** | Adhesion, Cross Hatch | 5B PASS
 - **ASTM D522-93A** | Flexibility Mandrel | ¼" Diameter, No Fracture
 - **ASTM B117-95** | Salt Spray | 1,000 Hours
 - **UL DtOV2** | Organic Coating Steel Enclosures, Elect Eq. | Recognized

G. Application Criteria:

- **N.5.1** | Electrostatic Spray Cold | Substrate: 0.032 in. CRS
- **N.5.2** | Cure Schedule | 10 Minutes at 400° F
- **N.5.3** | Pretreatment | Bonderite 1000
- **N.5.4** | Film Thickness | 3.5 Mils

IV. WELDING

- A. All shop welds shall be executed in accordance with the latest edition of the American Welding Society Specifications.
- B. Welding procedures shall comply in accordance with the AWS D1.1-AWS Structural Welding Code-Steel.
- C. All welds to be performed by a certified welder. All welds shall be continuous where length is not given, unless otherwise shown or noted on drawings.
- D. All welds shall develop the full strength of the weaker member. All welds shall be made using E70xx.035 wire.
- E. Shop connections shall be welded unless noted otherwise. Field connections shall be indicated on the drawings. Field -welded connections are not acceptable.
- F. All fillet welds shall be a minimum of ¼" unless otherwise noted.
- G. All steel shall be welded shut at terminations to prevent internal leakage.
- H. Internal weld sleeving is not acceptable.
- I. On-site welding of any component is not acceptable.

VI. SEWING

- A. On-site sewing of a fabric will not be accepted.
- B. All corners shall be reinforced with extra non-tear cloth and strap to distribute the load.
- C. The perimeters that contain the cables shall be double lock stitched.

VII. INSTALLATION HARDWARE

- A. Bolt and fastening hardware shall be determined based on calculated engineering loads.
- B. All bolts shall comply with SAE-J429 (Grade 8) or ASTM A325 (Grade BD). All nuts shall comply with ASTM F-594, alloy Group 1 or 2.
- C. Upon request, Stainless Steel hardware shall comply with ASTM A-304.
- D. 1/4" galvanized wire rope shall be 7x19 strand with a breaking strength of 7,000 lbs. for shades generally under 575 sq. ft. unless requested larger by the customer. For shades over 575 sq. ft., cable shall be 5/16" with a breaking strength of 9,800 lbs. Upon request, 1/4" Stainless Steel wire rope shall be 7x19 strand with a breaking strength of 6,400 lbs. 5/16" Stainless Steel wire rope shall be 7/19 strand with a breaking strength of 9,000 lbs.
- E. All fittings required for proper securing of the cable are hot dipped galvanized.

VIII. CONCRETE

- A. Concrete work shall be executed in accordance with the latest edition of American Concrete Building Code ACI 318 unless specified by the governing municipality.
- B. Concrete specifications shall comply in accordance with, and detailed as per plans as follows:
 - 1. 28 Days Strength $F'_c = 2500$ psi
 - 2. Aggregate: HR
 - 3. Slump: 3-5
 - 4. Portland Cement shall conform to C-150
 - 5. Aggregate shall conform to ASTM C-33
- C. All reinforcement shall conform to ASTM A-615 grade 60.
- D. Reinforcing steel shall be detailed, fabricated and placed in accordance with the latest ACI Detailing Manual and manual of Standard Practice
- E. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant (See Table 1).
- F. The contractor shall not pour any concrete when daily ambient temperature is below 55° F.

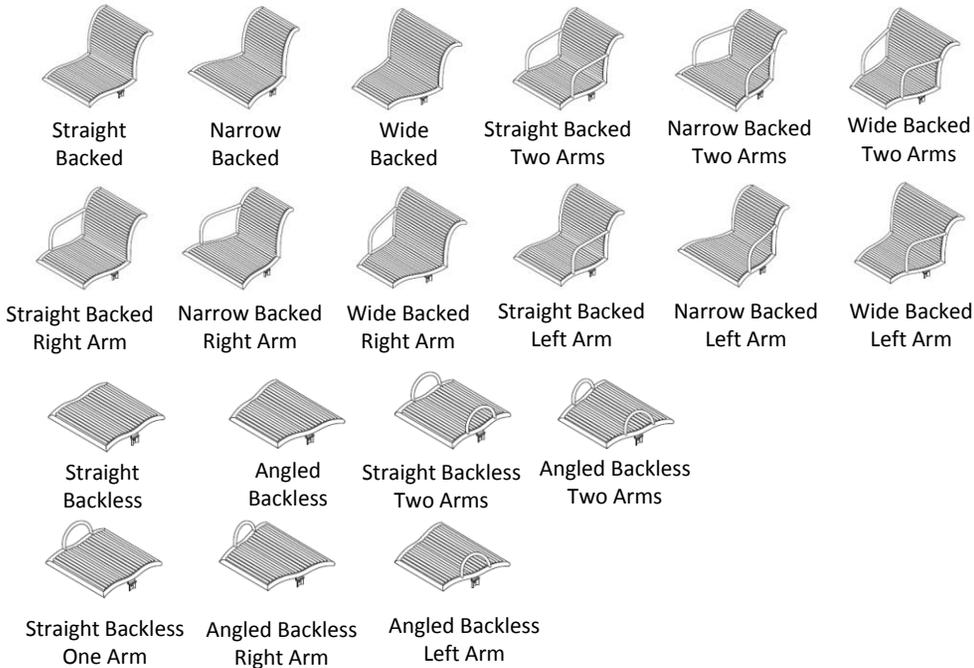
Temperature Range	% Accelerator	Type Accelerator
75-80°	1%	High Early (Non-Calcium)
70-75°	2%	High Early (Non-Calcium)
Below 70°	3%	High Early (Non-Calcium)

IX. FOOTINGS

- A. All anchor bolts set in new concrete shall be ASTM A-307, or ASTM F-1554 if specified by engineer.
- B. All anchor bolts shall be zinc plated unless specified otherwise.
- C. Footing shall be placed in accordance with and conform to engineered specifications and drawings.

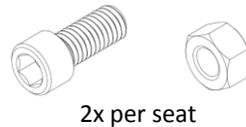
APPENDIX B

PRESIDIO BENCH INSTALLATION



Included components:

- 7/16-14 x 1" hex head cap screw (2 per seat)
- 7/16-14 hex finish nut (2 per seat)
- Arms, if specified, are welded to the seat frame



Tools required:

- 3/8" socket with flex head handle
- 11/16" box wrench

Anchoring hardware: Not included. Corrosion-resistant hardware is recommended. Maximum 3/8" diameter bolts recommended.

For Surface Mount: Each support has (6) 9/16" diameter holes for anchoring.

ASSEMBLE WITH CARE! Pangard II® Polyester Powdercoat is a strong, long-lasting finish. To protect this finish during assembly, place unwrapped powdercoated parts on packaging foam or other non-marring surface. Do not place or slide powdercoated parts on concrete or other hard or textured surface – this will damage the finish causing rust to occur. Use touch-up paint on any gouges in the finish caused by assembly tools.

FREESTANDING INSTALLATION:

1. Set unit in place.
2. Adjust glides as necessary to level bench.

SURFACE MOUNT INSTALLATION:

1. Set unit in place. Place all units that are to be installed in a group before anchoring any of them. Horizontal support tubes may be aligned and butted end-to-end.
2. Mark hole locations. See Fig. 1 for surface mount plate details.
3. Move unit to allow access for drilling holes.
4. Drill holes at marked locations according to anchor manufacturer's recommendations. Minimum 2-1/2" anchor depth is recommended.
5. Move unit back into place and install anchors.

EMBEDDED INSTALLATION:

1. Set unit in place.
2. Mark hole locations.
3. Move unit to allow access for excavating holes.
4. Excavate area for each vertical support as shown in Fig. 2.
5. Set unit in place and secure before pouring concrete. Clean any excess concrete off of support tube. The top of the support tube should be between 13-3/4" and 15-3/4" for comfortable seating height.

SEAT INSTALLATION:

1. Place seat on support tube, aligning mounting adapters.
2. Using hardware provided, insert cap screw through adapters and install the hex nut on the inside of the bracket. See Fig. 3. Repeat for other side.
3. Tighten hardware on one side halfway, and then tighten the other side halfway. Repeat until each side is securely fastened. Tighten to 40 ft-lbs.

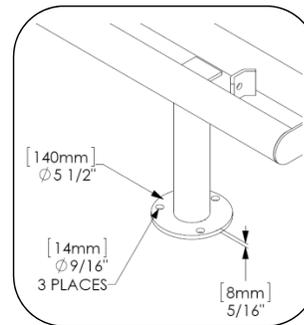


Fig. 1 – Surface Mount

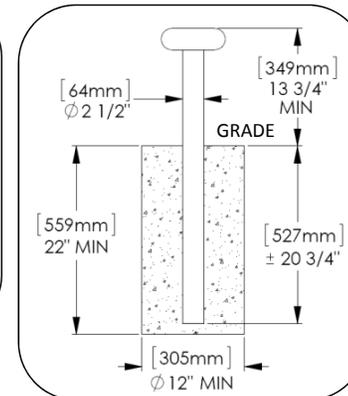


Fig. 2 – Embedded

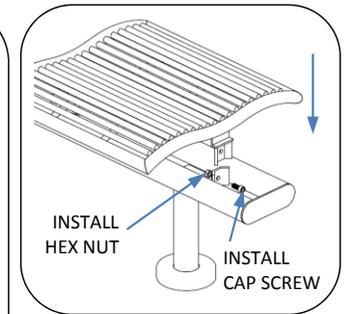


Fig. 3 – Seat install

APPENDIX C

GEOTECHNICAL EVALUATION REPORT

above ground storage tank
air quality
asbestos/lead-based paint
baseline environmental assessment
brownfield redevelopment
building/infrastructure restoration
caisson/piles
coatings
concrete
construction materials services
corrosion
dewatering
drilling
due care analysis
earth retention system
environmental compliance
environmental site assessment
facility asset management
failure analyses
forensic engineering
foundation engineering
geodynamic/vibration
geophysical survey
geosynthetic
greyfield redevelopment
ground modification
hydrogeologic evaluation
industrial hygiene
indoor air quality/mold
instrumentation
masonry/stone
metals
nondestructive testing
pavement evaluation/design
property condition assessment
regulatory compliance
remediation
risk assessment
roof system management
sealants/waterproofing
settlement analysis
slope stability
storm water management
structural steel/welding
underground storage tank

GEOTECHNICAL EVALUATION REPORT

**LA CRONE PARK IMPROVEMENTS
CITY OF KALAMAZOO, MICHIGAN**

SME Project No. KG61883
August 9, 2010



Soil and Materials Engineers, Inc.



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Jeffery M. Krusinga, PE, GE
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Louis J. Northouse, PE
Joel W. Rinkel, PE
Jason A. Schwartzberger, PE
Larry W. Shook, PE
Thomas H. Skotzke
Michael J. Thelen, PE
John C. Zarzecki, GET, CDT, NDE

August 9, 2010

Mr. Larry L. Harris, ASLA
L.L. Harris and Associates, Inc.
3503 Greenleaf Boulevard
Kalamazoo, Michigan 49008

VIA EMAIL: lharris@llharrisassociates.com (pdf file)

RE: Geotechnical Evaluation
La Crone Park Improvements
City of Kalamazoo, Michigan
SME Project No. KG61883

Dear Mr. Harris:

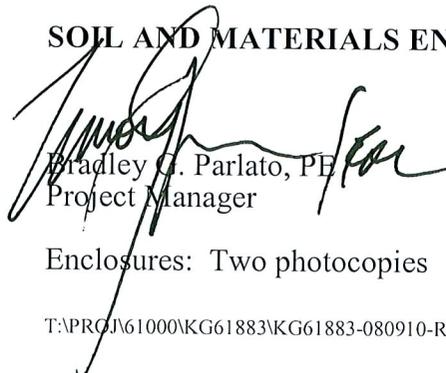
We have completed our geotechnical evaluation for the proposed La Crone Park Improvement Project located in Kalamazoo, Michigan. This report presents the results of our observations and analyses, and our recommendations for subgrade preparation, earthwork and foundation, and pavement design. Furthermore, our report contains a brief discussion regarding construction considerations related to the geotechnical conditions disclosed by the borings.

Implementation of our recommendations may affect the design, construction, and performance of the structure and related facilities along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Sincerely,

SOIL AND MATERIALS ENGINEERS, INC.


Bradley G. Parlato, PE
Project Manager

Enclosures: Two photocopies

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OFFICES
Indiana
Michigan
Ohio

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consultants in the geosciences, materials, and the environment

TABLE OF CONTENTS

SUMMARY	i
1. INTRODUCTION.....	1
1.1 Site Conditions.....	1
1.1.1 Pavement Visual Condition Survey	2
1.2 Project Description.....	2
2. EVALUATION PROCEDURES.....	3
2.1 Field Exploration	3
2.2 Laboratory Testing.....	4
3. SUBSURFACE CONDITIONS.....	4
3.1 Soil Conditions.....	4
3.2 Groundwater Conditions.....	5
4. ANALYSIS AND RECOMMENDATIONS.....	6
4.1 Site Preparation and Earthwork	6
4.2 Subgrade Preparation for Floor Slabs.....	8
4.3 Foundation Recommendations.....	8
5. PRELIMINARY PAVEMENT RECOMMENDATIONS.....	9
5.1 Subgrade Preparation for Pavements	10
5.2 Recommended Pavement Sections	12
5.3 Drainage.....	14
5.4 Pavement Construction Notes.....	14
6. CONSTRUCTION CONSIDERATIONS	16

APPENDIX A:	BORING LOCATION DIAGRAM
	BORING LOGS (B1 THROUGH B10, B7A & B9A)
	USACE DCP DATA SHEETS (B3 THROUGH B9)
	GEOTECHNICAL NOTES
	UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
	IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL
	ENGINEERING REPORT
	GENERAL COMMENTS
	LABORATORY TESTING PROCEDURES

SUMMARY

The report conclusions and recommendations are summarized as follows:

1. The soil conditions encountered generally consisted of pavement or topsoil overlying sand fill over organic soils (i.e. peat and/or organic silt), underlain by natural clay or sand. Groundwater was encountered at depths ranging from about 6.5 to 13.5 feet below the ground surface (elevations of 760.5 to 768.5 feet).
2. The existing organic soils are compressible and are not considered suitable for support of foundations and floor slabs. Significant settlement is likely to occur if the organic soils are loaded by raising site grades. Based on the relatively shallow depths of the organics encountered in the proposed building area, we believe a mass undercut of these unsuitable soils and replacement with engineered fill presents the most economical and practical approach for support of the proposed structure.
3. Complete removal and replacement of the compressible organic soils in the parking lot and tennis courts may be a feasible option. However, complete removal of the organics in the basketball courts is likely cost prohibitive due to the depth of the organics and groundwater level in this area. We have provided alternatives for both supporting the pavements over the existing fill and organic soils and for undercutting the organic soil (where feasible) and supporting the pavements on engineered fill. Although removal and replacement of the organic soils would result in a more stable subgrade and a higher level of pavement performance throughout a longer design life, we recommend the selected alternative be based on economic and performance comparisons of the two alternatives.
4. Spread footing foundations bearing on engineered fill placed over suitable natural sands can be used to support the proposed building addition after completing a mass excavation and replacement program to remove the compressible organic soils from the building footprint. A maximum net allowable soil bearing pressure of 3,000 psf for design of spread foundations is recommended for footings bearing on suitable engineered fill or crushed aggregate placed after performing the mass excavation, or on suitable natural soils below the organics. Relatively shallow undercut excavations should be expected since suitable natural soils were encountered about 4.5 to 5.5 feet below the existing ground surface. Based on the borings, we do not anticipate significant groundwater seepage during the mass excavation. Groundwater seepage (if encountered) should be controllable utilizing normal sump pit and pumping procedures at the anticipated depths in the building area.

The summary presented above includes selected elements of our findings and recommendations and is provided solely for purposes of overview. It does not present crucial details needed for the proper application of our findings and recommendations. It should therefore not be considered apart from the entire text of this report and appendices.

REPORT PREPARED BY:

Kevin J. Glupker, EIT
Senior Engineer

REPORT REVIEWED BY:

Timothy J. Mitchell, PE
Principal Consultant

1. INTRODUCTION

This report presents the results of the geotechnical evaluation performed by Soil and Materials Engineers, Inc. (SME) for the proposed site improvements at the City of Kalamazoo's La Crone Park. Specifically, this report provides recommendations for the design and construction of the proposed restrooms, parking lot and entrance loop, basketball courts, and tennis court.

This evaluation was conducted in general accordance with the scope of services outlined in our proposal dated June 22, 2010, with the exception that six borings were extended deeper than the proposed depths and three additional borings were performed to further evaluate the depth and lateral extent of the organic soils. A total of 84 additional lineal feet of drilling was performed. Mr. Larry Harris, ASLA with L.L. Harris and Associates (L.L. Harris) authorized this evaluation.

1.1 Site Conditions

The project site is located at the existing La Crone Park, at 535 W. Paterson Street, in Kalamazoo, Michigan. The site is bordered by Paterson Street to the north, Cobb Avenue to the west, and William Street to the south. Residential properties border the park on the east side. Existing site features currently consist of:

1. Three Portland cement concrete (PCC) pavement tennis courts,
2. two asphalt concrete basketball courts,
3. a single-story, concrete-masonry unit (CMU) restroom facility on the east side of the park,
4. a baseball field on the west side of the park, and
5. picnic tables and swing sets located at the central portions of the park.

The ground surface throughout the park mostly consists of maintained grass lawn with mature trees located sporadically throughout the park. A chain link fence is present along the perimeter of the site.

A preliminary site plan prepared by L.L. Harris, undated, was provided to SME for use in developing the recommendations contained below. The plan included existing and proposed site features and existing site topography. The plan does not include proposed grading information.

Based on the existing topographic information indicated on the site plan, the ground surface within the park is relatively level, with existing ground surface elevations ranging from about 775 to 777 feet.

1.1.1 Pavement Visual Condition Survey

The existing basketball courts consist of hot mix asphalt (HMA) pavement. Based on our visual survey, the surface of the basketball courts appeared to be in relatively good condition except for limited longitudinal and traverse cracking. SME cored the west basketball court pavement and found 6.5 inches of HMA pavement. Based on our observations of the core profile, the basketball courts appear to have been overlaid. The original pavement appears to have consisted of two lifts totaling 4 inches followed by overlay layers of 1.5 inches and 1 inch, respectively. The overlay layers were delaminated from the original pavement surface. The lower pavement layers were extracted intact and displayed moderate voids/deterioration. The HMA mixes consisted of natural mixed aggregate, along with visible clay-iron stone. Clay-iron stone in the wearing course often results in staining and “pop outs”, which can be problematic in athletic courts. Natural aggregates from pits in West Michigan often contain appreciable clay-iron stone and other soft stone materials. More recent design trends limit or restrict the use of clay-iron stone in exterior athletic pavement surfaces, such as tennis and basketball court wearing course mixes. Limestone aggregates can be substituted for natural aggregates, and are often used in asphalt concrete mixtures for competition athletic courts.

The existing tennis courts are composed of PCC pavements, which appeared to be in generally fair condition with several mid-panel and meandering cracks. The easternmost court is showing signs of subgrade settlement related cracking near the southeast corner. These conditions would adversely affect the intended use of the tennis courts.

1.2 Project Description

The project will consist of:

1. Demolishing and removing the existing restrooms and tennis courts,
2. constructing a new single-story, slab-on-grade restroom building centrally located within the park,
3. constructing an entrance loop and barrier free parking lot along Williams Street,
4. reconstructing and expanding the basketball courts to the south and east,
5. constructing a new tennis court near the existing restrooms,
6. constructing a walking path around the perimeter of the park, and
7. possibly developing a public gardening area at the northeast corner of the park.

Proposed grading information was not provided to us at the time this report was prepared. Based on the existing site topography, we anticipate that cuts and fills of less than 1 foot will be required to establish final subgrade levels.

2. EVALUATION PROCEDURES

2.1 Field Exploration

Twelve borings (B1 through B10, B7A, & B9A) were performed at the project site on July 16 and 20, 2010. The borings were extended to depths ranging from 5 to 20 feet below the existing ground surface. Please refer to the boring logs in Appendix A for the specific depths of the borings. The approximate locations of the borings are shown on the Boring Location Diagram in Appendix A.

The planned number, locations, and depths of the borings were jointly determined by SME, and L.L. Harris. Prior to the field exploration, the proposed boring locations were staked in the field by SME relative to existing site features shown on the referenced site drawings. Boring B7A, B9A, and B10 were located during the field exploration to further delineate the organic soils encountered. The existing ground surface elevations at the boring locations were interpolated by SME to the nearest one-foot from the site topographic information included on the referenced site plan.

The pavement at locations C1, B7, B8, and B9 was cored using a 4 inch diameter core barrel. Soil samples at B4, B8, and B9 were obtained using hand operated equipment. The remaining borings were drilled using a truck-mounted rotary drill rig and were advanced to the sampling depths using continuous-flight, hollow-stem augers. The drill rig borings included soil sampling based upon the Split-Barrel Sampling procedure. Soil samples collected from the borings were sealed in glass jars by the drillers.

United States Army Corps of Engineers (USACE) dynamic cone penetrometer (DCP) tests were performed at borings B3 through B9 to evaluate the support characteristics of the upper subgrade soils. The DCP index is converted into an equivalent California Bearing Ratio (CBR) value using relationships developed by the USACE. Using this information, a soil strength profile with depth is obtained for each test location. Refer to the attached USACE DCP Data Sheets for specific test results and strength profiles.

Groundwater level measurements were recorded during and immediately after completion of each boring. After recording groundwater level readings, the boreholes were backfilled with auger cuttings and/or sand fill. Therefore, long-term groundwater level information is not available from the borings. The borings that were performed in the existing basketball and tennis courts were topped with commercial grade asphalt cold patch.

2.2 Laboratory Testing

The soil samples were classified in the laboratory based on the Unified Soil Classification System (USCS) using visual classification methods. The Laboratory Testing Procedures attached to this report provides general descriptions of the laboratory tests performed.

Boring logs were prepared and include information on materials encountered and pertinent observations made during the field operations. The boring logs are included in the attachments.

Soil samples retained over a long time, even in sealed jars, are subject to moisture loss and are no longer representative of the conditions initially encountered in the field. Therefore, soil samples are normally retained in our laboratory for 60 days and then disposed, unless instructed otherwise.

3. SUBSURFACE CONDITIONS

3.1 Soil Conditions

In general, the soil conditions encountered at the site consisted of surficial pavement or topsoil, overlaying variable fill over organic deposits (peat and/or organic silt), then natural sands and clays.

The sand fill encountered in the proposed building and parking lot areas contained occasional topsoil layers, but did not appear to contain significant construction debris (i.e. cinders, brick, rubble). The fill in these areas was in a very loose to loose condition with standard penetration test (SPT) resistances (N-values) ranging from 4 to 8 blows per foot (bpf). The underlying organic soils in these areas extended to relatively shallow depths ranging from about 3.5 to 5 feet below the existing ground surface, and the peat soils exhibited moisture contents ranging from 45 to 92 percent.

The fill in the proposed basketball and tennis court areas (east portion of site) contained varying amounts organics, cinders, brick, and rubble, and was in a loose to medium dense condition with SPT N-values ranging from 8 to 11 bpf. Loss-on-ignition (LOI) tests performed on samples of the fill indicated organic contents ranging from 6.7 to 8.6 percent. The thickness of the underlying organic deposits increased near the northeast corner of the site (borings B7 through B9, B7A, & B9A) where peat and organic silt extended to depths ranging from 8.5 to 15 feet below the existing surface. The moisture contents of the samples obtained from this area ranged from about 119 and 232 percent for the peat and 51 and 114 percent for the organic silt.

Natural sands and clays encountered below the organic soils were in a loose to dense condition with N-values ranging from 7 to 47 bpf. Borings B8 and B9 were terminated in organic soils, although nearby borings extended below the fill. The depths to natural inorganic soils, and groundwater level information, at the boring locations are listed in Table 1 below. The depths are referenced from the existing ground or pavement surface.

Table 1
Approximate Depths To Natural Inorganic Soils

Boring	Depth to Natural Inorganic Soils (ft)	Approximate GW Levels (Upon Completion of Drilling)	
		Depth (ft.)	Elevation (ft.)
B1	5	7.5	768.5
B2	4.5	7.5	768.5
B3	4.5	8.0	768
B4	3.5	Not Encountered	Not Encountered
B5	3.5	6.5	767.5
B6	5	6.5	767.5
B7	15	13.5	760.5
B7A	8.5	7.0	767
B8	Not Encountered	Not Encountered	Not Encountered
B9	Not Encountered	Not Encountered	Not Encountered
B9A	12.5	9.0	764
B10	0.5	7.0	767

3.2 Groundwater Conditions

Groundwater was encountered about 6.5 to 13.5 feet below the existing ground or pavement surface at the boring locations. Groundwater was not encountered at borings B4, B8, and B9. Refer to Table 1 above for approximate groundwater depths and elevations. In general, based on our short term groundwater level readings, we anticipate groundwater levels ranged

from about elevations 767 to 769 feet at the time of our field evaluation. However, longer term readings (and the installation of groundwater level wells) could be required to more accurately determine groundwater levels at this site.

Hydrostatic groundwater levels should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater levels (or lack thereof) indicated by the borings and presented in this section represent conditions at the time the readings were taken. The actual groundwater levels at the time of construction may vary.

4. ANALYSIS AND RECOMMENDATIONS

The existing debris-containing fills and underlying compressible organic soils encountered at the site are generally poor subgrade materials and are not recommended for support of the proposed restroom building. Although these materials have been in-place over many years, and have supported pavements in some areas of the park, the risks of constructing new pavements over the existing fills and organic soils are expected to range from premature deterioration resulting from non-uniform subgrade support and frost-related movements, to more severe differential settlements and cracking resulting from settlement of organic soils and fill. More severe settlement and more significant pavement performance issues should be expected in areas where grades are raised over compressible organic soils and in previously undeveloped areas where new construction will occur over compressible organic soils.

In the following report sections, we recommend undercutting the existing fill and organic soils within the proposed building areas and backfilling with engineered fill. In proposed pavement areas, we provide a general assessment of risk for various subgrade preparation alternatives.

4.1 Site Preparation, Earthwork, and Engineered Fill

A mass excavation of the existing fill and organic soils is recommended in the proposed building areas. By removing the existing fills and organics, and replacing those materials with engineered fill, foundations and floor slab areas can bear directly on engineered fill over suitable natural soils. Another benefit of the mass excavation is the improvement of subgrades for utility support within the restroom structure. Based on the building borings (B1 and B2), excavation depths in the range of about 4.5 to 5.5 are anticipated to encounter suitable natural soils. The

zone of over excavation and replacement should be oversized laterally on a one vertical to one horizontal slope from the outside edge of the footing. Based on the anticipated undercut depths, we recommend a minimum over excavation and replacement zone extending at least 5 feet outside the building perimeter. Existing underground utilities (if any) should be removed and rerouted around the new building footprint. Excavations required to remove existing utilities should be backfilled to the design subgrade level with granular engineered fill.

Based on the borings, we do not anticipate groundwater to be a significant factor during the mass excavation for the building. If groundwater accumulates within the excavation, a working surface of crushed aggregate or crushed concrete may be required to protect the exposed surface from disturbance. A well-graded, crushed natural aggregate or crushed concrete ranging in nominal size from 1 to 3 inches, with no more than 7 percent passing the No. 200 sieve, is recommended to stabilize disturbed areas. Shallow sump pit and pumping operations should generally be sufficient to dewater excavations extending less than one foot below the groundwater level.

SME should be present during the undercutting operations to observe the excavations, and to verify suitable natural bearing soils are encountered. Once the excavation extends below the fill and organics to expose the suitable natural soils, the contractor should be prepared to reestablish grades with engineered fill. Excavations for the mass undercut should be backfilled and suitably compacted the same day they are performed.

Any fill placed in structural areas, including utility trench backfill, should consist of an approved granular material, free of frozen soil, organics, or other deleterious materials. Proposed fill should contain less than 4 percent organics by weight and should also not contain appreciable amounts of silt or clay. The fill should be spread in level layers not exceeding 9 inches in loose thickness and be compacted to a minimum of 95 percent of the maximum dry density as determined in accordance with the Modified Proctor test. We also recommend the upper 12 inches of the exposed subgrade in cut areas be compacted to a minimum of 95 percent of the maximum dry density determined by the Modified Proctor test.

Based on the information from the borings, some of the existing sand fill and natural sand may be suitable for use as engineered fill provided the material meets the general requirements listed above. Portions of the cleaner existing site sands (with USCS designations “SP” and “SP-SM”) may meet this criteria, and could be considered for reuse as engineered fill to reestablish grades. However, if it is desired to reuse portions of the upper granular materials as engineered fill, the contractor must exercise care to separate materials containing organics or debris, and materials containing appreciable amounts of silt or clay, from the cleaner granular materials that

are considered suitable for reuse. We recommend using granular material meeting the gradational requirements of MDOT Class II Granular Material in areas where drainage is required, and to backfill areas where compaction is achieved using smaller walk-behind type compaction equipment.

4.2 Subgrade Preparation for Floor Slabs

Prior to concrete placement for floor slabs, the final subgrade should be observed and tested for suitability of floor slab support. Disturbed areas indicated by SME should be suitably recompacted or removed and replaced with engineered fill.

We recommend the upper 6 inches of the slab subgrade consist of an approved granular material such as MDOT Class II sand. The purpose of this recommended granular layer is to provide a leveling surface for construction of the floor slabs and a moisture capillary break between the slabs and the underlying soils. An aggregate material such as MDOT 21AA dense-graded aggregate may also be considered for this purpose, if necessary to stabilize and protect subgrades during seasonally wet times of the year.

Slabs should be separated by isolation joints from structural walls bearing on their own footings to permit relative movement. A minimum of 6 inches of engineered fill should be provided between the bottom of the slab and the top of the spread footing below. Otherwise other arrangements should be made to allow for potential relative settlements such as thickened slabs with appropriate reinforcing steel, or other appropriate details.

4.3 Foundation Recommendations

Spread footing type foundations can be utilized for support of the proposed restrooms after performing a mass excavation of the existing fill and peat, and replacing these materials with crushed aggregates and/or engineered fill meeting the recommendations discussed previously in this report.

A maximum net allowable soil bearing pressure of 3,000 psf, is recommended for sizing foundations bearing on engineered fill placed over suitable natural soil. To verify suitable foundation subgrade conditions at this site, we recommend the project geotechnical engineer (SME) observe and test the undercut subgrade soils and also the final foundation subgrades. Overly loose or disturbed foundation subgrade soils which cannot be suitably densified in-place, should be undercut and replaced with granular engineered fill or crushed aggregate meeting the recommendations in this report.

Shallow foundations should be situated a minimum of 42 inches below final site grades for protection against frost action during normal winters. The granular soils encountered at this site are susceptible to sloughing and caving, and construction of trench-formed footings is not considered feasible.

For bearing capacity and settlement considerations, we recommend continuous footings should have a minimum width of 18 inches and isolated column footings should have a minimum lateral dimension of 30 inches. Based on the anticipated light loads, the minimum footing size criteria may govern the size of the foundations and not the allowable soil bearing pressure.

We estimate total settlement for the foundations using the recommended net allowable bearing pressure and bearing on suitable subgrade, as described above, should be less than 1 inch. This settlement estimate is based on the available boring information and our experience with similar structures and soil conditions.

5. PRELIMINARY PAVEMENT RECOMMENDATIONS

The fill and organic soils present at the site are poorly suited for support of pavement systems. Pavements constructed over these soils are susceptible to greater total and differential settlements and deflection related cracking. Organic soils degrade and compress over time, and the variable thickness of the organic soils at this site is likely to result in uneven settlement and cracking as observed at the east tennis courts. We have assumed final grades will be within one foot of existing grades. In areas where grades are raised, the additional load from the fill is likely to result in significant additional settlement of the underlying compressible organic soils. The amount of settlement will be primarily dependent on the amount (depth) of fill placed and the thickness and characteristics of the underlying organic soils. If it is necessary to raise grades, we recommend the fill be placed at least several months in advance of the final paving to allow settlement to occur. If significant grade changes are necessary, we recommend SME be consulted to determine whether a specific surcharging program should be performed.

Our pavement design recommendations are intended to reduce, but not eliminate, the detrimental effects of the supporting pavement over organic subgrade soils. Based on the shallow depth of organics it may be feasible to undercut the organic soil and construct a conventional (non-reinforced) pavement section in the parking lot and tennis court areas. Removing the organic soils and replacing them with engineered fill would eliminate the risks of

poor performance due to the compressible soils. Full depth removal of the organics in the basketball courts is not considered economically feasible due to the depth of the organics, the presence of groundwater, and the relatively limited project budget. If possible, we recommend shifting the basketball courts to the west where thinner organic deposits were encountered, or exploring other areas of the site to look for more suitable subgrade conditions.

We have provided alternatives for both supporting the pavements over the existing fill and organic soils and undercutting the organic soil and supporting the pavements on engineered fill. Given the varying depths of organic soils at this site, we recommend comparing the relative costs for the two general approaches for each area, full depth removal of peat soils versus a reinforced pavement section over peat soils. Table 1 above can be used to estimate the approximate over excavation depths that would required for full depth removal.

Consideration could also be given to performing a surcharge program, especially in the proposed basketball court area where the deeper organic soils were encountered. Surcharge programs consist of preloading the compressible soils and then placing a surcharge load greater than the final design load. This surcharge load is maintained until specific criteria are achieved, which may include a target total settlement and/or a decreased rate of settlement, indicating the completion of primary consolidation. At that time, the excess fill, or surcharge, is removed, the pavement subgrade is suitably prepared, and the recommended pavement system is constructed.

A properly implemented surcharge program can significantly decrease (but not necessarily eliminate) post-construction settlements. Based on our understanding of the project schedule, surcharging may not be feasible due to the daily public use of the existing athletic courts, and the relatively expedited design and construction schedule. However, consideration could be given to performing the surcharge program throughout the winter months when the courts are not used. SME should be contacted if additional information regarding a surcharging program is desired.

5.1 Subgrade Preparation For Pavements

The type of earthwork equipment used for this project should be limited to lightweight, tracked earthmoving equipment that is specially suited to traversing weak subgrades. The contractor selected for this project should be well qualified and experienced with construction of geotextile/geogrid reinforced pavements over poor subgrades.

Subgrade preparation for constructing pavements over organic deposits should include cutting the surficial materials to achieve the design subgrade level (which is 23 inches below the top of design pavement grades). SME must be on-site to verify the resulting subgrade is suitably

stable for placement of the recommended reinforced pavement section. In areas where the surface subgrade consists of considerable granular fill, we anticipate generally stable conditions should be encountered. However, in areas where the organic soils are near the subgrade surface, undercutting and other subgrade improvements will likely be needed. Overly soft or disturbed areas should be improved by placing a layer of well-graded, coarse crushed aggregate (ranging in nominal size from 1 to 3 inches), and tracking the aggregate into the subgrade surface with a bulldozer or by static rolling with the steel drum roller, until the subgrade is judged stable enough for placement of the pavement section.

After cutting the subgrade, and verifying stability, a standard woven MDOT Stabilization Geotextile fabric should be placed directly over the resulting fill or organic soils. The fabric strips should be overlapped a minimum of 2 feet in each direction where it is placed over organic deposits. Once the fabric is in place, the first layer of MDOT Class II sand fill should be pushed over the fabric, carefully starting at one end of the site, while never allowing a construction vehicle to travel directly on the exposed subgrade. The sand subbase should be thoroughly tracked in with a bulldozer. Once the full 12 inches is in place, the subbase should be static rolled using a smooth drum roller. Vibratory compaction should be used only if it does not disturb the underlying subgrade.

Once the subbase is placed, and thoroughly tracked and static rolled, we recommend placing a layer of geogrid (Tensar BX1200) over the sand subbase material, following the manufacturer's directions related to placement and overlapping over swamp deposits. Use of the fabric and geogrid will improve pavement performance by reducing the effects of settlement and frost movements. If the fabric and geogrid are not used, construction compaction difficulties may be experienced and a reduced useful service life should be expected. We recommend placing 8 inches of MDOT 21AA aggregate directly over the geogrid. The aggregate base should also be compacted using a smooth drum roller. We recommend the aggregate surface be proofrolled in the presence of SME, using a loaded dump truck, or lighter equipment such as a loader. ***However, the proofroll equipment should be at least equivalent to the weight of the equipment that will be used during paving.*** Areas exhibiting significant rutting or deflection during the proofroll should be improved as necessary to develop a suitable construction platform prior to paving.

5.2 Recommended Pavement Sections

Performance grade PG58-28 asphalt cement shall be used in the production of all basketball court and tennis court bituminous mixtures. The softer asphalt should provide more ductile low temperature behavior for the asphalt concrete. Bituminous mixes should be designed for 3 percent air voids. A thorough mix design review should be performed.

The aggregate used in the mixtures should have proven performance in recreational facilities applications and specifically for tennis courts. Materials containing pyrite, clay/iron stone or other deleterious materials could cause staining of the court surface and pop-outs resulting from degradation of the soft aggregates during freeze-thaw cycles. We recommend pretesting aggregates to be used in the tennis court mixtures, and limiting the total of soft particles to 1.0 percent, with no more than 0.5 percent of that being clay-ironstone.

Care should also be taken during the wearing course placement to keep the paver screed and rollers free of dirt and debris that may contain deleterious material that could be introduced into the asphalt concrete material.

The following tables present the layer material and thickness recommendations for both the parking lot and athletic court pavement sections for the alternative construction methods:

**HMA PAVEMENT - RECOMMENDED MATERIALS AND LAYERS
 PEAT/ORGANIC SILT SUBGRADE**

LAYER	MATERIAL	THICKNESS (in.)
Bituminous Wearing*	MDOT 1100T-20AA or 36A	1.5
Bituminous Leveling	MDOT 1100L-20AA or 13A	1.5
Aggregate Base	MDOT 21AA	8.0
Geogrid	Tensar BX1200	One layer
Sand Subbase	MDOT Class II	12.0 minimum
Woven Fabric	MDOT Stabilization Geotextile	One layer

HMA Mixes For Basketball and Tennis Court Use:

- Aggregates (coarse and fine) for the wearing course should consist of crushed limestone,
- Performance Grade PG58-28 asphalt cement shall be used
- Recycled Asphalt Pavement (RAP) should not be allowed in the surface course
- Limit RAP to 30 percent in leveling course

The following section can be used if it is decided to remove peat marsh soils in accordance with MDOT Standard Plans for Treatment of Peat Marshes Method A. Given the shallow depths of organic soils at this site, we recommend you compare the relative costs for the two general approaches.



**HMA PAVEMENT- RECOMMENDED MATERIALS AND LAYERS
AREAS OF FULL DEPTH ORGANIC SOILS REMOVAL**

LAYER	MATERIAL	THICKNESS (in.)
Bituminous Wearing	MDOT 1100T-20AA or 36A	1.5
Bituminous Leveling	MDOT 1100L-20AA or 13A	1.5
Aggregate Base	MDOT 21AA	8.0
Sand Subbase	MDOT Class II	12.0

HMA Mixes For Basketball and Tennis Court Use:

Aggregates (coarse and fine) for the wearing course should consist of crushed limestone, Performance Grade PG58-28 asphalt cement shall be used
Recycled Asphalt Pavement (RAP) should not be allowed in the surface course
Limit RAP to 30 percent in leveling course

Our recommendations are based on the recommended subgrade preparations and the final subgrade passing a thorough proofroll under a fully loaded tandem axle truck. Routine maintenance such as crack sealing, patching, thin overlays and re-application of the basketball and tennis courts surfacing should be performed such that water infiltration and frost heave effects associated with the local climate are minimized.

The tennis court surface course should have control joints sawed between playing surfaces and along the nets. The purpose of the control joints is to mitigate cracking by providing relief of stress caused by the movement of the pavement from environmental factors. These joints should be sealed with a hot poured rubberized asphalt sealant, checked annually, and maintained as needed to prevent infiltration of water and debris.

The foundation posts for the tennis courts nets and fence should be installed to a minimum depth of 42 inches. If vertical holes (foundation excavations) for the net posts cannot be maintained until concrete placement due to sloughing, then the foundations should be formed with sonotubes or similar device to prevent a “mushrooming” effect near the ground surface. These procedures are recommended to prevent frost heaving of the concrete posts which can lead to premature cracking of the asphalt concrete around the posts.

Vehicle traffic should not be allowed on the tennis court or basketball pavement. Surface preparation for application of the tennis and basketball court surfaces should be in accordance with the surfacing manufacturer’s recommendations. Typically, we recommend that the bituminous surface be left uncoated for a period of 90 days after paving.

5.3 Drainage

The pavement systems must be properly drained to reduce the possibility of frost heaving and softening of the subgrade due to water infiltrating through cracks. The infiltrated water, if not properly drained will adversely affect the pavement performance. Drainage is, therefore, considered very important for this site. In general, we recommend edge drains be placed along the low edges of the tennis and basketball courts to promote subsurface drainage. Edge drains should also be placed on the outside edge of the pavement where grades cannot be properly sloped away from the pavement. The edge drains should consist of a 6 inch perforated drain tile pipe in a trench a minimum of 2.5 feet deep. The trench should be backfilled with MDOT 34R peastone and wrapped in nonwoven filter fabric similar to Amoco 4545 as opposed to using a socket wrapped pipe. The fabric should be overlapped on top of the trench. We recommend SME be allowed to review the final grading plans for recommendations on placement of edge drains and underdrains.

5.4 Pavement Construction Notes

To provide adequate service life and protect the pavement investment, we present the following construction notes. These notes should be included in the project specifications and should be implemented during the construction activities:

1. In general, earthwork and pavement construction should be performed in accordance with current MDOT Standard Specifications for Construction unless otherwise noted in the following items.
2. Remove existing vegetation, trees, pavement, aggregate base, deleterious materials, and unsuitable fill, topsoil, or organic soils to expose the design subgrade soil.
3. Excavate to the depth of the final subgrade elevation to allow for grade changes and the placement of the recommended pavement system.
4. On site fill material can be used if the specified compaction requirements can be achieved. If on site material is used, it should be clean and free of frozen soil, organics, or other deleterious materials.
5. The top 12 inches of the exposed subgrade as well as individual fill layers should be compacted to achieve a minimum of 95 percent of the maximum Modified Proctor dry density.

6. The final subgrade should be thoroughly proofrolled using a fully loaded tandem axle truck under the observation of a geotechnical/pavement engineer. Loose or yielding areas that cannot be mechanically stabilized should be removed and replaced with engineered fill or as dictated by field conditions.
7. The aggregate base should be compacted to achieve a minimum of 95 percent of the maximum Modified Proctor dry density. The base and subgrade compaction should extend a minimum of 1 foot beyond the paved edge.
8. All bituminous materials should be compacted to a density ranging between 94 to 97 percent of the maximum density as determined by the Rice Method.
9. A bond coat of SS-1h emulsion should be required between the leveling course and the wearing course. The bond coat should be applied in a uniform manner over the surface at a rate of 0.1 gallons/s.y.
10. Performance grade PG64-22 asphalt cement shall be used in the production of all parking lot bituminous mixtures. Reclaimed Asphalt Pavement (RAP) shall be limited to 15 percent in the wearing course mixture for the parking lots and 30 percent in all leveling course mixtures.
11. Performance grade PG58-28 asphalt cement shall be used in the production of basketball court and tennis court bituminous mixtures. RAP shall not be allowed in the wearing course mixtures.
12. Final pavement elevations should be so designed to provide positive surface drainage.
13. Subsurface drains should be installed to facilitate drainage. Cutoff drains should be installed along edges of the pavement where the adjacent ground surface is higher.
14. Construction traffic should not access the athletic court pavements. If construction traffic is anticipated to access the new parking lot pavements, the placement of the final lift should be delayed until the majority of the construction activities have been completed. This action will allow repair of localized failure, if any does occur, as well as reduce load damage on the pavement system. We believe this recommendation will reduce future maintenance costs due to localized premature pavement failures.
15. Surface preparation for application of the tennis and basketball surfaces should be in accordance with the surfacing manufacturer's recommendations. Typically, we recommend that the bituminous surface be left uncoated for a period of 90 days after paving.

6. CONSTRUCTION CONSIDERATIONS

Compaction at this site should be performed primarily with smooth drum static rollers. Construction equipment should not be allowed to randomly traffic this site. Haul routes and construction staging areas should be designated and used. The surface soils are relatively loose and in some areas the fill thickness over organic soils is thin. Vibrations from heavy vehicle traffic across the site will cause subgrade disturbance.

Groundwater seepage is not anticipated in shallow excavations terminating above about elevation 769 feet. We anticipate standard sump pit and pump methods should generally be adequate to control groundwater on a localized basis for excavations that extend less than 1-foot below the groundwater level or to handle perched groundwater conditions if encountered. In excavation areas where groundwater accumulates, a working surface of either crushed aggregate or crushed concrete may be required to protect the exposed surface from disturbance.

The clayey and silty sand fills, and the organic soils, are moisture sensitive, and subgrade disturbance is likely to occur if these soils are subjected to moisture and/or repeated trafficking from construction equipment. Disturbed subgrade materials will require undercutting and replacement with a granular engineered fill or with crushed aggregate or crushed concrete. It also may be necessary to improve disturbed subgrades that become wet by placing a layer of coarse crushed concrete or crushed aggregate, and compacting the material into the subgrade surface.

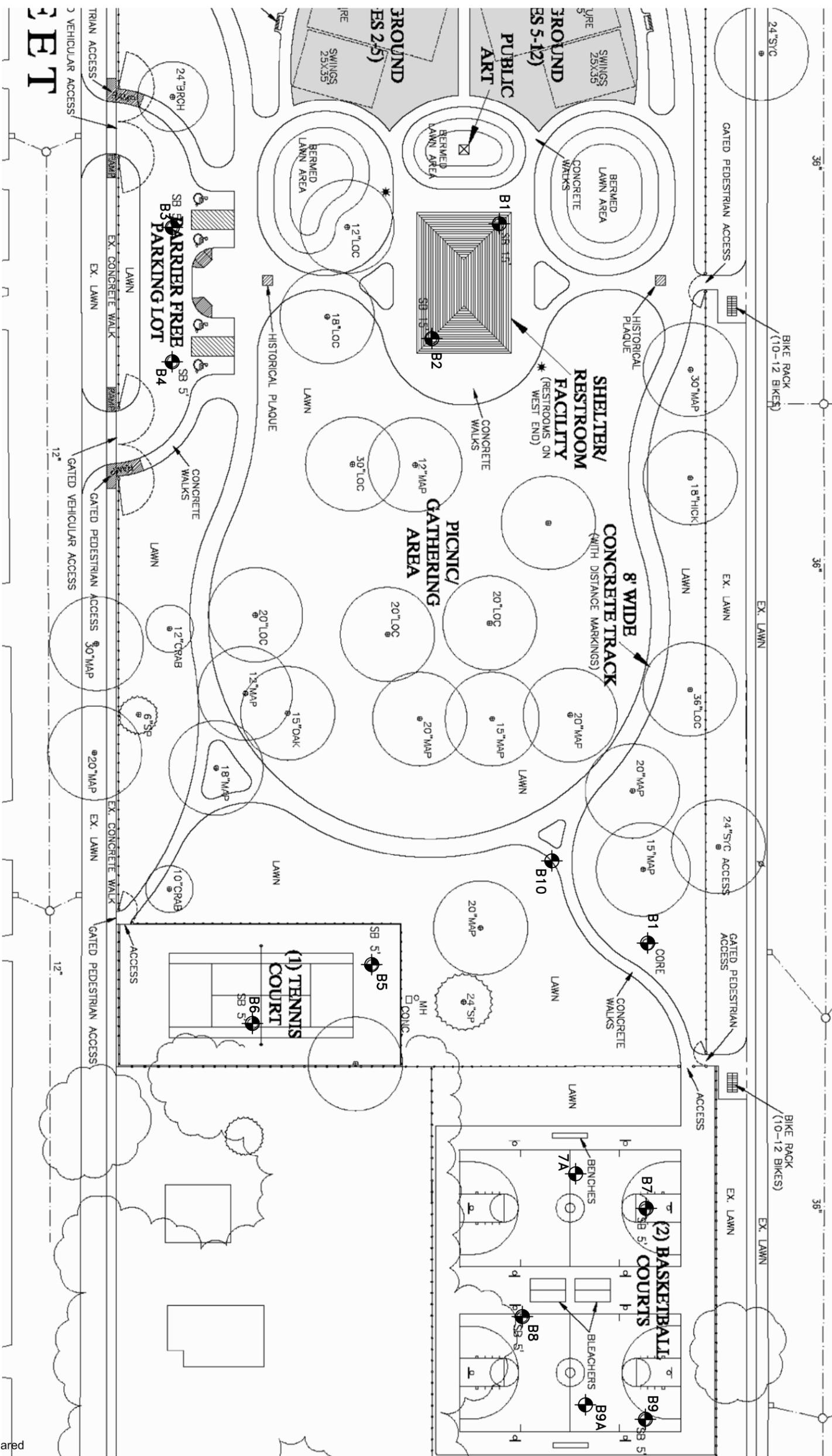
The contractor must provide a safely sloped excavation or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

This report does not address handling, transportation or disposal considerations for the existing fill and other existing site materials. An environmental evaluation could be performed to address such issues.

APPENDIX A

1. BORING LOCATION DIAGRAM
2. BORING LOGS (B1 THROUGH B10, B7A & B9A)
3. USACE DCP DATA SHEETS (B5 THROUGH B9)
4. GEOTECHNICAL NOTES
5. UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
6. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT
7. GENERAL COMMENTS
8. LABORATORY TESTING PROCEDURES

7. PATTERSON STREET



LEGEND
 APPROXIMATE BORING LOCATION



NOTE:
 DRAWING INFORMATION TAKEN FROM SITE PLAN (UNDATED)
 PREPARED BY LARRY HARRIS AND ASSOCIATES, INC.

Aug 09, 2010 - 4:11pm - Kzooshared
 S:\Drawings\Geotech & Design\61000\KG61883\KP61883.dwg

No.	Revision Date

BORING LOCATION DIAGRAM LA CRONE PARK IMPROVEMENTS CITY OF KALAMAZOO, MICHIGAN

Date	08/09/10
Drawn By	KJG
Designed By	KJG
Scale	NTS
Project	KP61883

plymouth
 bay city
 grand rapids
 indianapolis
 kalamazoo
 lansing
 shelby twp.
 toledo
 traverse city



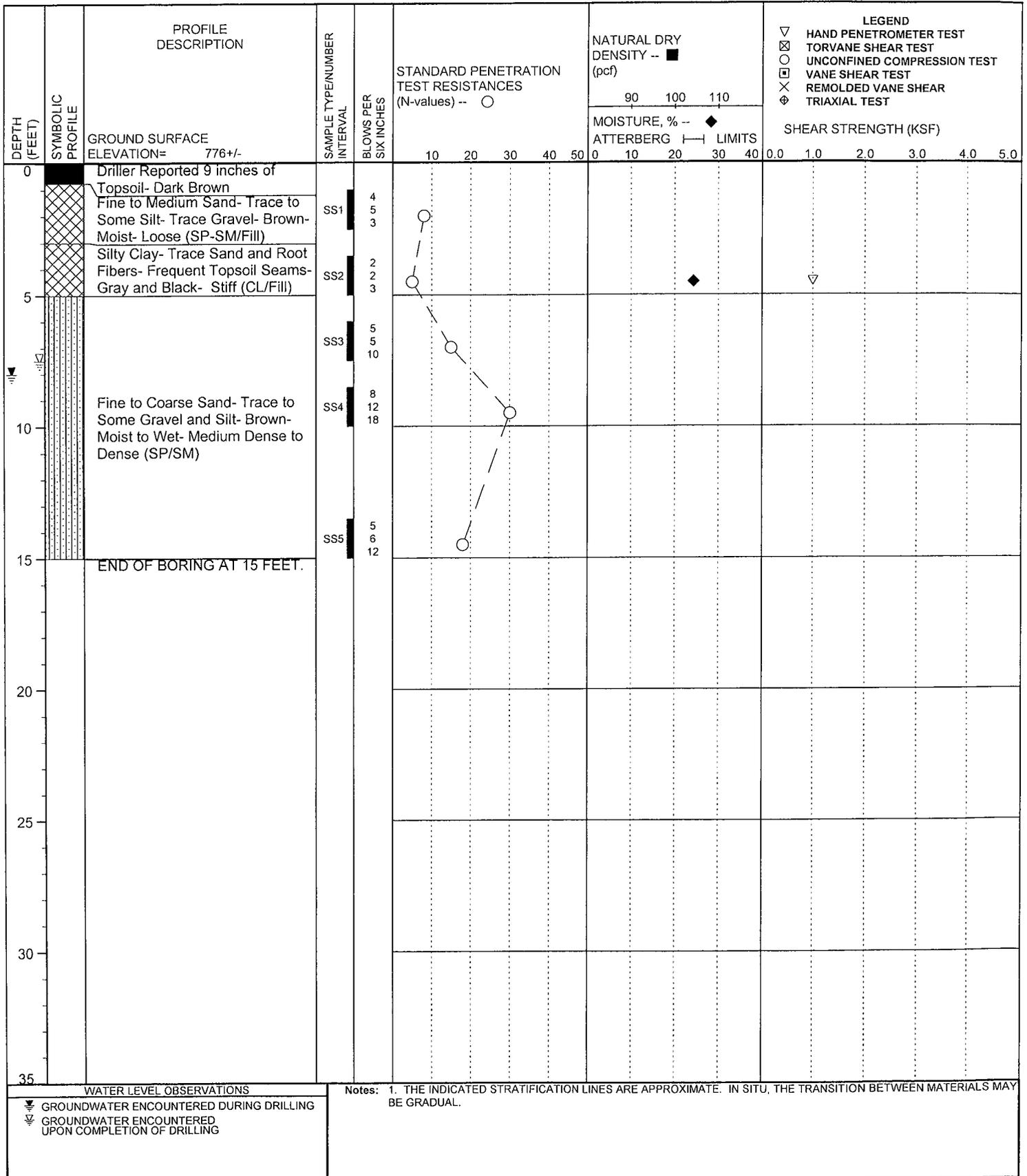
Figure No. 1



soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010 BORING B1
 PROJECT NUMBER: KG61883 SHEET: 1



WATER LEVEL OBSERVATIONS
 ▽ GROUNDWATER ENCOUNTERED DURING DRILLING
 ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING

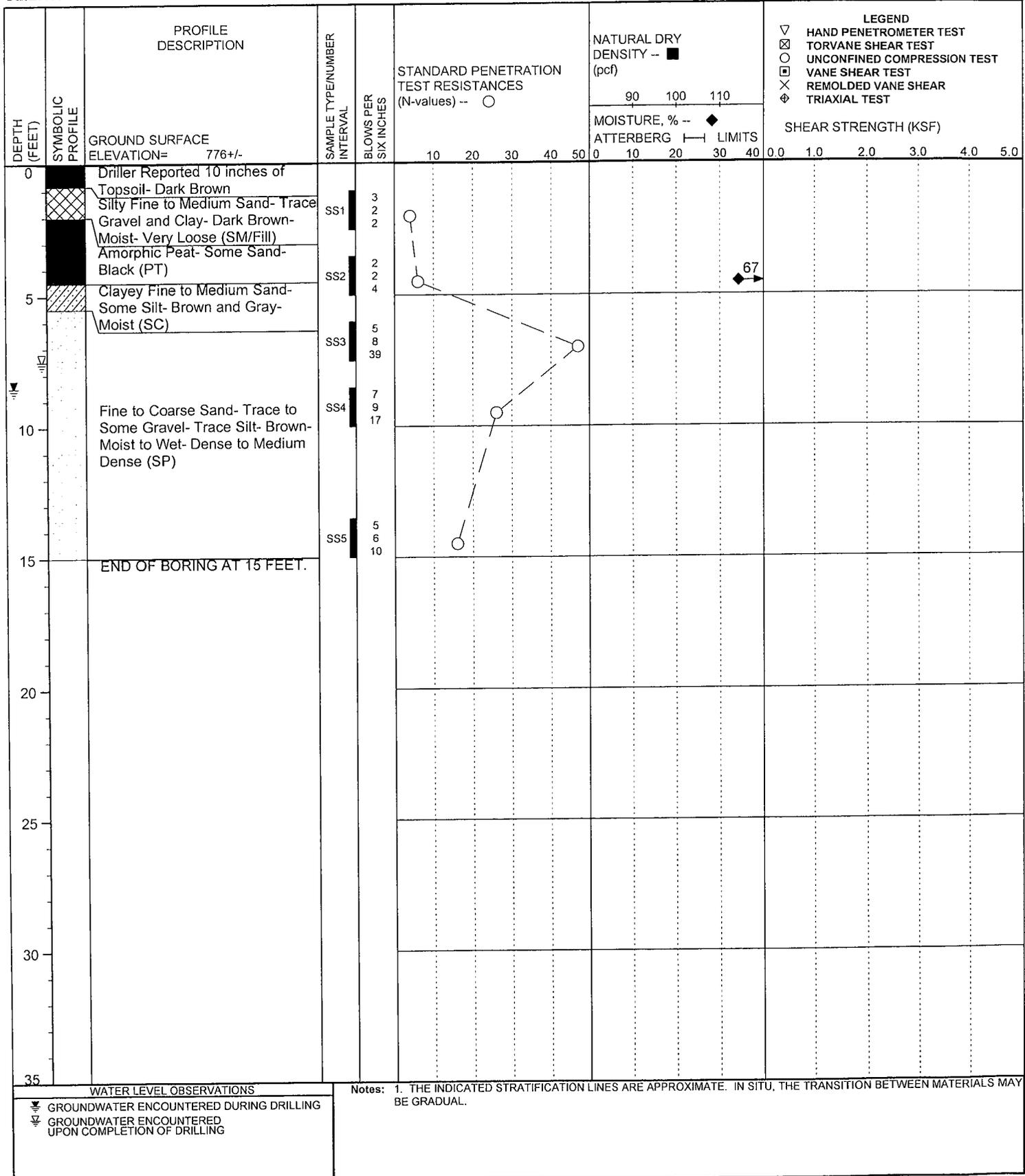
Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.



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 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010
 PROJECT NUMBER: KG61883
 BORING B2
 SHEET: 1



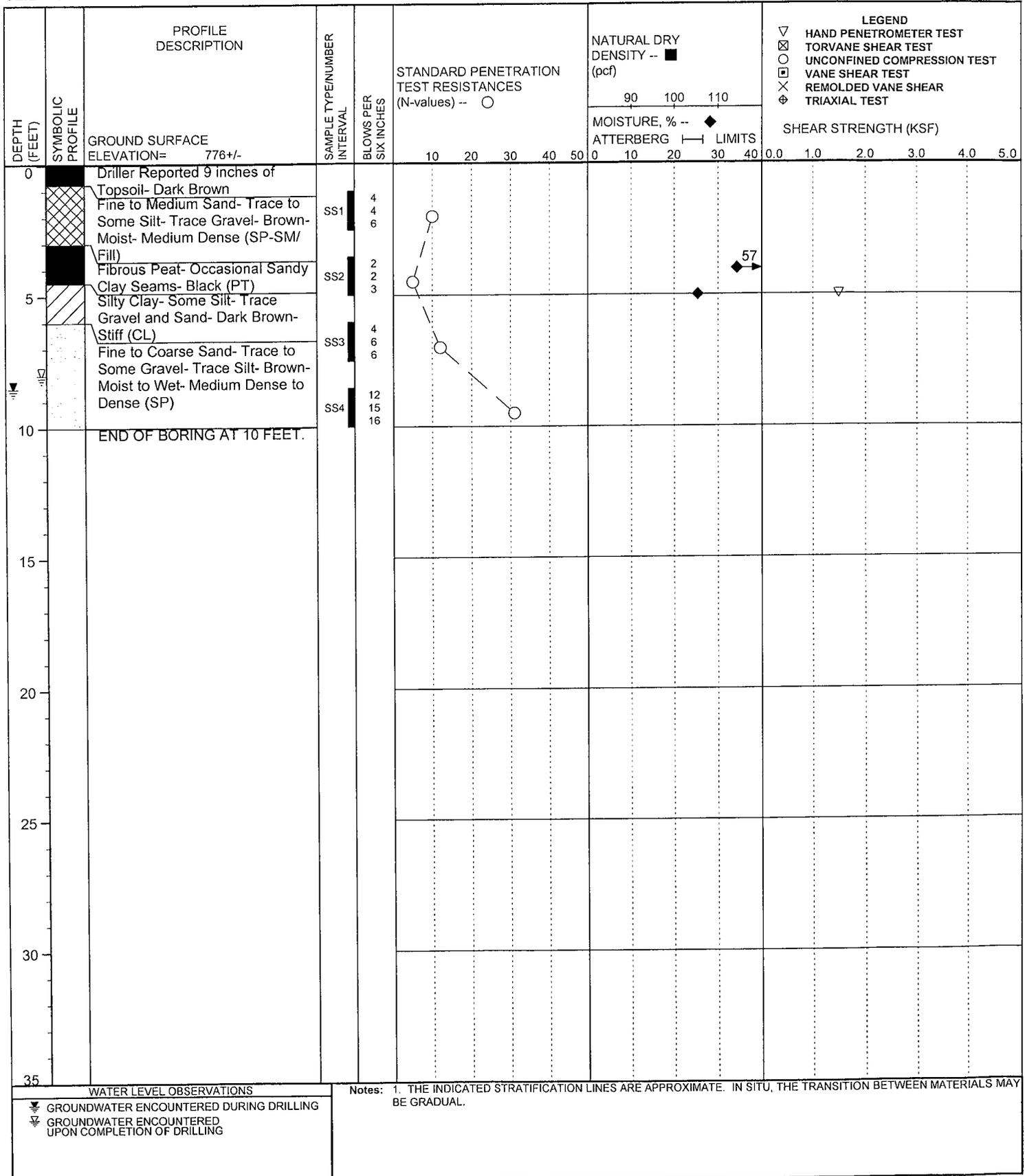
DRILLER: TW (GLD) DRILL METHOD: Hollow Stem Augers WATER LEVEL DURING DRILLING: 8.5 WATER LEVEL HOURS AFTER COMPLETION:
 RIG NO.: CME 75 BACKFILL METHOD: Soil Cuttings WATER LEVEL UPON COMPLETION: 7.5 CAVE OF BOREHOLE AT



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A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010 BORING B3
 PROJECT NUMBER: KG61883 SHEET: 1





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 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: KJG/MLB DATE: 07/16/2010 BORING B4
 PROJECT NUMBER: KG61883 SHEET: 1

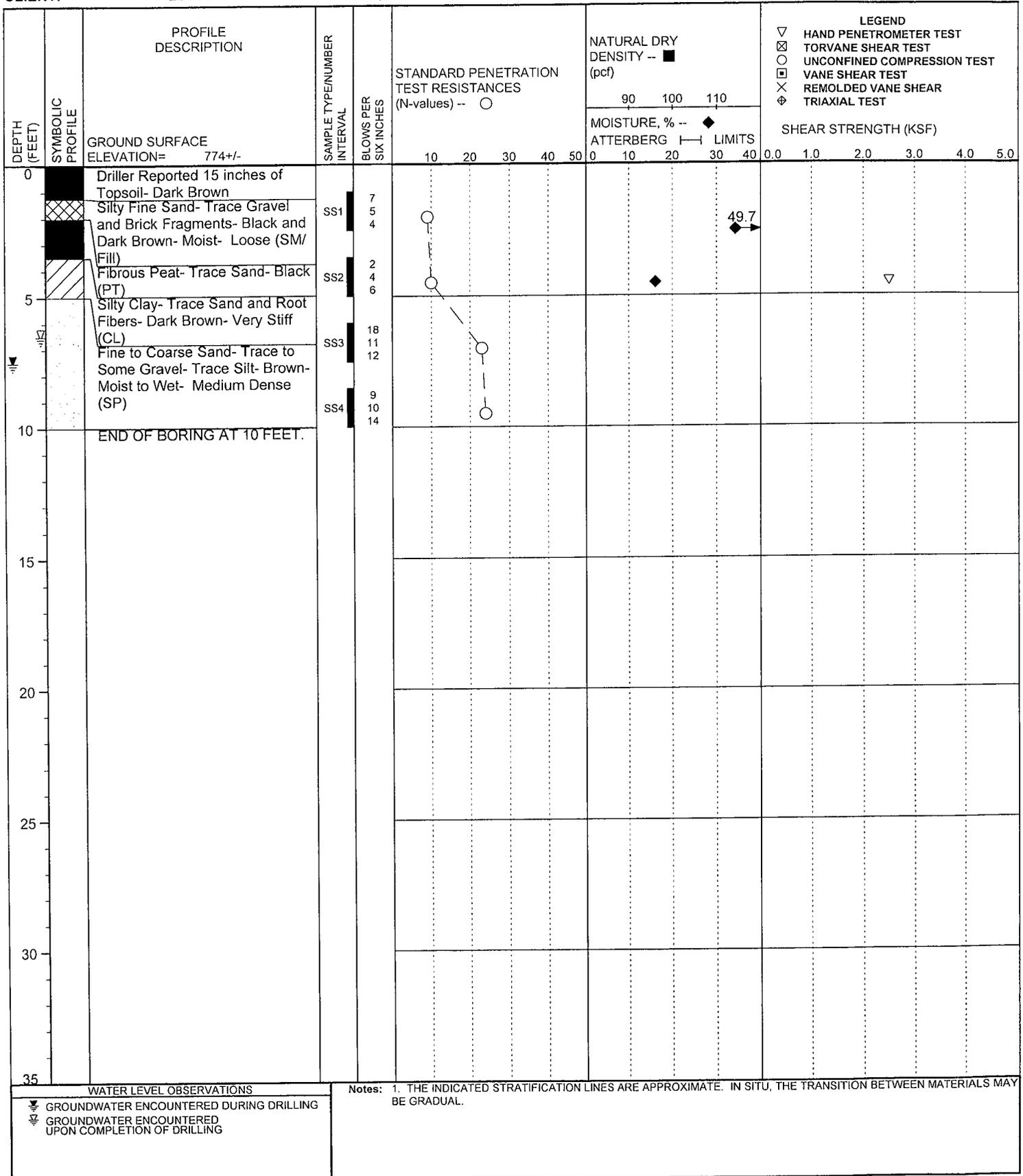
DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NUMBER INTERVAL	BLOWS PER SIX INCHES	STANDARD PENETRATION TEST RESISTANCES (N-values) -- ○	NATURAL DRY DENSITY -- ■ (pcf)		MOISTURE, % -- ◆	ATTERBERG LIMITS	SHEAR STRENGTH (KSF)								
						90	100			110	0.0	1.0	2.0	3.0	4.0	5.0		
0		GROUND SURFACE ELEVATION= 776+/-																
		Silty Fine Sand- Trace Gravel and Root Fibers- Dark Brown- Moist (SM/Topsoil)	HA1															
		Sandy Peat- Occasional Sand Layers- Black (PT)	HA2															
5		Sandy Clay- Some Silt- Trace Gravel- Dark Brown- Very Stiff (CL)	HA3															
		Fine to Medium Sand- Trace Silt and Gravel- Brown- Moist (SP)	HA4															
		END OF BORING AT 6.25 FEET.																
10																		
15																		
20																		
25																		
30																		
35																		
WATER LEVEL OBSERVATIONS ▽ GROUNDWATER ENCOUNTERED DURING DRILLING ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING			Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL. 2. GROUNDWATER WAS NOT ENCOUNTERED.															



soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010 BORING B5
 PROJECT NUMBER: KG61883 SHEET: 1

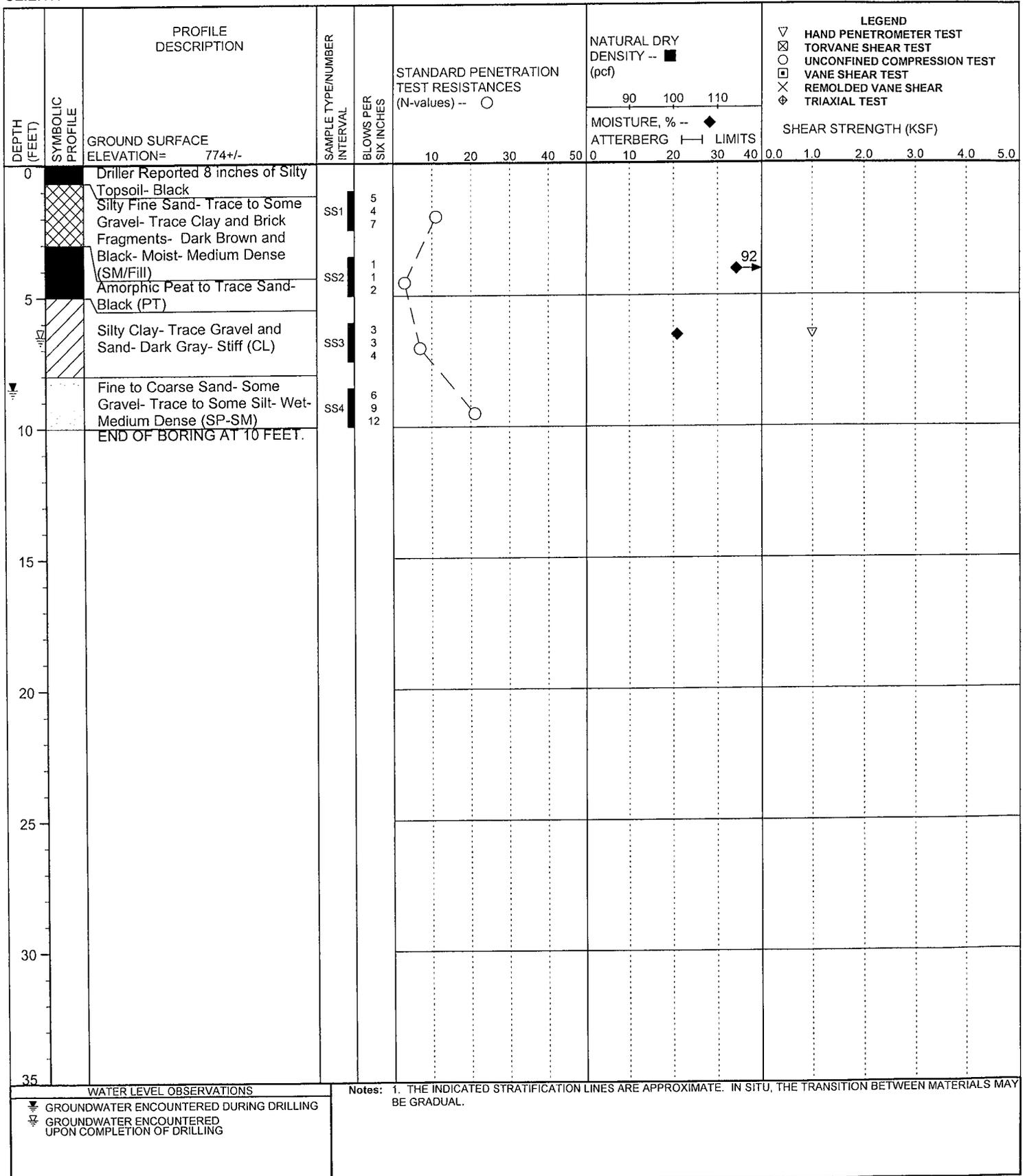




soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010 BORING B6
 PROJECT NUMBER: KG61883 SHEET: 1

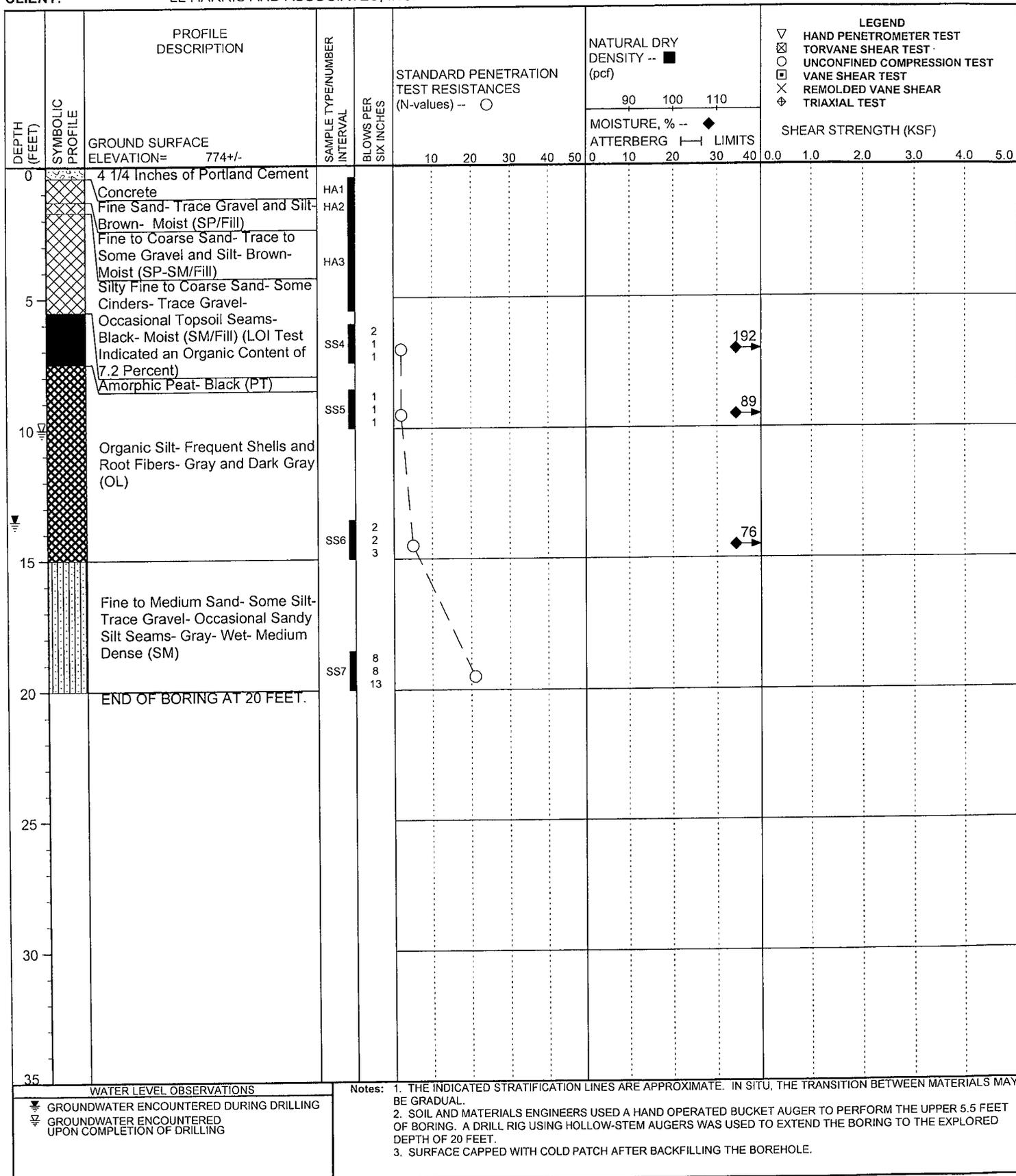




soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: KJG/MLB DATE: 07/16/2010 BORING B7
 PROJECT NUMBER: KG61883 SHEET: 1



WATER LEVEL OBSERVATIONS
 ▽ GROUNDWATER ENCOUNTERED DURING DRILLING
 ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING

Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
 2. SOIL AND MATERIALS ENGINEERS USED A HAND OPERATED BUCKET AUGER TO PERFORM THE UPPER 5.5 FEET OF BORING. A DRILL RIG USING HOLLOW-STEM AUGERS WAS USED TO EXTEND THE BORING TO THE EXPLORED DEPTH OF 20 FEET.
 3. SURFACE CAPPED WITH COLD PATCH AFTER BACKFILLING THE BOREHOLE.

DRILLER: DRILL METHOD: Hollow Stem Augers WATER LEVEL DURING DRILLING: 13.5 WATER LEVEL HOURS AFTER COMPLETION:
 RIG NO.: CME 75 BACKFILL METHOD: Soil Cuttings WATER LEVEL UPON COMPLETION: 10 CAVE OF BOREHOLE AT 10



soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/17/2010 BORING B8
 PROJECT NUMBER: KG61883 SHEET: 1

DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NUMBER INTERVAL	BLOWS PER SIX INCHES	STANDARD PENETRATION TEST RESISTANCES (N-values) -- ○	NATURAL DRY DENSITY -- ■ (pcf)	MOISTURE, % -- ◆	ATTERBERG LIMITS	LEGEND	
						90 100 110			0 10 20 30 40	▽ HAND PENETROMETER TEST
0		GROUND SURFACE ELEVATION= 773+/-								○ UNCONFINED COMPRESSION TEST
0	▨	4.5 Inches of Portland Cement Concrete	HA1							⊠ VANE SHEAR TEST
0	▨	Fine to Coarse Sand- Trace to Some Silt- Trace Gravel- Brown-Moist (SP-SM/Fill)	HA2							◆ REMOLDED VANE SHEAR
0	▨	Silty Fine to Coarse Sand- Some Cinders- Trace to Some Gravel and Topsoil- Black- Moist (SM/Fill) (LOI Test Indicated an Organic Content of 6.7 Percent)	HA3							◇ TRIAXIAL TEST
5	▨	Amorphous Peat- Trace Root Fibers- Black (PT)	HA4				172			
5	▨	Organic Silt- Some Shell Fragments- Trace to Some Sand- Trace Root Fibers- Dark Gray- Soft (OL)	HA5				232			
5	▨	END OF BORING AT 9 FEET.	HA6				79			
10										
15										
20										
25										
30										
35										

WATER LEVEL OBSERVATIONS
 ▽ GROUNDWATER ENCOUNTERED DURING DRILLING
 ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING

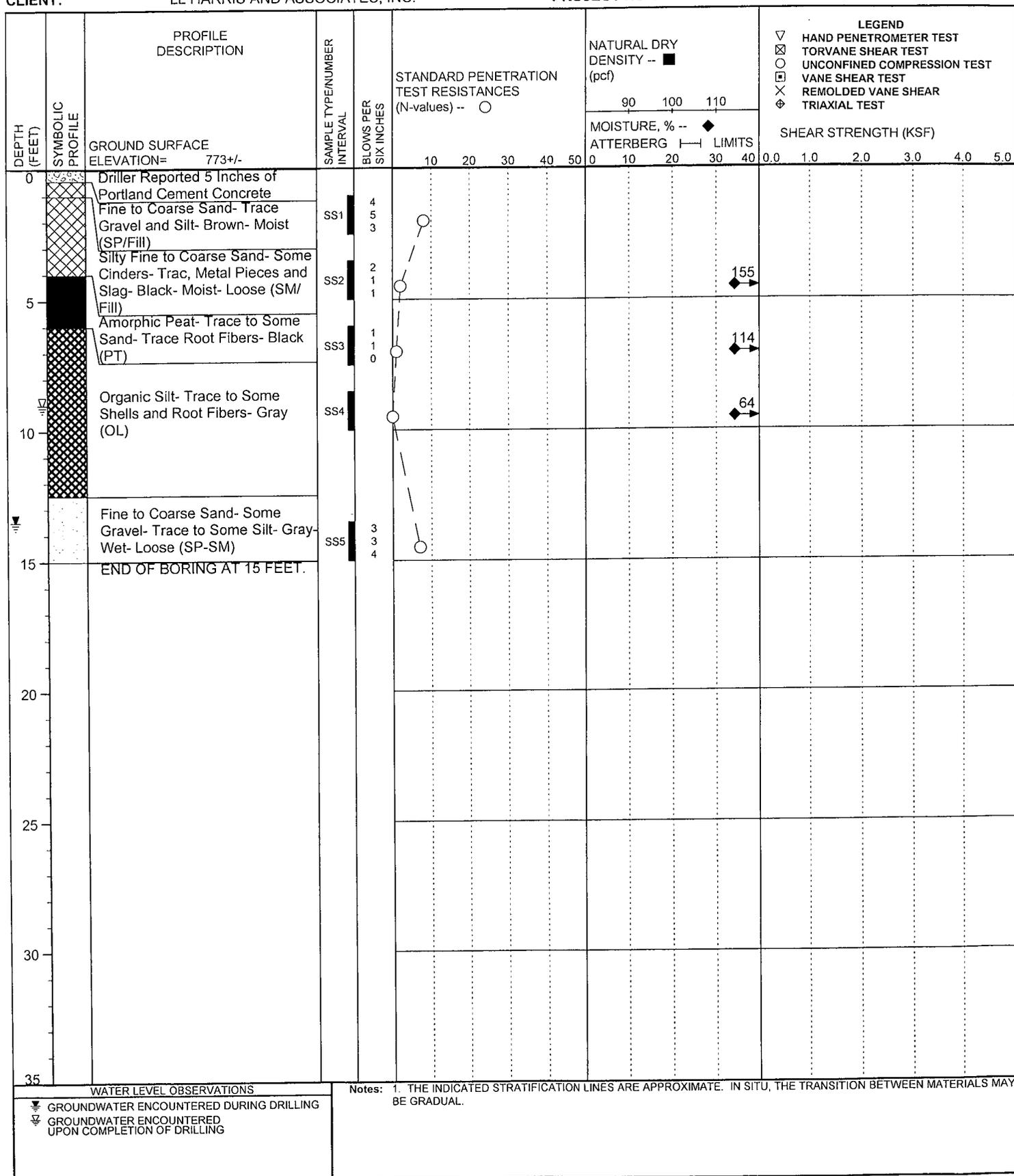
Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.
 2. GROUNDWATER WAS NOT ENCOUNTERED.



soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/17/2010 BORING B9A
 PROJECT NUMBER: KG61883 SHEET: 1



WATER LEVEL OBSERVATIONS
 ▽ GROUNDWATER ENCOUNTERED DURING DRILLING
 ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING

Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.



soil and materials engineers, inc.

PROJECT NAME: LA CRONE PARK IMPROVEMENTS
 PROJECT LOCATION: KALAMAZOO, MICHIGAN
 CLIENT: LL HARRIS AND ASSOCIATES, INC.

A/E: LL HARRIS AND ASSOCIATES, INC.
 BY: CDK/MLB DATE: 07/20/2010 BORING B10
 PROJECT NUMBER: KG61883 SHEET: 1

DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NUMBER INTERVAL	BLOWS PER SIX INCHES	STANDARD PENETRATION TEST RESISTANCES (N-values) -- ○	NATURAL DRY DENSITY -- ■ (pcf)	MOISTURE, % -- ◆	LEGEND	
						90 100 110	0 10 20 30 40	▽ HAND PENETROMETER TEST	⊠ TORVANE SHEAR TEST
						ATTERBERG LIMITS		SHEAR STRENGTH (KSF)	
						0 10 20 30 40	0.0 1.0 2.0 3.0 4.0 5.0		
0		GROUND SURFACE ELEVATION= 774+/-							
0		Driller Reported 6 Inches of Topsoil							
0-4		Fine Sand- Trace Silt- Brown- Moist- Medium Dense (SP)	SS1	4 5 6	○				
4-5		Silty Clay- Trace to Some Sand- Dark Brown- Stiff (CL)	SS2	3 3 4	○		◆	▽	
5-8		Fine to Medium Sand- Trace to Some Silt- Trace Gravel- Brown- Moist to Wet- Medium Dense (SP-SM)	SS3	8 9 15	○				
8-10		Fine to Coarse Sand- Trace Gravel and Silt- Brown- Wet- Medium Dense (SP)	SS4	5 9 11	○				
10		END OF BORING AT 10 FEET.							
15									
20									
25									
30									
35									

WATER LEVEL OBSERVATIONS
 ▽ GROUNDWATER ENCOUNTERED DURING DRILLING
 ▽ GROUNDWATER ENCOUNTERED UPON COMPLETION OF DRILLING

Notes: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE. IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.



USACE DCP DATA SHEET

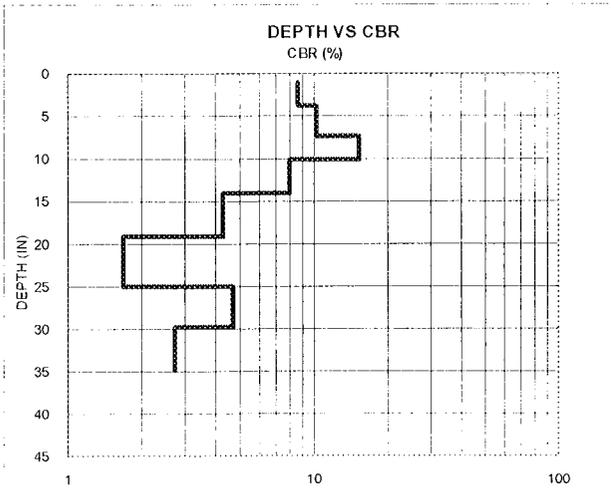
PROJECT: La Crone Park Improvements
 PROJECT NO.: KP61883
 LOCATION: Kalamazoo, Michigan
 CLIENT: L.L. Harris and Associates, Inc
 DATE: 7/16/10
 BY: KJG
 DEPTH TO START OF TEST FROM SURFACE: 1 inches

PROBE/CORE: B4
 STREET:
 ADDRESS:
 STATION:
 OFFSET:
 LANE:
 GROUND EL: 776+/-

No. of Blows	Accum. Pen. (mm)	Pen. per Blow Set (mm)	Pen. per Blow (mm)	Hammer Blow Factor	CBR (%)	Depth from Surface (inches)	Comment	Average CBR (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	50	0						
6	120	70	12	2	8.6	3.8		
9	210	90	10	2	10.2	7.3		
10	280	70	7	2	15.2	10.1		
8	380	100	13	2	7.9	14.0		10.2
6	510	130	22	2	4.3	19.1	Poor	
3	660	150	50	2	1.7	25.0	Very Poor	
6	780	120	20	2	4.7	29.7	Poor	
4	910	130	33	2	2.7	34.9	Very Poor	3.3

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer

NOTES: 1. Refer to Boring Log for Soil and Groundwater Conditions.



CBR Ranges for Subgrade Conditions

CBR < 3: Very Poor CBR 5-10: Marginal
 CBR 3-5: Poor CBR > 10: Good

Depth to Groundwater From Surface : Note 1.
 Depth of Frost From Surface : Note 1.

From	To	Material



USACE DCP DATA SHEET

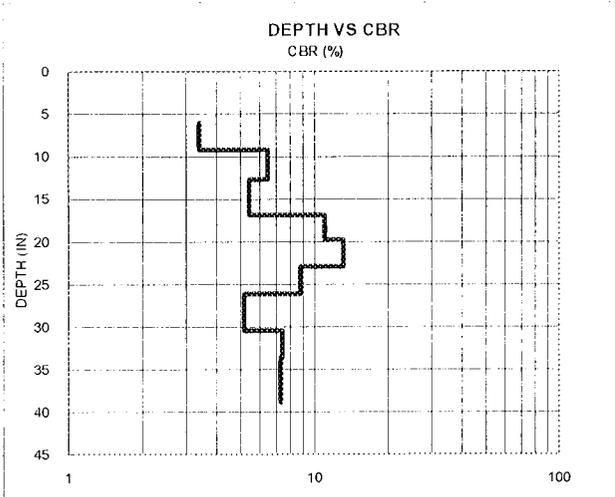
PROJECT: La Crone Park Improvements
 PROJECT NO.: KP61883
 LOCATION: Kalamazoo, Michigan
 CLIENT: L.L. Harris and Associates, Inc
 DATE: 7/16/10
 BY: KJG
 DEPTH TO START OF TEST FROM SURFACE: 6 inches

PROBE/CORE: B8
 STREET: _____
 ADDRESS: _____
 STATION: _____
 OFFSET: _____
 LANE: _____
 GROUND EL: 773+/-

No. of Blows (1)	Accum. Pen. (mm) (2)	Pen. per Blow Set (mm) (3)	Pen. per Blow (mm) (4)	Hammer Blow Factor (5)	CBR (%) (6)	Depth from Surface (inches) (7)	Comment (8)	Average CBR (%) (9)
0	190	0						
3	270	80	27	2	3.4	9.1	Poor	3.4
6	360	90	15	2	6.5	12.7		
6	465	105	18	2	5.4	16.8		
8	540	75	9	2	11.0	19.8		
10	620	80	8	2	13.1	22.9		
7	700	80	11	2	8.8	26.1		
6	810	110	18	2	5.2	30.4		
6	890	80	13	2	7.4	33.6		
10	1025	135	14	2	7.3	38.9		7.8

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer

NOTES: 1. Refer to Boring Log for Soil and Groundwater Conditions.



CBR Ranges for Subgrade Conditions
 CBR < 3: Very Poor CBR 5-10: Marginal
 CBR 3-5: Poor CBR > 10: Good

Depth to Groundwater From Surface : Note 1.
 Depth of Frost From Surface : Note 1.

From	To	Material



Drilling and Sampling Symbols

SS	-	Split-Spoon 1-3/8" I.D., 2" O.D. except where noted	NR	-	No Recovery
LS	-	Liner Sample	RC	-	Rock Core with diamond bit. NQ size, except where noted
AS	-	Power Auger Sample	RB	-	Rock Bit
2ST	-	Shelby Tube – 2" O.D.	VS	-	Vane Shear
3ST	-	Shelby Tube – 3" O.D.	PM	-	Pressuremeter
PS	-	Piston Sample – 3" diameter	WOH	-	Weight of Hammer
WS	-	Wash Sample			
HA	-	Hand Auger Sample	SP	-	Soil Probe
BS	-	Bag or Bottle Sample	PID	-	Photo Ionization Device
CS	-	Continuous Sample	FID	-	Flame Ionization Device

Standard Penetration 'N' – Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split spoon, except where noted.

Particle Sizes

Boulders	-	Greater than 12 inches (305 mm)
Cobbles	-	3 inches (76.2 mm) to 12 inches (305 mm)
Gravel-Coarse	-	3/4 inches (19.05 mm) to 3 inches (76.2mm)
Fine	-	No. 4 (4.75 mm) to 3/4 inches (19.05 mm)
Sand-Coarse	-	No. 10 (2.00 mm) to No. 4 (4.75 mm)
Medium	-	No. 40 (0.425 mm) to No. 10 (2.00 mm)
Fine	-	No. 200 (0.074 mm) to No. 40 (0.425 mm)
Silt	-	0.005 mm to 0.074 mm
Clay	-	Less than (0.005 mm)

Depositional Features

Parting	-	as much as 1/16 inch (1.6 mm) thick
Seam	-	1/16 inch (1.6 mm) to 1/2 inch (12.7 mm) thick
Layer	-	1/2 inch (12.7 mm) to 12 (305 mm) inches thick
Stratum	-	greater than 12 inches (305 mm) thick
Pocket	-	small, erratic deposit of limited lateral extent
Lens	-	lenticular deposit
Varved	-	alternating seams or layers of silt and/or clay and sometimes fine sand
Occasional	-	one or less per foot (305 mm) of thickness
Frequent	-	more than one per foot (305 mm) of thickness
Interbedded	-	applied to strata of soil or beds of rock lying between or alternating with other strata of a different nature

Groundwater levels indicated on the boring log are the levels measured in the boring at the times indicated. The accurate determination of groundwater levels may not be possible with short term observations, especially in low permeability soils. The groundwater levels shown may fluctuate throughout the year with variation in precipitation, evaporation and runoff.

Classification

Cohesionless Soils (Blows per foot or 0.3 m)

Very Loose	:	0 to 4
Loose	:	5 to 9
Medium Dense	:	10 to 29
Dense	:	30 to 49
Very Dense	:	50 to 80
Extremely Dense	:	Over 80

Soil Constituents

Trace	:	Less than 5%
Trace to Some	:	5% to 12%
Some	:	12% to 25%
Use Descriptor	:	25% to 50%
(i.e., Silty, Clayey, etc.)		

Cohesive Soils

	<u>Consistency</u>	<u>Shear Strength</u>
Very Soft	:	0.25 kips/ft ² (12.0 kPa) or less
Soft	:	0.25 to 0.49 kips/ft ² (12.0 to 23.8 kPa)
Medium	:	0.50 to 0.99 kips/ft ² (23.9 to 47.7 kPa)
Stiff	:	1.00 to 1.99 kips/ft ² (47.8 to 95.6 kPa)
Very Stiff	:	2.00 to 3.99 kips/ft ² (95.7 to 191.3 kPa)
Hard	:	4.00 kips/ft ² (191.4 kPa) or greater

Soil description

If clay content sufficiently dominates soil properties, then clay becomes the primary noun with the other major soil constituent as modifier: i.e. silty clay. Other minor soil constituents may be added according to estimates of soil constituents present, i.e., silty clay, trace to some sand, trace gravel.



UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	
		GW Well-graded gravels; sandy gravels, little or no fines
		GP Poorly-graded gravels; sandy gravels, little or no fines
	Gravels with fines (More than 12% fines)	
		GM Silty gravels, some sand or sandy gravels, some silt
		GC Clayey gravels, some sand or sandy gravels, some silt
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	
		SW Well-graded sands, gravelly sands, little or no fines
		SP Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
		SM Silty sands or sands, some silt
		SC Clayey sands or sands, some clay

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size)

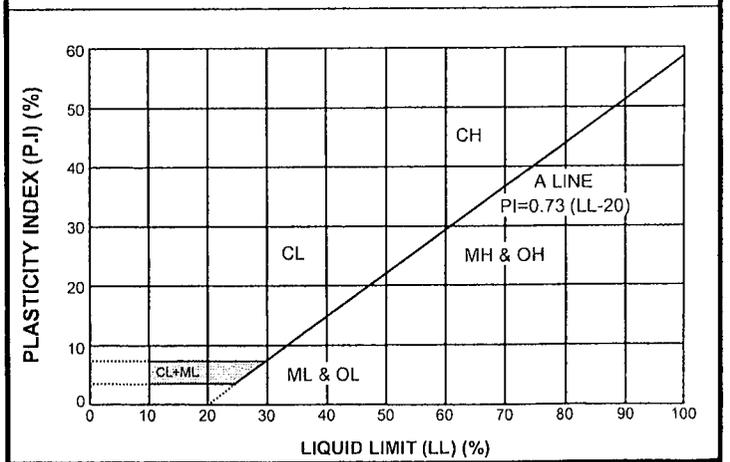
SILTS AND CLAYS Liquid limit less than 50%		ML Inorganic silty soils or clayey silts with slight plasticity
		CL Inorganic clays of low plasticity, sandy clays, silty clays
		OL Organic silts and organic clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH Inorganic silts of high plasticity
		CH Inorganic clays of high plasticity
		OH Organic silts and organic clays of high plasticity
HIGHLY ORGANIC SOILS		PT Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
 Less than 5 percent.....GW, GP, SW, SP
 More than 12 percent.....GM, GC, SM, SC
 5 to 12 percent.....Borderline cases requiring dual symbols

PLASTICITY CHART



Important Information About Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.



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GENERAL COMMENTS

Basis of Geotechnical Report

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

Review of Design Details, Plans, and Specifications

SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

Review of Report Information With Project Team

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

Field Verification of Geotechnical Conditions

SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

Project Information for Contractor

This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

Third Party Reliance/Reuse of This Report

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

LABORATORY TESTING PROCEDURES

Visual Engineering Classification

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

Moisture Content

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110° C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

Hand Penetrometer Tests

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

Torvane Shear Tests

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

Loss-on-Ignition (Organic Content) Tests

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440° C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

Atterberg Limits Tests

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a 1/2-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool 1/2 inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.

APPENDIX D

GEO TECHNICAL EVALUATION REPORT



GEOTECHNICAL EVALUATION REPORT

LA CRONE PARK SPLASHPAD AND SITE IMPROVEMENTS
KALAMAZOO, MICHIGAN

SME Project No. 084004.00
June 10, 2020





3301 Tech Circle Drive
Kalamazoo, MI 49008-5611

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June 10, 2020

Ms. Melinda R. Whitten, RLA
Vice President
MCSA Group, Inc.
529 Greenwood Avenue S.E.
East Grand Rapids, Michigan 49506

Via E-mail: mwhitten@mcsagroup.com (PDF file)

RE: Geotechnical Evaluation Report
La Crone Splashpad and Site Improvements
535 W. Paterson Street
Kalamazoo, Michigan 49007
SME Project No. 084004.00

Dear Ms. Whitten:

We have completed the geotechnical evaluation for the subject project. This report presents the results of our observations and analyses, and our geotechnical recommendations based on the information disclosed by the borings.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Very truly yours,

SME

Kevin J. Glupker, PE
Project Manager / Senior Consultant

TABLE OF CONTENTS

- 1. INTRODUCTION 1
 - 1.1 SITE CONDITIONS1
 - 1.2 PROJECT DESCRIPTION.....1
 - 1.3 PREVIOUS EVALUATION2
- 2. EVALUATION PROCEDURES.....2
 - 2.1 FIELD EXPLORATION2
 - 2.2 LABORATORY TESTING2
- 3. SUBSURFACE CONDITIONS3
 - 3.1 SOIL CONDITIONS3
 - 3.2 GROUNDWATER CONDITIONS.....3
- 4. ANALYSIS AND RECOMMENDATIONS4
 - 4.1 SITE PREPARATION AND EARTHWORK4
 - 4.1.1 EXISTING FILL AND ORGANIC SOIL CONSIDERATIONS..... 4
 - 4.1.2 SUBGRADE PREPARATION – MASS EXCAVATION 4
 - 4.1.3 ENGINEERED FILL REQUIREMENTS 5
 - 4.2 FOUNDATIONS5
 - 4.2.1 SUBGRADE VERIFICATION..... 5
 - 4.2.2 SHADE SAIL FOUNDATIONS..... 5
 - 4.3 SEISMIC SITE CLASS7
 - 4.4 CONSTRUCTION CONSIDERATIONS7
- 5. SIGNATURES 7

APPENDIX A

- BORING LOCATION DIAGRAM (FIGURE NO. 1)
- BORING LOG TERMINOLOGY
- BORING LOGS (B101 THROUGH B104)

APPENDIX B

- IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT
- GENERAL COMMENTS
- LABORATORY TESTING PROCEDURES

1. INTRODUCTION

This report presents the results of the geotechnical and pavement evaluation performed by SME for the proposed splashpad and site improvements at La Crone Park. Our services were performed in accordance with the scope of services outlined in SME Proposal No. P00764.20, dated March 30, 2020. Please refer to the referenced proposal for the specific scope of services. MCSA Group, Inc. (MCSA) authorized our services.

MCSA provided SME with the following information to assist with our evaluation and the preparation of this report:

- A PDF file titled “Construction Plans – La Crone Park Splashpad Improvements” (Sheet Nos. 1 through 12) with a latest revision date of May 7, 2020, and prepared by MCSA. The plan set included drawings depicting existing site features, proposed site improvements, and construction details for the proposed splashpad, shade sail, utilities and site improvements.
- A PDF of a drawing titled “La Crone Splashpad” dated January 10, 2020, and prepared by Superior Recreational Products. The drawing includes the layout and dimensions of the proposed shade sail structure, as well as a footing detail and a column and footing schedule for the structure.
- A PDF titled “Shade Structure Material Specifications” detailing the manufacturer’s specifications for the fabric, structural steel, connections, and foundations for the shade structure.

1.1 SITE CONDITIONS

The project site is located at La Crone Park located at 535 W. Paterson Street in Kalamazoo, Michigan. The location of the project site is depicted on the Location Map inset on the Boring Location Diagram (Figure No. 1) included in Appendix A of this report.

The project site currently consists of existing recreational facilities including tennis courts, basketball courts, a playground, paved pathways, parking areas, and restrooms. The project area is located in the existing grass-covered area of the park just northwest of the existing playground and restroom building. Based on our review of the referenced site survey, the existing ground surface is relatively flat, with surface elevations within the project area ranging from around 776.5 to 778 feet.

1.2 PROJECT DESCRIPTION

The proposed improvements at the site will consist of constructing a concrete surfaced splashpad area with an incorporated shade sail structure and concrete walkways. New water and sewer utilities will be constructed to supply the water fountains and provide drainage. The locations of the proposed site improvements are illustrated on Figure No. 1.

Specifications and design details were provided for the proposed shade sail structure. However, estimated structural loading information was not provided for the shade sail structure. The proposed shade sail structure is a pre-engineered Superior Shade system designed by Superior Recreational Products. The proposed shade sail structure will consist of a tensioned fabric shade cover supported by galvanized schedule 40 steel tubing columns consisting of HSS ASTM A-53 Grade C steel, with diameters of 5 to 8 inches. The columns will be spaced apart at about 13 to 21 feet around the perimeter of the shade sail structure in an asymmetric pentagon formation. The columns will be anchor-bolted to reinforced concrete foundations. The fabric shade cover will be connected at or near the tops of the columns at heights of about 8 to 12 feet above the ground surface. Based on our experience with similar structures, we anticipate axial compressive loads of less than 10 kips and axial tension loads of less than 5 kips for each column. Each column is anticipated to be designed to resist moment forces due to wind loading.

Based on our review of the providing grading plan (“Grading Plan Enlargement”, Sheet No. 5), we expect relatively minor earthwork (cuts and fills of 1 foot or less) will be required to achieve final subgrade levels in the proposed pavement and shade sail areas.

Contact SME if our understanding of the project discussed above is incorrect or has changed.

1.3 PREVIOUS EVALUATION

SME previously performed a geotechnical evaluation at the site in 2010 (SME Project No. KG61883). The evaluation included four borings (B1 through B4) and engineering recommendations for the nearby restroom and shelter structure, as well as pavement and recreational areas throughout the east portion of the site. SME referenced the historic soil borings in preparation of this report. The locations of the borings B1 through B4 are depicted in Figure No. 1.

2. EVALUATION PROCEDURES

2.1 FIELD EXPLORATION

SME completed four borings (B101 through B104) at the project site on May 26, 2020. The approximate as-drilled boring locations are shown on Figure No. 1.

MCSA and SME jointly determined the number, depths, and locations of the borings. Prior to the field exploration, SME staked the borings in the field using a hand-held Trimble GPS device with sub-meter accuracy. SME estimated the existing ground surface elevations at the borings to the nearest 1-foot based on the topographic information included in the referenced grading plan.

Borings B101 through B104 were advanced using a truck-mounted rotary drill rig, and extended to depths of 5 to 15 feet below the existing surface. The borings included soil sampling based upon the Split-Barrel Sampling procedure. The driller sealed recovered split-barrel samples in glass jars.

Groundwater level observations in the boreholes were recorded during and immediately after completion of each boring. The boreholes were backfilled with auger cuttings after completion and collection of groundwater observations. Therefore, long-term groundwater levels are not available from the borings.

Soil samples recovered from the field exploration were sent to our laboratory for further observation and testing.

2.2 LABORATORY TESTING

The laboratory testing program consisted of performing visual soil classification on recovered samples in general accordance with ASTM D-2488, along with moisture content and shear strength testing on portions of cohesive samples. Moisture content testing was performed on portions of organic soil samples, and loss-on-ignition (LOI) testing was performed on select samples of fill obtained at borings B102 and B103 that appeared to contain organic material. The Laboratory Testing Procedures in Appendix B provides descriptions of the laboratory tests performed. Based on the laboratory testing, we prepared a soil description and assigned a Unified Soil Classification System (USCS) group symbol to each of the soil strata encountered.

Upon completion of the laboratory testing, we prepared boring logs that include the soil descriptions, penetration resistances, pertinent field observations made during the boring operations, and the results of the laboratory testing. Each log also includes the existing ground surface elevation, as estimated by SME. The boring logs are included in Appendix A. Explanations of symbols and terms used on the boring logs are provided on the Boring Log Terminology sheet included in Appendix A.

Soil samples are normally retained in our laboratory for 60 days and are then disposed of, unless instructed otherwise.

3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

The soil conditions encountered at borings B101 through B104 generally consisted of surficial topsoil, where encountered, overlying existing fill underlain by natural sands. In addition, organic soils consisting of peat were encountered below the existing fill at borings B101 and B104. The existing fill extended to depths of 3 to 8 feet below the existing ground surface, corresponding to elevations between about 768 and 774 feet. The peat extended to depths of 4.8 and 6 feet below the existing ground surface, corresponding to elevations between about 771 and 772.2 feet. The sand fill exhibited a very loose to loose condition, and the clay fill exhibited a medium consistency, with moisture contents ranging from 17 to 19 percent. LOI testing performed on the sand fill indicated organic contents between about 4.3 to 18.2 percent. The peat exhibited moisture contents between 51 and 65 percent. The natural sands were in loose to medium dense condition.

The soil profile described above and included on the boring logs is a generalized description of the conditions encountered. The stratification depths described above and shown on the boring logs are intended to indicate a zone of transition from one soil type to another. They are not intended to show exact depths of change from one soil type to another. The soil descriptions are based on visual classification of the soils encountered. Soil conditions may vary between or away from the boring locations from those conditions noted on the logs. Please refer to the boring logs for the soil conditions at the specific boring locations.

The thickness of surficial materials, such as topsoil, can be difficult to accurately measure in small-diameter boreholes since mixing of the surface materials with the underlying subgrade can occur while advancing the augers. Therefore, the thicknesses of topsoil noted on the logs should be considered approximate. Shallow test pits should be performed if more accurate topsoil measurements are desired.

It is sometimes difficult to distinguish between fill and natural soils based on samples and cuttings from small-diameter boreholes. Therefore, the delineation of fill described above and on the boring logs should be considered approximate only.

3.2 GROUNDWATER CONDITIONS

Groundwater was encountered during and upon completion of drilling at borings B101 through B103, at depths ranging from 6 to 8 feet below the existing ground surface (about elevations 769 to 770 feet). Groundwater was not encountered in boring B104, which terminated at an approximate elevation of 772 feet.

Groundwater was encountered in borings B1 through B3 performed at the site in 2010 at depths ranging from 6.5 to 8.5 feet below the existing surface (elevations 767.5 to 768.5). Groundwater was not encountered in boring B4, which terminated at an approximate elevation of 770 feet.

Hydrostatic groundwater levels, including perched conditions, should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater information reported on the boring logs represents conditions at the time the readings were taken and may vary from the groundwater conditions encountered at the time of construction.

4. ANALYSIS AND RECOMMENDATIONS

4.1 SITE PREPARATION AND EARTHWORK

4.1.1 EXISTING FILL AND ORGANIC SOIL CONSIDERATIONS

The existing fill and organic soils encountered at borings B101 through B104 are poor subgrade support soils, are moderately compressible, and will compress/settle when subjected to loading. Therefore, **we do not recommend supporting the proposed foundations of the shade sail above the existing fill or organic soils.** Therefore, we recommend undercutting the existing fill and organic soils from below proposed foundations.

SME was not requested to provide pavement design recommendations, but was requested to provide pavement subgrade preparation recommendations. **To provide suitable pavement subgrade, we recommend the existing fill and organic soils are removed from beneath the entire pavement areas and backfilled with engineered fill.** Alternatively, SME can assist the team by providing pavement engineering recommendations similar to our referenced 2010 geotechnical evaluations which may allow for alternative pavement subgrade options that are integrated into the pavement section provided the Owner is willing to accept risks of settlement below the pavements and potentially cracking of the pavements. If requested, SME can assist the Owner in providing pavement engineering recommendations that will reduce the risks of construction of pavements overlying the existing fill and organic soils.

The recommendations provided in the following report sections are based on the assumptions that the existing fill and organic soils will be undercut from beneath proposed foundations and within the footprint of the pavements for the proposed development.

4.1.2 SUBGRADE PREPARATION – MASS EXCAVATION

We recommend undercutting unsuitable soils (existing fill and organic soils) from within the entire footprint of the shade sail and pavements. The undercut excavation should extend a minimum of 10 feet beyond the limits of the proposed improvements. We anticipate the sides of the undercut excavations will be sloped back on a temporary basis to a stable inclination during construction. The undercut excavation should be backfilled with engineered fill to the design subgrade level after the unsuitable soils are completely removed. Since the undercut excavation will extend over a relatively large area, the undercut excavation is sometimes called a “mass excavation”.

We anticipate the majority of the excavation of unsuitable soils will be at or above the groundwater. However, excavations of unsuitable soils near boring B102 are anticipated to extend below the groundwater. Therefore, where excavations extend below the groundwater, we recommend using a sequential undercutting procedure where the undercutting and backfilling is performed within a relatively small area instead of opening up the entire mass excavation area all at one time. For this approach, the mass excavation is performed by sequentially undercutting the unsuitable soils in a small area to expose suitable underlying soils, stabilizing the bottom of the excavation using crushed aggregates, and then backfilling the excavation with crushed aggregate to above the groundwater level. This procedure is repeated while working only in a small section or area of the overall mass excavation at one time.

Based on the boring information, undercuts are expected to extend about 5 to 8 feet below the existing ground surface. However, undercut depths could vary between or away from the boring locations. SME should be present to verify the undercuts expose suitable natural soils at the base of the undercuts, and the contractor should be prepared for variable undercut depths.

The excavation must be observed by SME to verify suitable removal of unsuitable soils and that suitable natural inorganic soils are encountered at the base of the undercut. After verification of suitable removal of unsuitable soils by SME, the base of each undercut section should be immediately stabilized and backfilled to above the groundwater level using a well-graded, coarse, crushed aggregate or crushed concrete, ranging from about 1 to 3 inches in nominal size, and containing less than 7 percent passing the No. 200 sieve. The coarse, crushed aggregate should be tamped into the exposed subgrade using the excavator bucket or static rolled until it is stable. We recommend backfilling with the coarse-crushed material to at least 1-foot above the groundwater level.

Where granular engineered fill will be placed above the coarse, crushed aggregate, the surface of the coarse material must either be choked using a layer of MDOT 21AA dense-graded aggregate, or covered with a suitable non-woven filter fabric. The choke layer or the non-woven fabric is required to prevent migration of the overlying finer granular fill into the voids of the coarser material.

Groundwater control will be necessary during the undercutting and backfilling operations, until the excavation is backfilled to above the site groundwater level. Test pits should be performed at the site prior to construction to verify groundwater levels and infiltration rates. This information can then be used to assist the contractor in planning for control of groundwater seepage during construction.

After excavation and removal of the unsuitable soils, underlying natural sands in a loose to medium dense condition are expected to be encountered. The contractor must be prepared to immediately stabilize the resulting subgrade at the base of the undercuts by charging the base of the undercut excavation with the recommended coarse, crushed aggregate. Therefore, the coarse, crushed aggregate must be present at the site and ready for placement in the excavations immediately after the presence of suitable natural subgrade soils are visually verified by SME. The existing natural soils may be wet, and conventional vibratory methods for compaction of fill will likely result in further subgrade disturbance. Therefore, the coarse, crushed material should be tamped into the exposed subgrade using the excavator bucket, or worked into the subgrade by static rolling until the subgrade becomes stable.

4.1.3 ENGINEERED FILL REQUIREMENTS

Fill placed within the construction area, including utility trench backfill, must be an approved material, free of frozen soil, organics, or other deleterious materials. The fill must be placed on suitably prepared subgrade, spread in level layers not exceeding 9 inches in loose thickness, and compacted to a minimum of 95 percent of the maximum dry density as determined in accordance with the Modified Proctor test. Compact granular fill using a steel-drum, vibratory roller or vibratory plate compactor, either a walk-behind type or a plate compactor mounted on a backhoe or excavator (hoe-pac).

We do not recommend the existing fill and organic soils be used as engineered fill. We recommend imported fill meet the gradational requirements of MDOT Class II granular material.

4.2 FOUNDATIONS

4.2.1 SUBGRADE VERIFICATION

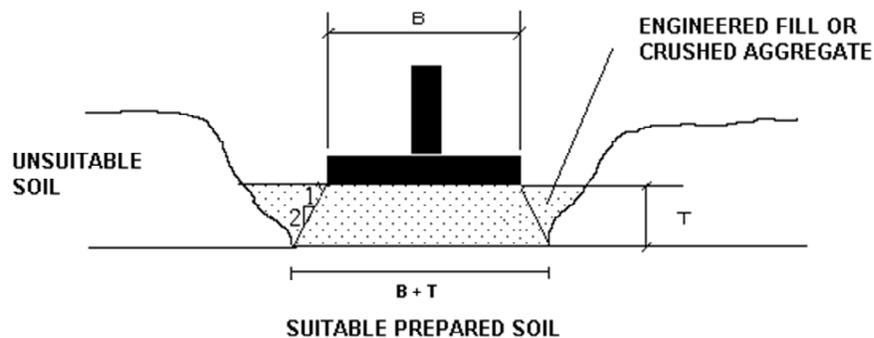
SME should observe and test the foundation subgrade prior to construction of the foundations. By performing the geotechnical evaluation for this project, and preparing this geotechnical evaluation report, SME is best suited to verify the recommendations of this report, and the design requirements of this project, are in fact incorporated into the construction.

4.2.2 SHADE SAIL FOUNDATIONS

Shallow spread foundations are proposed to support each post column around the perimeter of the shade sail structures. Shallow spread foundations extending through the existing fill and organic soils and

bearing on suitable natural sands or on engineered fill placed over suitable natural sands are recommended for support of the proposed shade sail structure. A maximum net allowable bearing pressure of 3,000 psf is recommended for design of the shallow foundations. The design maximum net allowable soil bearing pressure is based on a global safety factor of 3 or more (for general shear failure). Suitable natural sands were encountered beginning about 6 feet below the existing ground surface at boring B101.

Once each foundation area is exposed, SME must observe and test foundation subgrade conditions to verify suitable soils are encountered or improvements are performed, as needed, prior to foundation construction. Based on the borings, we anticipate unsuitable soils will be exposed at the proposed bearing foundations. Unsuitable soils should be undercut to expose the underlying suitable natural sands and the excavation backfilled to the design bearing level with engineered fill or crushed aggregate. Undercut excavations should be extended laterally on a two vertical to one horizontal slope from the edge of the foundation, as shown on the Typical Foundation Undercutting Diagram below:



Foundations for the shade sail structure must be situated a minimum of 42 inches below final site grade. The foundations and proposed bearing soils should be protected from freezing during construction if work occurs in the winter months.

Foundations constructed in caving soils (e.g., granular engineered fill) should be formed to maintain vertical sides that are less susceptible to the risks of frost movements that can occur when the sides of the foundations are allowed to "mushroom out" near the top. Since granular soils will be used as engineered fill, the contractor should be prepared to slope back foundation excavations and form the foundations. Caved soils and disturbed soils should be removed from foundation subgrades before placing concrete.

Total settlement for shallow foundations is estimated to be ½-inch or less, and differential settlements for foundations supporting similar loads are estimated to be about one-half of the total settlement estimate, or less. The settlement estimates provided are based on the boring information, maximum net allowable soil bearing pressure, the anticipated design structural loads, our experience with similar structures and soil conditions, and field verification of suitable bearing soils by SME.

For uplift resistance at the proposed shade sail column spread foundations, the weight of the foundation concrete and the weight of the soil directly overlying the concrete foundation may be used for uplift resistance. For this case and for compacted granular engineered fill placed over the concrete foundation, we recommend the compacted fill be considered to have a unit weight of 115 pounds per cubic-foot (pcf).

4.3 SEISMIC SITE CLASS

Based on the subsurface information obtained from the borings to a maximum depth of 15 feet, and on our general experience in the project area, seismic site Class D applies to this site in accordance with the 2015 Michigan Building Code (MBC) referencing Table 20.3-1 in ASCE Standard ASCE/SEI 7-10.

4.4 CONSTRUCTION CONSIDERATIONS

To confirm the recommendations of this report, SME must be present during the mass undercut to verify unsuitable soils are removed, suitable natural inorganic soils are encountered, undercut excavations are properly oversized, exposed subgrades are properly stabilized, and engineered fill is properly placed.

We expect excavations will extend up to about 2 feet below the groundwater. Therefore, groundwater control will be necessary to complete the mass excavations to remove the unsuitable soils, as discussed previously. Assuming the undercutting and backfilling is completed sequentially, and coarse, crushed aggregates are used to immediately backfill sequential cuts, standard sump pit and pumping methods using multiple, closely-spaced sumps may be suitable to control groundwater in localized areas for the temporary undercuts. In excavation areas where groundwater accumulates, a working surface of either crushed aggregate or crushed concrete should be established to protect the exposed surface from disturbance.

The contractor must provide a safely sloped excavation or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. Additionally, if material is stored or equipment is operated near an excavation, use stronger shoring to resist the extra pressure due to the superimposed loads.

Handling, transportation, and disposal of excavated materials should be performed in accordance with applicable environmental regulations.

5. SIGNATURES

Prepared By:

Zachary L. Miller, PE
Project Engineer

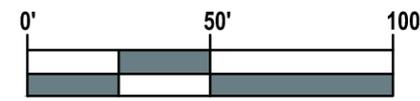
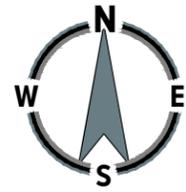
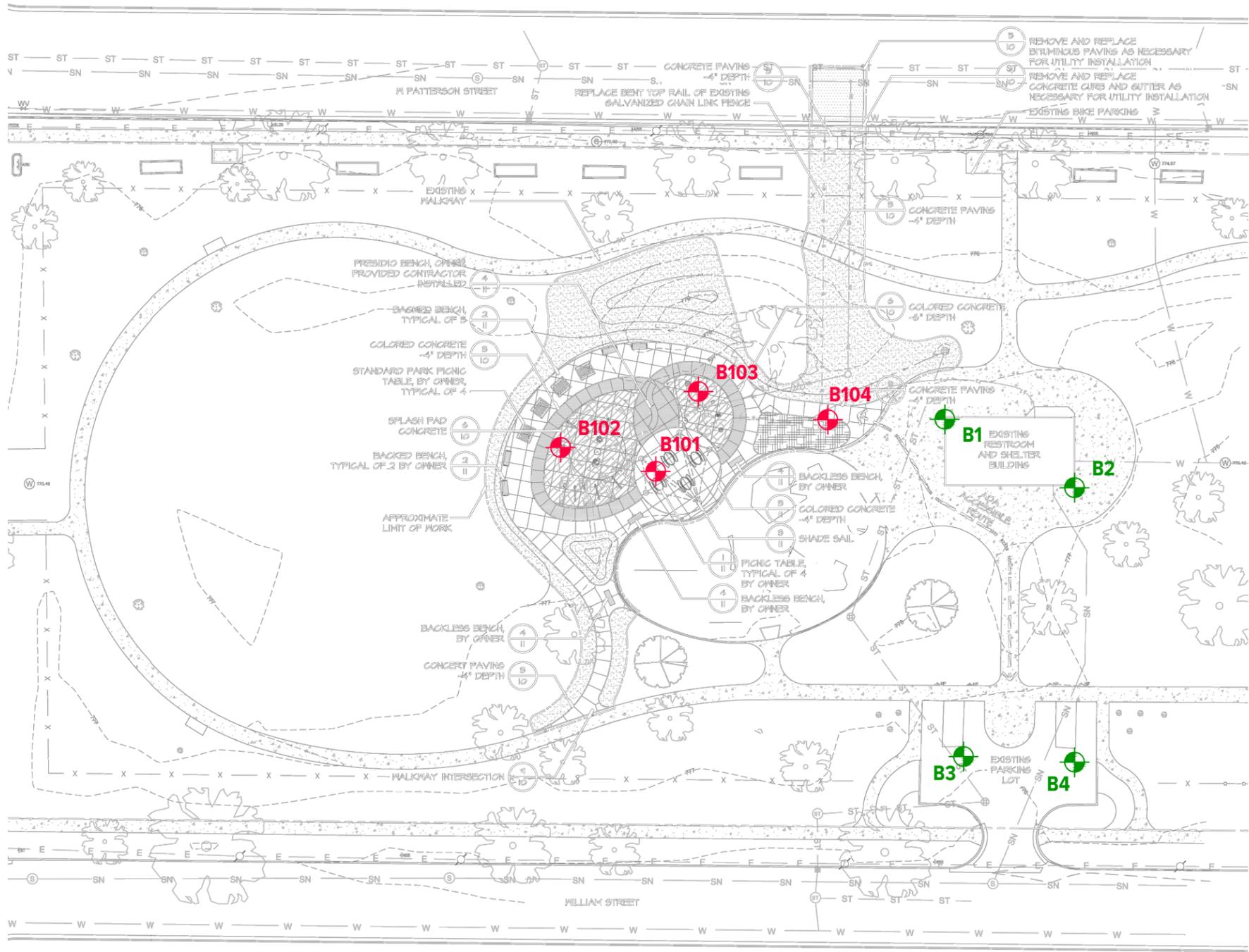
Reviewed By:

Andrew T. Bolton, PE
Senior Consultant

APPENDIX A
BORING LOCATION DIAGRAM (FIGURE NO. 1)
BORING LOG TERMINOLOGY
BORING LOGS (B101 THROUGH B104)

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PLOT DATE: Jun 10, 2020 - 9:50am - matt.nowakrochford



GRAPHIC SCALE: 1" = 50'

LEGEND

-  APPROXIMATE LOCATION OF BORING
-  APPROXIMATE LOCATION OF 2010 SME BORING (SME PROJECT NO. KG61883)



LOCATION MAP

NOT TO SCALE



NOTE:
BASE DRAWING INFORMATION TAKEN FROM A DRAWING TITLED "SITE PLAN", SHEET NO. 1, PREPARED BY MCSA GROUP, INC. WITH A DATE OF MAY 7, 2020.



Project
LA CRONE PARK
SPLASHPAD AND
SITE IMPROVEMENTS

Project Location

KALAMAZOO,
MICHIGAN

Sheet Name

BORING LOCATION
DIAGRAM

No.	Revision Date

Date	06/05/2020
CADD	MNR
Designer	ZM
Scale	AS NOTED
Project	084004.00

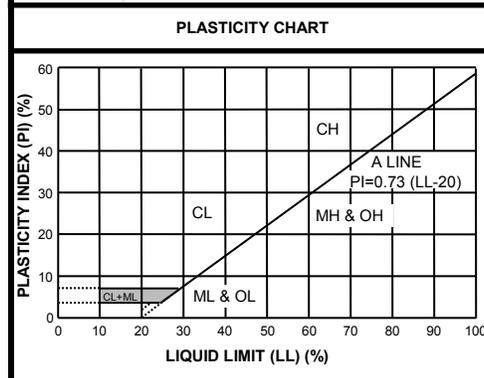
Figure No.
1

DRAWING NOTE: SCALE DEPICTED IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA
NO REPRODUCTION SHALL BE MADE WITHOUT THE PRIOR CONSENT OF SME
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UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
COARSE-GRAINED SOIL (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravel (Less than 5% fines)		
GRAVEL More than 50% of coarse fraction larger than No. 4 sieve size		GW Well-graded gravel; gravel-sand mixtures, little or no fines
		GP Poorly-graded gravel; gravel-sand mixtures, little or no fines
Gravel with fines (More than 12% fines)		
		GM Silty gravel; gravel-sand-silt mixtures
		GC Clayey gravel; gravel-sand-clay mixtures
Clean Sand (Less than 5% fines)		
SAND 50% or more of coarse fraction smaller than No. 4 sieve size		SW Well-graded sand; sand-gravel mixtures, little or no fines
		SP Poorly graded sand; sand-gravel mixtures, little or no fines
Sand with fines (More than 12% fines)		
		SM Silty sand; sand-silt-gravel mixtures
		SC Clayey sand; sand-clay-gravel mixtures
FINE-GRAINED SOIL (50% or more of material is smaller than No. 200 sieve size)		
SILT AND CLAY Liquid limit less than 50%		ML Inorganic silt; sandy silt or gravelly silt with slight plasticity
		CL Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
		OL Organic silt and organic clay of low plasticity
SILT AND CLAY Liquid limit 50% or greater		MH Inorganic silt of high plasticity, elastic silt
		CH Inorganic clay of high plasticity, fat clay
		OH Organic silt and organic clay of high plasticity
HIGHLY ORGANIC SOIL		PT Peat and other highly organic soil

OTHER MATERIAL SYMBOLS		
		
Topsoil	Void	Sandstone
		
Asphalt	Glacial Till	Siltstone
		
Base	Coal	Limestone
		
Concrete	Shale	Fill

LABORATORY CLASSIFICATION CRITERIA	
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
GP	Not meeting all gradation requirements for GW
GM	Atterberg limits below "A" line or PI less than 4
GC	Atterberg limits above "A" line with PI greater than 7
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
SP	Not meeting all gradation requirements for SW
SM	Atterberg limits below "A" line or PI less than 4
SC	Atterberg limits above "A" line with PI greater than 7
<p>Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:</p> <p>Less than 5 percent.....GW, GP, SW, SP More than 12 percent.....GM, GC, SM, SC 5 to 12 percent.....Cases requiring dual symbols</p> <ul style="list-style-type: none"> • SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel) • SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel) • GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand) • GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand) <p>If the fines are CL-ML:</p> <ul style="list-style-type: none"> • SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel) • SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel) • GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand) • GM-GC (CLAYEY SILTY GRAVEL or CLAYEY SILTY GRAVEL with Sand) 	
PARTICLE SIZES	
Boulders	- Greater than 12 inches
Cobbles	- 3 inches to 12 inches
Gravel- Coarse	- 3/4 inches to 3 inches
Gravel- Fine	- No. 4 to 3/4 inches
Sand- Coarse	- No. 10 to No. 4
Sand- Medium	- No. 40 to No. 10
Sand- Fine	- No. 200 to No. 40
Silt and Clay	- Less than (0.0074 mm)



CLASSIFICATION TERMINOLOGY AND CORRELATIONS			
Cohesionless Soils		Cohesive Soils	
Relative Density	N-Value (Blows per foot)	Consistency	Undrained Shear Strength (kips/ft²)
Very Loose	0 to 4	Very Soft	0 - 2
Loose	4 to 10	Soft	2 - 4
Medium Dense	10 to 30	Medium	4 - 8
Dense	30 to 50	Stiff	8 - 15
Very Dense	50 to 80	Very Stiff	15 - 30
Extremely Dense	Over 80	Hard	> 30
Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted.			

VISUAL MANUAL PROCEDURE
When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:
For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:
<ul style="list-style-type: none"> • SC/CL (CLAYEY SAND to Sandy LEAN CLAY) • SM/ML (SILTY SAND to SANDY SILT) • GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY) • GM/ML (SILTY GRAVEL to Gravelly SILT)
For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay:
<ul style="list-style-type: none"> • SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand) • SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand) • SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand) • SW/SP (SAND or SAND with Gravel) • GP/GW (GRAVEL or GRAVEL with Sand) • SC/SM (CLAYEY to SILTY SAND) • GM/GC (SILTY to CLAYEY GRAVEL) • CL/ML (SILTY CLAY) • ML/CL (CLAYEY SILT) • CH/MH (FAT CLAY to ELASTIC SILT) • CL/CH (LEAN to FAT CLAY) • MH/ML (ELASTIC SILT to SILT) • OL/OH (ORGANIC SILT or ORGANIC CLAY)

DRILLING AND SAMPLING ABBREVIATIONS	
2ST	- Shelby Tube - 2" O.D.
3ST	- Shelby Tube - 3" O.D.
AS	- Auger Sample
GS	- Grab Sample
LS	- Liner Sample
NR	- No Recovery
PM	- Pressure Meter
RC	- Rock Core diamond bit. NX size, except where noted
SB	- Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	- Vane Shear
WS	- Wash Sample

OTHER ABBREVIATIONS	
WOH	- Weight of Hammer
WOR	- Weight of Rods
SP	- Soil Probe
PID	- Photo Ionization Device
FID	- Flame Ionization Device

DEPOSITIONAL FEATURES	
Parting	- as much as 1/16 inch thick
Seam	- 1/16 inch to 1/2 inch thick
Layer	- 1/2 inch to 12 inches thick
Stratum	- greater than 12 inches thick
Pocket	- deposit of limited lateral extent
Lens	- lenticular deposit
Hardpan/Till	- an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	- soil deposited by lake water
Mottled	- soil irregularly marked with spots of different colors that vary in number and size
Varved	- alternating partings or seams of silt and/or clay
Occasional	- one or less per foot of thickness
Frequent	- more than one per foot of thickness
Interbedded	- strata of soil or beds of rock lying between or alternating with other strata of a different nature



PROJECT NAME: La Crone Park Splashpad and Site Improvements
CLIENT: MCSA Group, Inc.

PROJECT NUMBER: 084004.00
PROJECT LOCATION: Kalamazoo, Michigan

DATE STARTED: 5/26/20

COMPLETED: 5/26/20

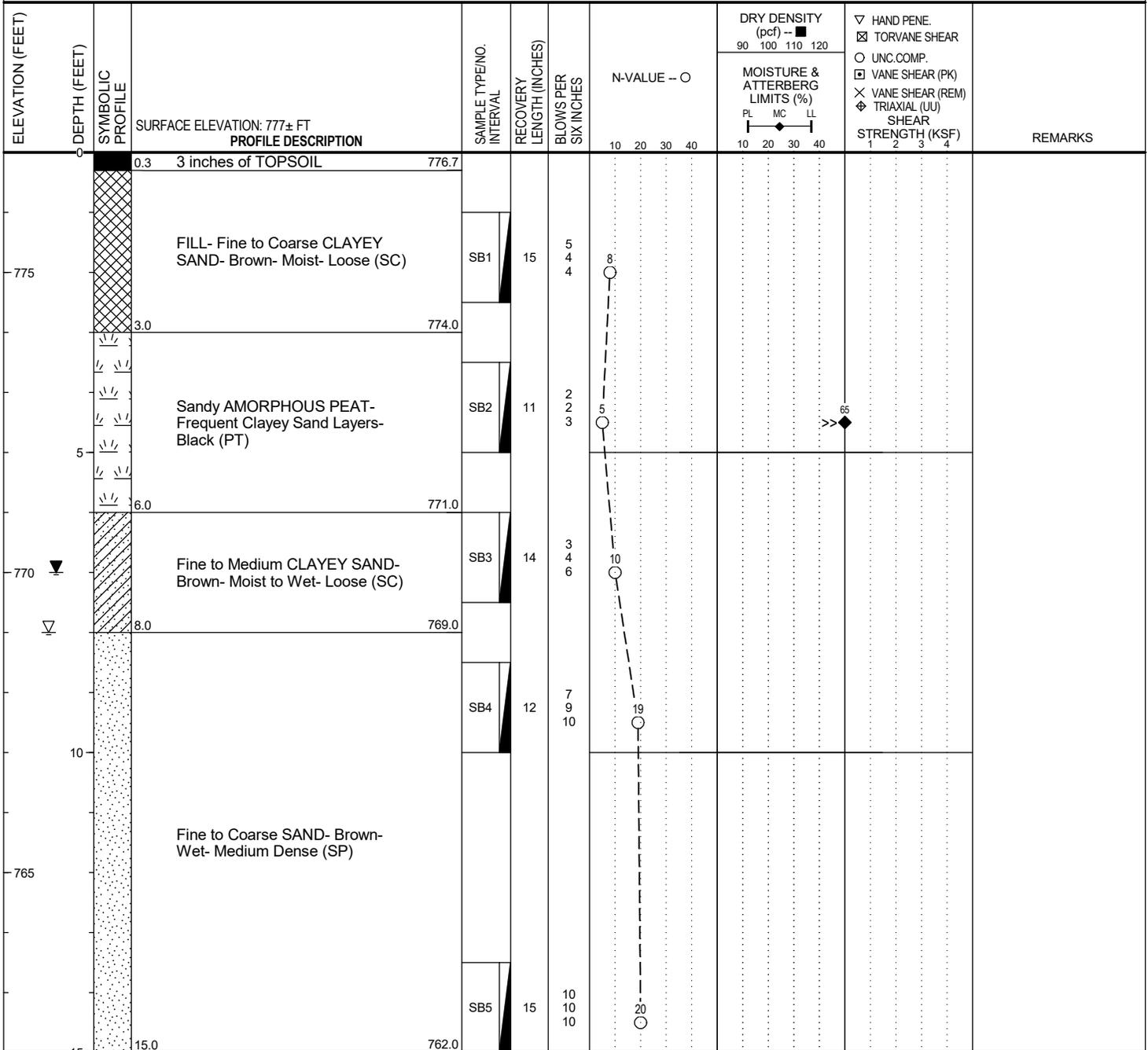
BORING METHOD: Solid-stem Augers

DRILLER: JR/WN

RIG NO.: 281-CME45B-Truck

LOGGED BY: ZLM

CHECKED BY: KJG



END OF BORING AT 15.0 FEET.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	8.0	769.0
▽ AT END OF BORING:	7.0	770.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.



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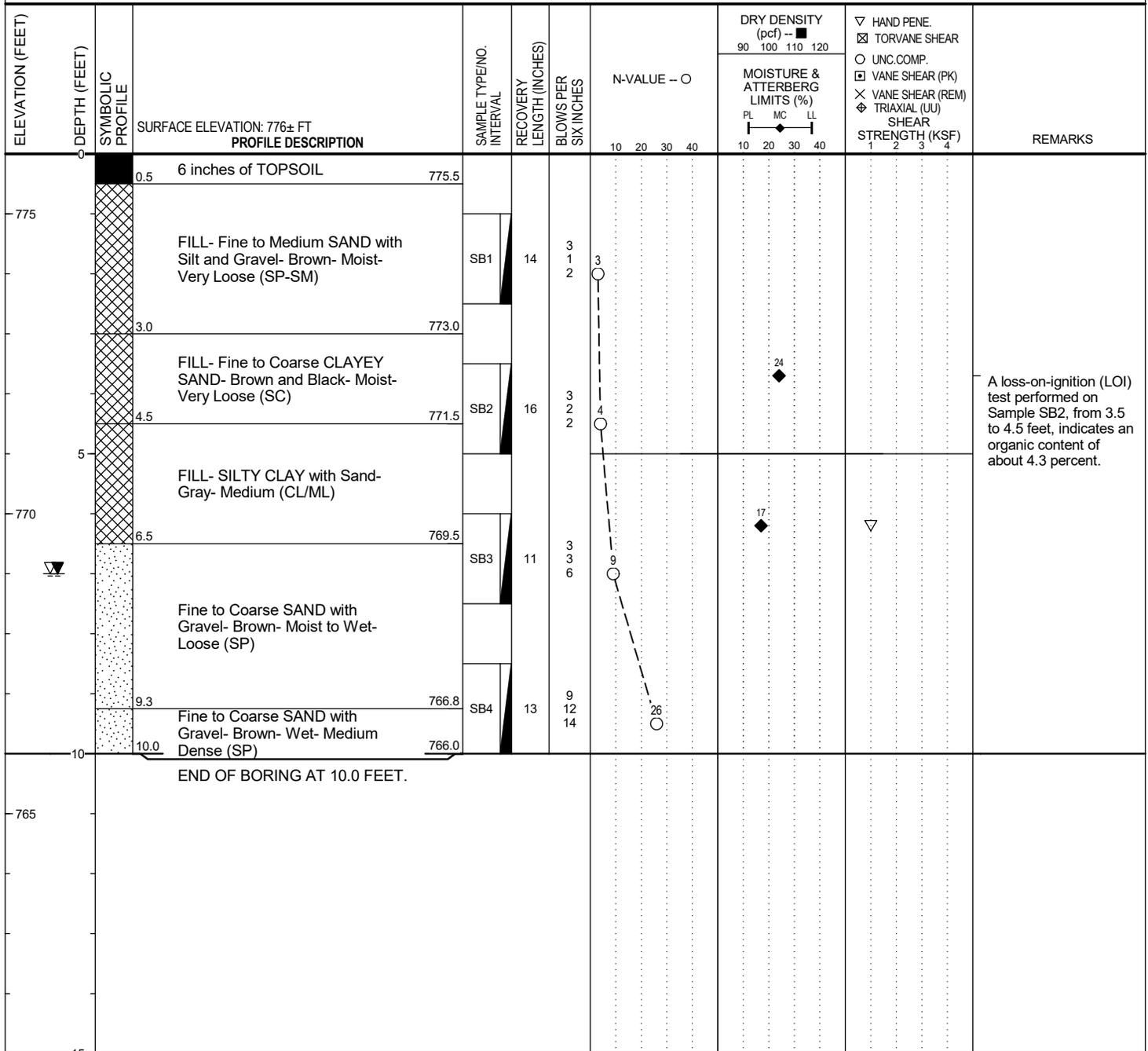
BORING METHOD: Solid-stem Augers

DRILLER: JR/WN

RIG NO.: 281-CME45B-Truck

LOGGED BY: ZLM

CHECKED BY: KJG



GROUNDWATER & BACKFILL INFORMATION		
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	7.0	769.0
▼ AT END OF BORING:	7.0	769.0
BACKFILL METHOD: Auger Cuttings		

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.



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RIG NO.: 281-CME45B-Truck

LOGGED BY: ZLM

CHECKED BY: KJG

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	SURFACE ELEVATION: 777± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○	DRY DENSITY (pcf) -- ■		MOISTURE & ATTERBERG LIMITS (%)	▽ HAND PENE. <input checked="" type="checkbox"/> TORVANE SHEAR <input type="checkbox"/> UNC.COMP. <input checked="" type="checkbox"/> VANE SHEAR (PK) <input checked="" type="checkbox"/> VANE SHEAR (REM) <input checked="" type="checkbox"/> TRIAXIAL (UU) SHEAR STRENGTH (KSF)	REMARKS
								90	100			
	0											
	0.8		FILL- 10 inches of SAND									
775			FILL- Fine to Medium SAND with Silt- Brown- Moist- Very Loose (SP-SM)	SB1	11	2 2 2	4					
	3.0											
			Sandy AMORPHOUS PEAT- Occasional Clayey Sand Layers- Black (PT)	SB2	16	2 4 5	9				51	
	4.8											
5	5.0		Fine to Medium SAND with Silt- Brown- Moist (SP-SM)									
			END OF BORING AT 5.0 FEET.									
770												
10												
765												
15												

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

GENERAL COMMENTS

LABORATORY TESTING PROCEDURES

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110° C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440° C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a 1/2-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool 1/2 inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.



*Passionate People Building
and Revitalizing our World*





DRAWINGS/PLANS

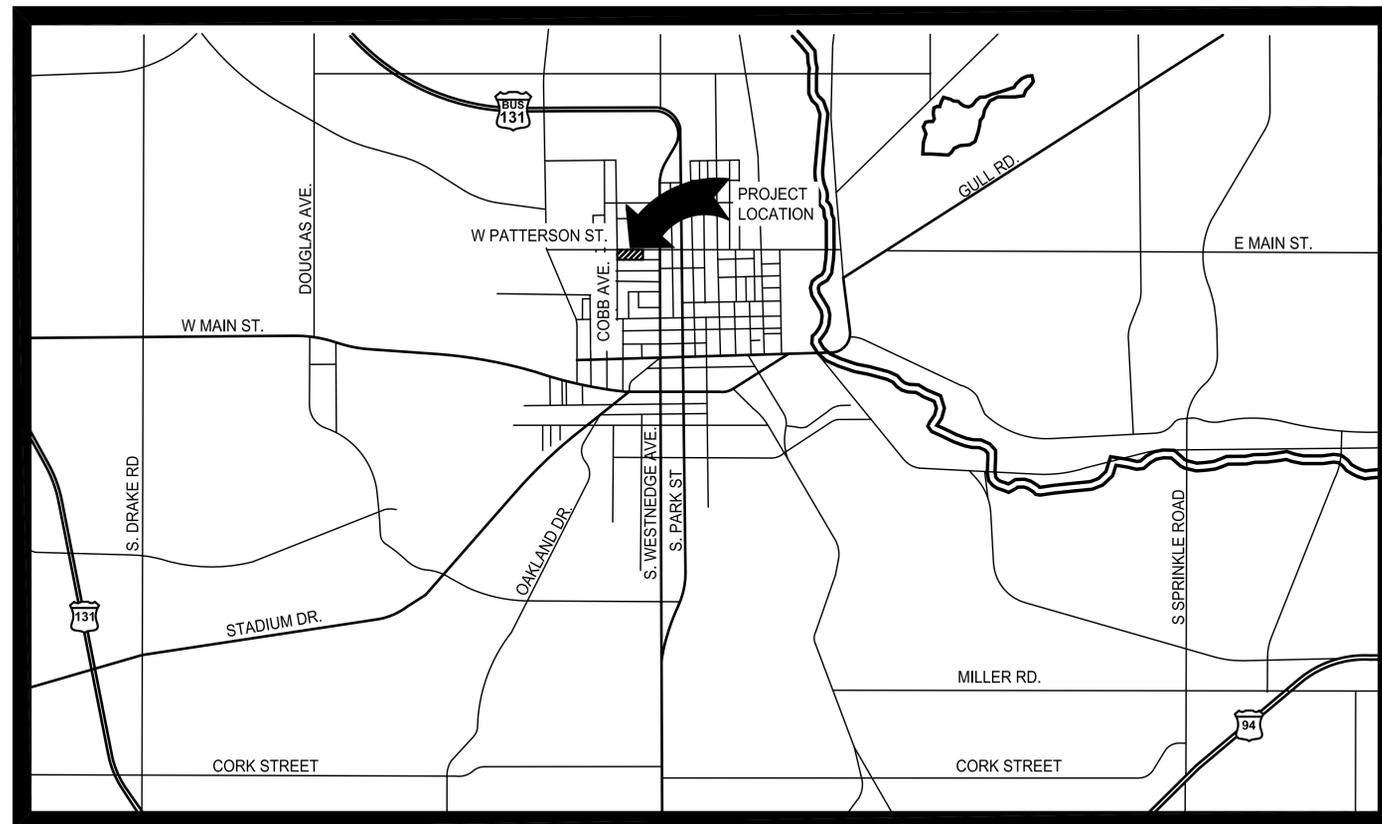
LaCrone Splash Pad Improvements

Bid Reference #: 91244-011.0

September 2020

CONSTRUCTION PLANS LA CRONE PARK SPLASHPAD IMPROVEMENTS

City Of Kalamazoo
09.24.2020



LOCATION MAP

NOT TO SCALE



SHEET INDEX

- 1 Site Plan
- 2 Existing Conditions and Removals Plan
- 3 Layout Plan
- 4 Layout Plan Enlargements
- 5 Grading and Drainage Plan
- 6 Not Used
- 7 Splashpad Plan and Details
- 8 Landscape and SESC Plan
- 9 Utility Plan
- 10-11 Construction Details
- 12 Survey

CONSULTING TEAM MEMBERS:

SUMMIT SURVEYING, INC.
TOPOGRAPHIC SURVEY



SUMMIT SURVEYING, INC.
P.O. Box 410
Allendale, MI 49401
Phone (616) 895-7190
Fax (616) 895-7191

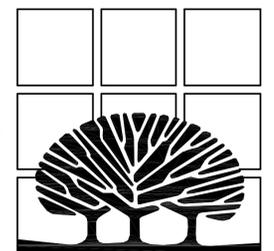
SME
GEOTECHINCAL EVALUATION REPORT

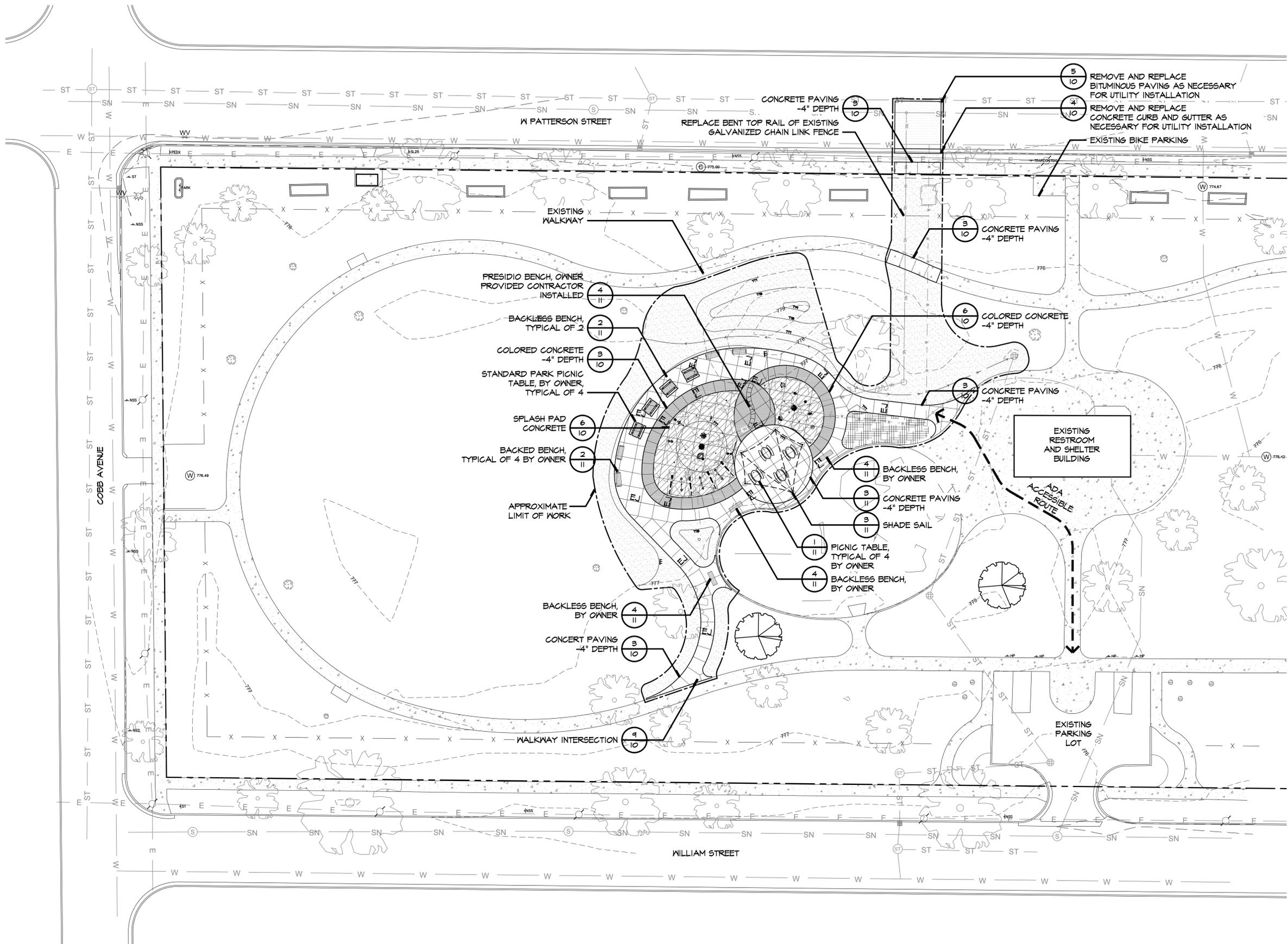
SME PROJEDCT NO. 084004.00
3301 Tech Circle Drive
Kalamazoo, MI 49008-5611
Phone (269) 323-3555

MCSA GROUP, INC.

Landscape Architecture • Park & Recreation Planning • Architecture
Downtown Planning • Interior Design • Sports Facility Planning

529 Greenwood Avenue S.E. • East Grand Rapids, MI 49506
616-451-3346 • FAX: 616-451-1935 • EMAIL: tas@mcsagroup.com





SITE CALCULATIONS:

GROSS SITE AREA: 217,492 SF/4.99 Acres
 EXISTING IMPERVIOUS SURFACE: 44,034 SF
 PROPOSED IMPERVIOUS SURFACE: 1,230 SF
 TOTAL IMPERVIOUS SURFACE: 51,264 SF
 PERCENTAGE OF IMPERVIOUS SURFACE INCREASE: 3.32%
 EXISTING BARRIER FREE PARKING: 4 SPACES
 EXISTING BIKE PARKING: 7
 TOTAL TREES (10" DBH OR GREATER) IN WORK AREA: 27
 TOTAL TREES REMOVED: 2

SITE GENERAL NOTES:

1. SITE PLAN SHOWN FOR GENERAL INFORMATION AND DETAIL. REFERENCE ONLY. SEE FOLLOWING PLAN SHEETS FOR SITE LAYOUT, GRADING, AND LANDSCAPE INFORMATION.
2. SEE SHEET 1 FOR PLAN SPLASHPAD EQUIPMENT.
3. CONTRACTOR SHALL PURCHASE AND STORE SPLASHPAD EQUIPMENT PRIOR TO THE END OF THE 2020 YEAR TO AVOID COST INCREASE. IF NOT PURCHASED WITHIN THE 2020 YEAR, ADDITIONAL COST WILL BE AT THE CONTRACTORS EXPENSES.

COMPLIANCE:

- ALL CONSTRUCTION SHALL CONFORM TO ALL ASPECTS OF THE STATE OF MICHIGAN BUILDING CODE (MBC), THE ADA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG) AND THE AMERICANS WITH DISABILITIES ACT (ADA). ALL WORK BY THE CONTRACTOR FOR COMPLETE EXECUTION OF THIS PROJECT SHALL MEET OR EXCEED LAWS, GUIDELINES, AND STATUTES IN EVERY SITUATION. IN THE EVENT THE CONTRACTOR BELIEVES THAT ANY PORTION OF THE WORK IS INCONSISTENT WITH THE MBC, ADAAG, AND ADA THEY MUST IMMEDIATELY INFORM THE LANDSCAPE ARCHITECT.

LEGEND

- DETAIL NUMBER SHEET NUMBER
- 4" CONCRETE PAVEMENT WITH CONTROL JOINTS
- 4" COLORED CONCRETE (SEE SPLASHPAD PLANS FOR COLOR PATTERN)
- SPLASHPAD CONCRETE (SEE SPLASHPAD PLANS FOR COLOR PATTERN)
- BITUMINOUS PAVING
- PLANTING BED WITH WOOD MULCH
- LAWN SEEDING
- EJ EXPANSION JOINT
- LIMIT OF WORK LINE
- X-X-X- EXISTING CHAINLINK FENCE TO REMAIN

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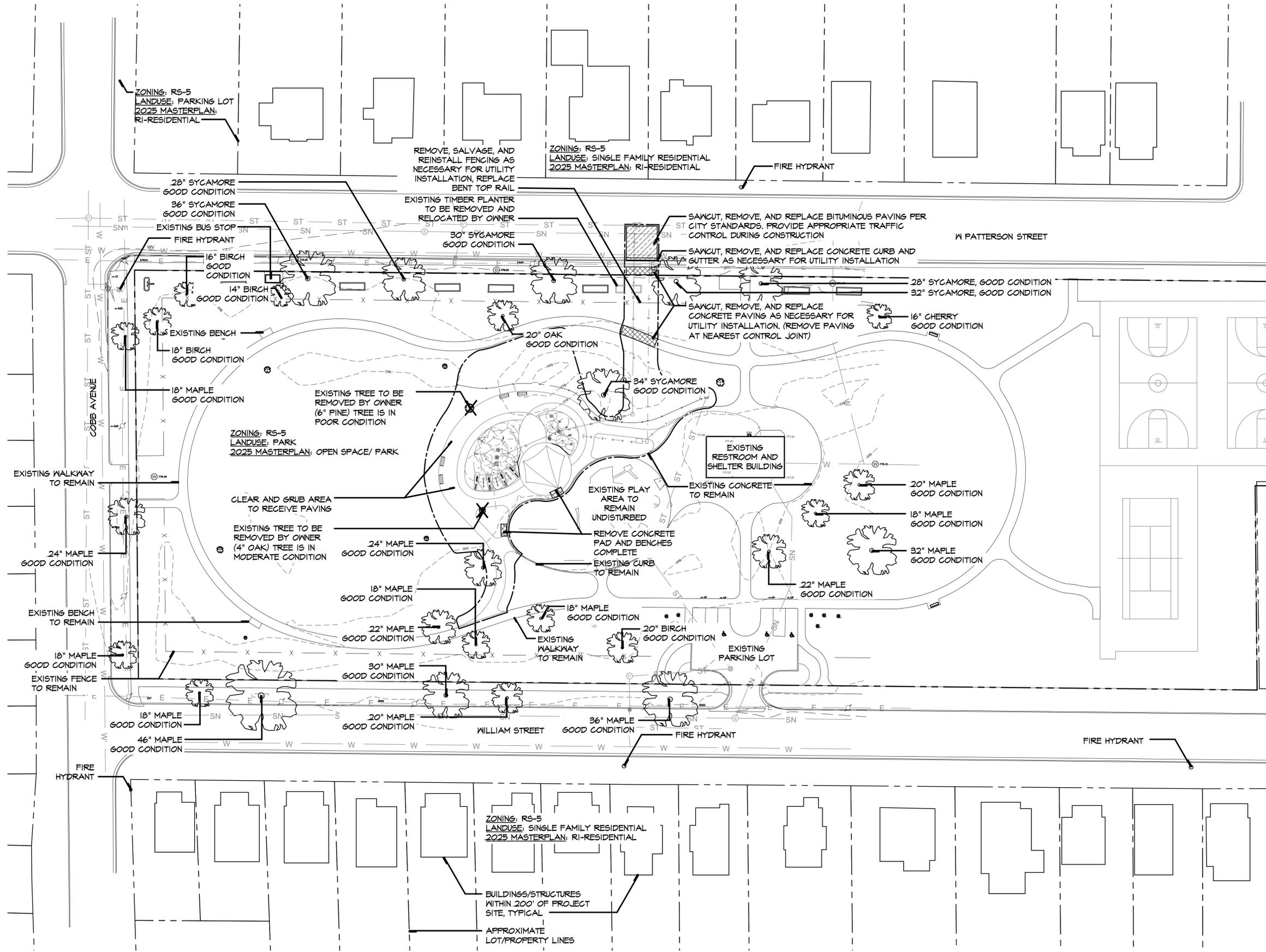
La Crone Park Splashpad Improvements
 Kalamazoo, MI

MCSA GROUP, INC.
 Landscape Architecture • Park & Recreation Planning • Architecture
 Downtown Planning • Interior Design • Sports Facility Planning
 529 Greenwood Avenue S.E. • East Grand Rapids, MI 49506
 616-451-3346 • FAX: 616-451-1935 • EMAIL: tas@mcsagroup.com



Site Plan

DATE	09.24.2020	PROJECT NO.	2029
REVISIONS		SHEET NO.	1



EXISTING CONDITIONS AND REMOVALS GENERAL NOTES:

1. TOPOGRAPHIC SURVEY BY:
 - SUMMIT SURVEYING, INC.
 - P.O. Box 410
 - Allendale, MI 49401
 - Phone (616) 895-7190
 - Fax (616) 895-7191
2. THE CONTRACTOR IS TO LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION OPERATIONS. CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGES TO UTILITIES CAUSED BY THEIR WORK. CONTACT MISS DIG FOR CONFIRMATION OF UTILITY LOCATIONS (1-800-482-7171).
3. PROTECT ALL TREES. DO NOT OPERATE EQUIPMENT, STORE, STOCKPILE, OR PARK WITHIN DRIPLINE OF TREES. HOLD NECESSARY DISTURBANCE TO A MINIMUM.
4. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR DAMAGE TO ITEMS NOT SCHEDULED FOR REMOVAL.
5. REMOVAL ITEMS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION AND ARE SHOWN SCHEMATICALLY. THE CONTRACTOR SHALL WALK THE SITE PRIOR TO BID TO BE FULLY FAMILIAR WITH THE EXTENT OF REMOVAL ITEMS. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVALS NECESSARY TO COMPLETE CONSTRUCTION. QUESTIONS REGARDING ITEMS TO BE REMOVED SHALL BE DIRECTED TO THE LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL STRIP AND STOCKPILE TOPSOIL AND DISTRIBUTE A MINIMUM OF 4" OF TOPSOIL ON ALL DISTURBED AREAS AT COMPLETION OF SITE GRADING. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED PER PLANTING PLANS AND SPECIFICATIONS.
7. CONTOURS ARE BASED ON NAVD83 DATUM

REMOVALS LEGEND:

- SAWCUT LINE
- CONCRETE TO BE REMOVED
- BITUMINOUS PAVEMENT TO BE REMOVED
- LIMIT OF WORK LINE
- REMOVE EXISTING TREE COMPLETE

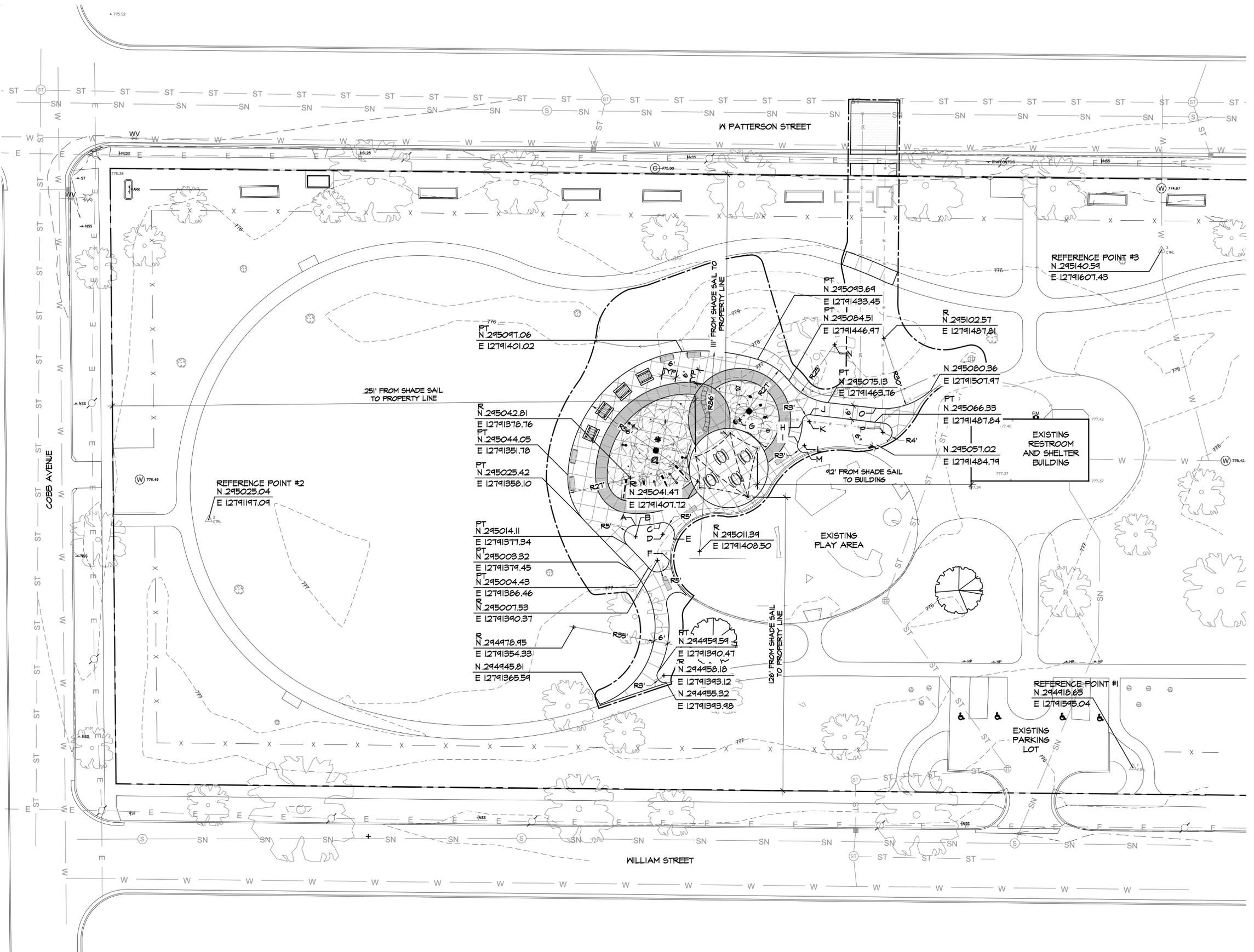
EXISTING CONDITIONS LEGEND:

- DECIDUOUS TREE
- CONIFEROUS TREE
- SITE LIGHT
- UTILITY POLE
- GUY ANCHOR
- ELECTRICAL
- CHAINLINK FENCE



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COORDINATION TABLE

KEY	COORDINATES
A	N 245022.59, E 12791380.93
B	N 245017.59, E 12791380.93
C	N 245023.60, E 12791391.58
D	N 245019.71, E 12791392.64
E	N 245016.64, E 12791397.19
F	N 245007.67, E 12791395.37
G	N 245067.81, E 12791425.75
H	N 245067.03, E 12791452.74
I	N 245057.85, E 12791450.85
J	N 245069.97, E 12791456.08
K	N 245066.99, E 12791455.74
L	N 245056.75, E 12791453.63
M	N 245053.98, E 12791454.78
N	N 245099.97, E 12791466.61
O	N 245072.77, E 12791484.39
P	N 245062.36, E 12791487.38

REFERENCE POINTS

REFERENCE POINTS ARE 18" REBAR WITH RED "SUMMIT SURVEYING" CAP. ELEVATIONS ARE BASED ON NAVD83 DATUM. USE REFERENCE POINTS AS BENCHMARKS.

Point	Northing	Easting	Elevation
1	244,918.65	12,791,595.04	776.25
2	245,025.04	12,791,917.09	776.83
3	245,140.59	12,791,607.43	775.33

LAYOUT LEGEND

- PCC POINT OF COMPOUND CURVATURE
- PT POINT OF TANGENCY
- R RADIUS POINT

LAYOUT GENERAL NOTES

1. ALL LAYOUT IS TO BE STAKED BY THE CONTRACTOR FOR APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.
2. NORTHINGS AND EASTINGS REFLECT THE CENTERLINE OF THE PATHS AND MAJOR END POINTS OF SITE ELEMENTS. AN EFFORT HAS BEEN MADE TO MINIMIZE THE DISTURBANCE OF MATURE TREES AND OTHER EXISTING NATURAL SITE FEATURES. THESE NORTHINGS AND EASTINGS MAY ONLY BE ADJUSTED WITH THE APPROVAL OF THE LANDSCAPE ARCHITECT.
3. CONTRACTOR SHALL VERIFY IN THE FIELD ALL LINES AND DIMENSIONS INDICATED IN THE PLANS AND REPORT ANY INCONSISTENCIES TO THE LANDSCAPE ARCHITECT FOR RESOLUTION.
4. ALL ANGLES ARE PERPENDICULAR UNLESS OTHERWISE NOTED.
5. CONTRACTOR SHALL BE PROVIDED ELECTRONIC COPY IN AUTOCAD 2018 FOR ALL LAYOUT AND GRADING CONTROL.

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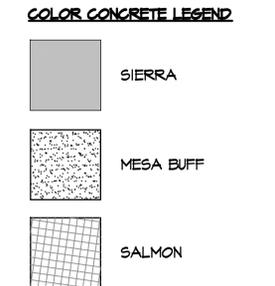
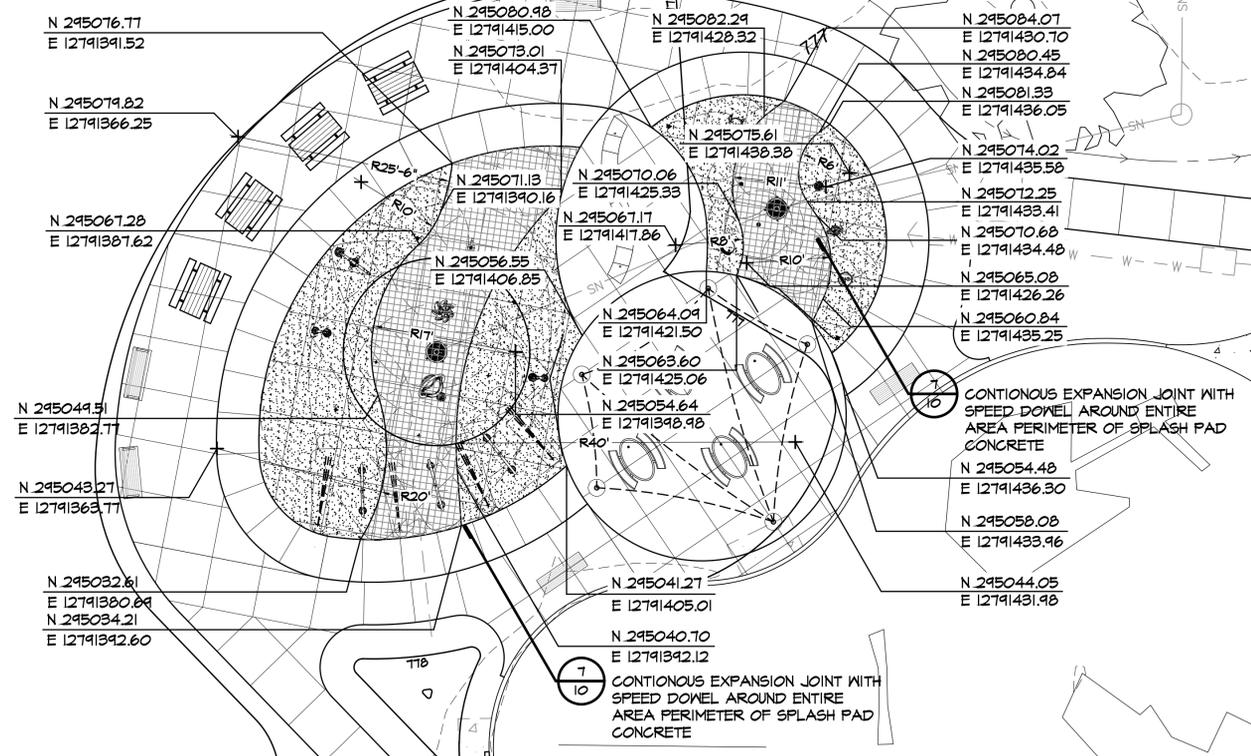
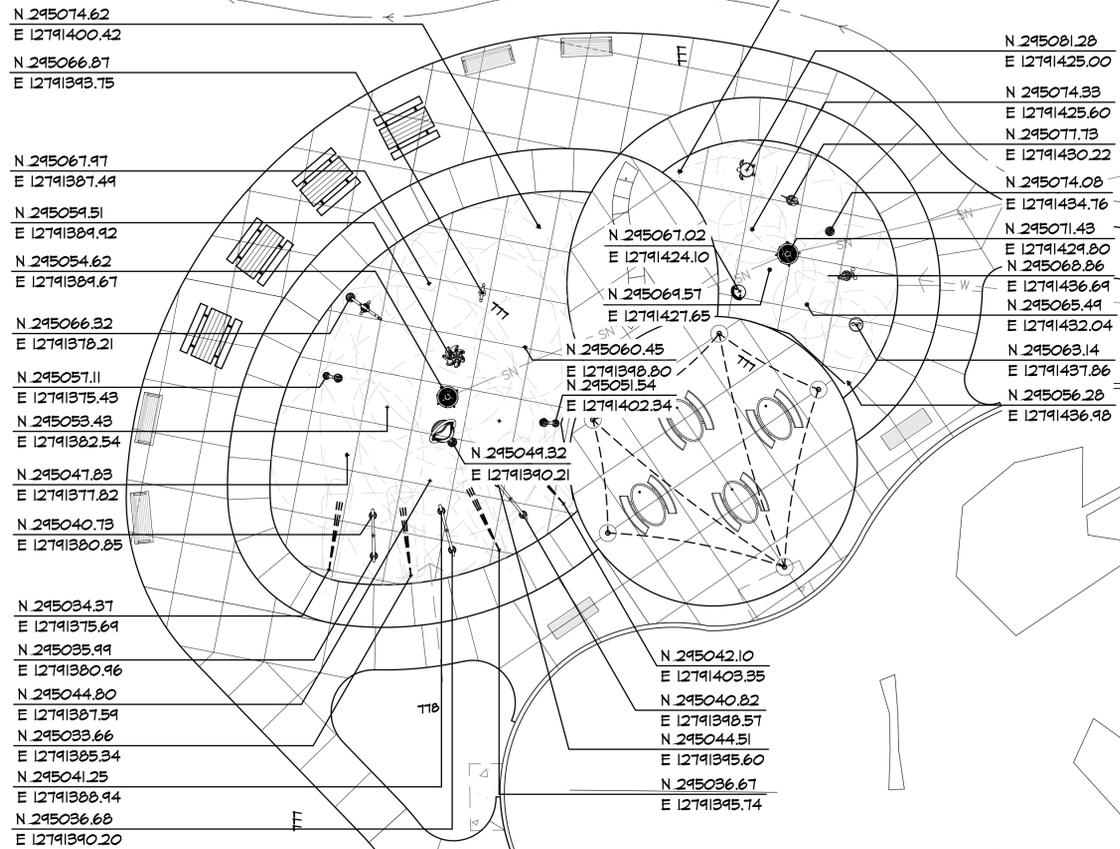
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SCALE:
1" = 20'

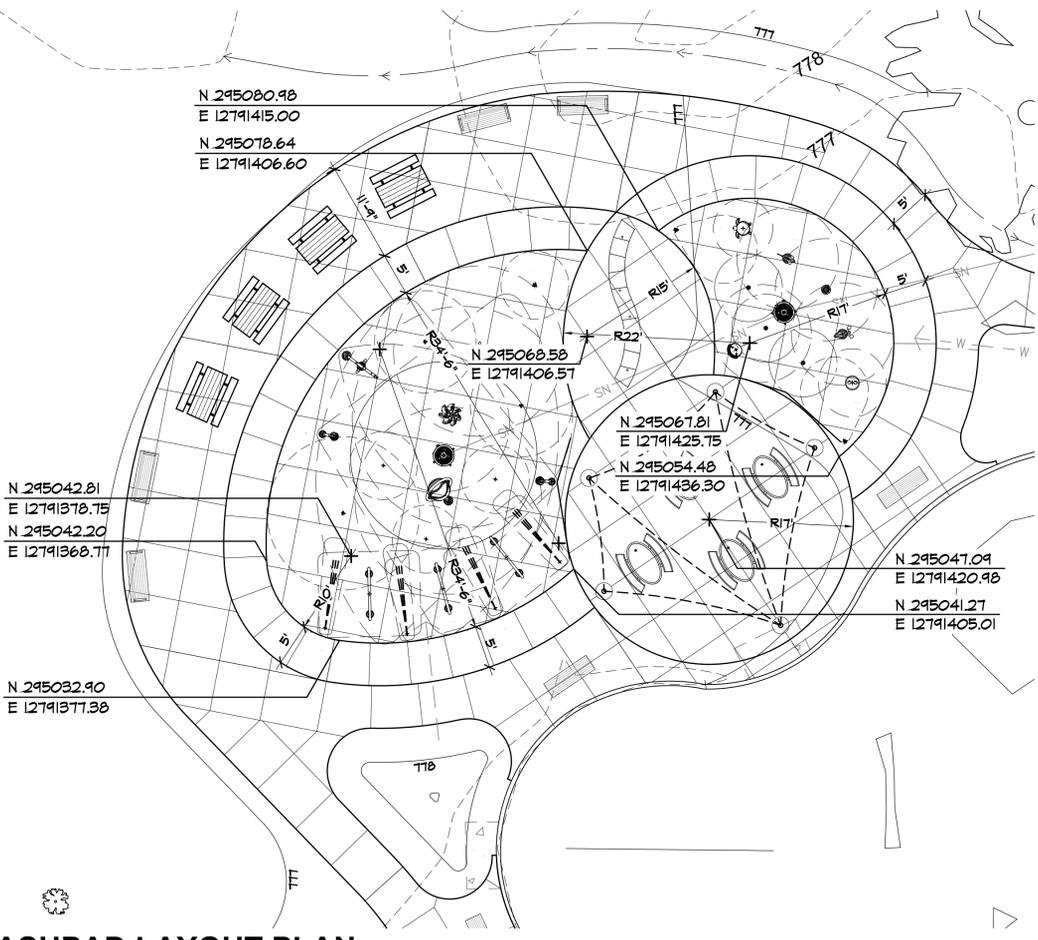
DATE	REVISIONS
09.24.2020	

PROJECT NO.	SHEET NO.
2029	3



- COLOR CONCRETE NOTES:**
- COLOR ADDITIVES FOR INTEGRALLY COLORED CONCRETE SHALL BE DAVIS COLORS.
 - SUBMIT PRODUCT DATA MANUFACTURERS INSTRUCTIONS FOR COLOR ADDITIVES CURING COMPOUNDS.
 - SUBMIT SAMPLES FOR COLOR SELECTION BY LANDSCAPE ARCHITECT.
 - PROVIDE ON SITE 3' X 3' MOCK UP FOR REVIEW BY LANDSCAPE ARCHITECT.
 - CONCRETE CONTRACTION JOINTS SHALL BE INSTALLED 5'-0" ON CENTER.

COLORED CONCRETE LAYOUT PLAN
1" = 10'



REFERENCE POINTS:
REFERENCE POINTS ARE 18" REBAR WITH RED "SUMMIT SURVEYING" CAP. ELEVATIONS ARE BASE ON NAVD88 DATUM. USE REFERENCE POINTS AS BENCHMARKS.

Point	Northing	Easting	Elevation
1	244,918.65	12,791,595.04	776.25
2	245,025.04	12,791,197.09	776.83
3	245,140.59	12,791,607.43	775.33

- LAYOUT LEGEND:**
- PCC POINT OF COMPOUND CURVATURE
 - PT POINT OF TANGENCY
 - R RADIUS POINT
 - C CENTER OF CIRCLE

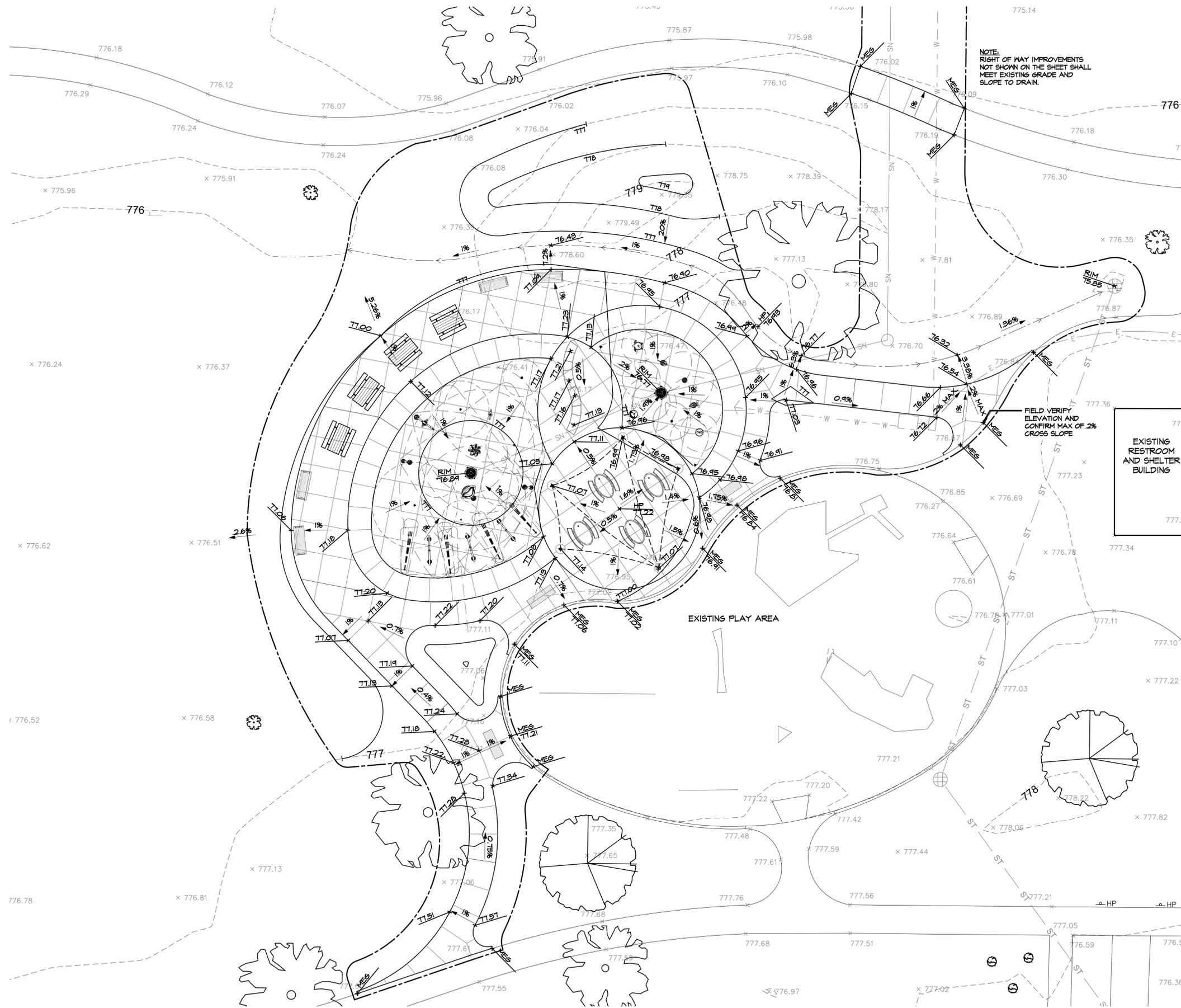
- LAYOUT GENERAL NOTES:**
- ALL LAYOUT IS TO BE STAKED BY THE CONTRACTOR FOR APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION. TRAIL LAYOUT ADJUSTMENT WILL BE MADE BY THE LANDSCAPE ARCHITECT WITH NO CONTRACT CHANGE.
 - NORTHINGS AND EASTINGS REFLECT THE CENTERLINE OF THE TRAILS AND PATHS AND MAJOR END POINTS OF SITE ELEMENTS. AN EFFORT HAS BEEN MADE TO MINIMIZE THE DISTURBANCE OF MATURE TREES AND OTHER EXISTING NATURAL SITE FEATURES. THESE NORTHINGS AND EASTINGS MAY ONLY BE ADJUSTED WITH THE APPROVAL OF THE LANDSCAPE ARCHITECT.
 - CONTRACTOR SHALL VERIFY IN THE FIELD ALL LINES AND DIMENSIONS INDICATED IN THE PLANS AND REPORT ANY INCONSISTENCIES TO THE LANDSCAPE ARCHITECT FOR RESOLUTION.
 - ALL ANGLES ARE PERPENDICULAR UNLESS OTHERWISE NOTED.
 - CONTRACTOR SHALL BE PROVIDED ELECTRONIC COPY IN AUTOCAD 2018 FOR ALL LAYOUT AND GRADING CONTROL.
 - SEE SHEET 3 FOR LAYOUT OF OVERALL ELLIPSE.

SPLASHPAD EQUIPMENT LAYOUT PLAN
1" = 10'

SPLASHPAD LAYOUT PLAN
1" = 10'

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GRADING LEGEND:

HP	HIGH POINT	PROPOSED CONTOUR	
LP	LOW POINT	SPOT GRADE	
MEG	MEET EXISTING GRADE	DIRECTION OF SLOPE	
RIM	RIM ELEVATION	CENTERLINE OF SWALE	
	EXISTING CONTOUR		

GRADING GENERAL NOTES:

1. FINISHED SURFACES TO BE SMOOTH AND EVEN WITH NO ABRUPT OR ANKWARD CHANGES IN GRADE. ADJUSTMENTS TO BE APPROVED BY LANDSCAPE ARCHITECT.
2. GRADE ALL SURFACES AS NOTED ON PLANS, MAXIMUM TRAVERSE SLOPE, OR RUNNING SLOPE SHALL NOT EXCEED 5% (1' IN 20') UNLESS OTHERWISE NOTED. PROPOSED CROSS SLOPES SHALL NOT EXCEED 2% (1' IN 50') UNLESS OTHERWISE NOTED.
3. ANY PAVING IN EXCESS OF THESE SLOPES AND NOT MEETING ADA REQUIREMENTS SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THEIR OWN COST.
4. GRADING LIMIT LINE SHALL BE MAINTAINED AS SHOWN ON THE PLANS.
5. CONTRACTOR TO PROVIDE ANY NECESSARY FILL MATERIAL.
6. ANY EXCESS FILL SHALL BE REMOVED FROM THE SITE.
7. ELEVATIONS ARE BASED ON NAVD83 DATUM (GEOID 12A) UTILIZING MDOT CORS.
8. THE HUNDREDS DIGIT HAS BEEN OMITTED FROM SOME GRADES. ADD 100 TO MATCH SURVEYED ELEVATIONS, DEPENDING ON SPOT ELEVATION LOCATION.
9. CONTRACTOR SHALL EXCAVATE A MINIMUM OF 4'-0" BELOW SPLASH PAD PAVING AND SHADE SAIL AREA. THIS EXCAVATION AND BACKFILLING WITH APPROPRIATE FILL SHALL BE PART OF CONTRACTORS BASE BID. PRIOR TO BACKFILLING SUB GRADE SHALL BE REVIEWED BY GEOTECHNICAL ENGINEER/TESTING COMPANY. IF ADDITIONAL EXCAVATION IS REQUIRED CONTRACTOR SHALL BE PAID USING UNIT PRICE ON BID FORM.

COMPLIANCE NOTE:

- ALL CONSTRUCTION SHALL CONFORM TO ALL ASPECTS OF THE STATE OF MICHIGAN BUILDING CODE (MBC), UNIFORM FEDERAL ACCESSIBILITY STANDARDS (UFAS), THE ADA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG) AND THE AMERICANS WITH DISABILITIES ACT (ADA). ALL WORK BY THE CONTRACTOR FOR COMPLETE EXECUTION OF THIS PROJECT SHALL MEET OR EXCEED LAWS, GUIDELINES, AND STATUTES IN EVERY SITUATION. IN THE EVENT THE CONTRACTOR BELIEVES THAT ANY PORTION OF THE WORK IS INCONSISTENT WITH THE MBC, UFAS, ADAAG, AND ADA THEY MUST IMMEDIATELY INFORM THE LANDSCAPE ARCHITECT.

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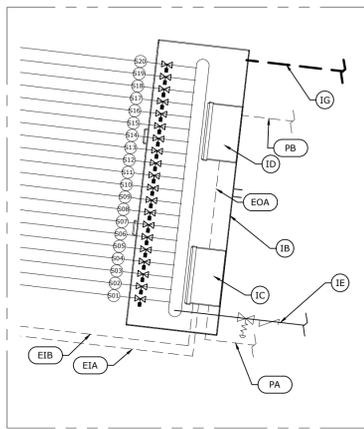


1 PIPING

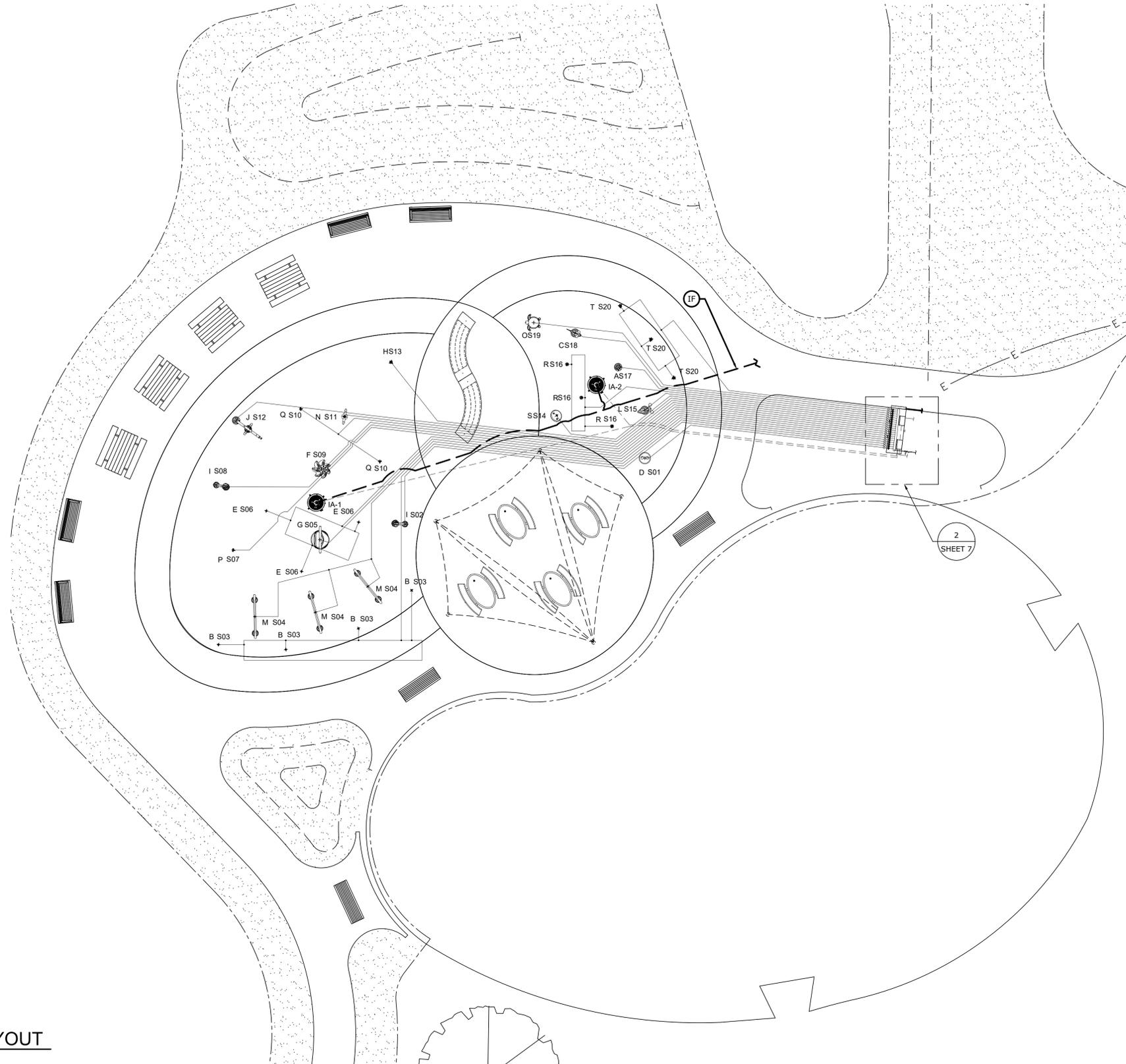
- 1.1 WDS CONFIGURATION ARE SCHEMATIC AND MAY BE MOVED OR ADJUSTED ON SITE BY VORTEX CERTIFIED INSTALLER TO ADJUST FOR SITE CONDITIONS
- 1.2 ANY REQUIRED BACKFLOW PREVENTER, PRESSURE REGULATOR AND WATER METER ON THE CITY WATER MAIN SHALL BE PROVIDED BY INSTALLER.
- 1.3 ALL PIPE LINES TO FEATURES TO HAVE A 1% MINIMUM RECOMMENDED SLOPE FOR PROPER WINTERIZATION.
- 1.4 ALL LINE SIZING (FEATURE CONNECTION TABLE) ASSUMES A MAXIMUM DISTANCE OF 135 FEET BETWEEN THE WATER DISTRIBUTION MANIFOLD AND THE FURTHEST PLAY PRODUCT. DISTANCES ABOVE 135 FEET MAY REQUIRE AN INCREASE IN LINE SIZING. PLEASE CONTACT VORTEX.
- 1.5 THE LINE DIAMETER FROM DRAIN SHALL BE 8" BASED ON THE MAXIMUM APPROXIMATE FLOW AT 1% SLOPE. FINAL LOCATION OF DRAIN AND LINE ROUTING ARE TO BE DETERMINED BY OTHERS.
- 1.6 PRESSURE LINES ARE RECOMMENDED TO BE SCHEDULE 80 PVC OR PEX, AND NON-PRESSURE LINES TO BE SCHEDULE 40, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
- 1.7 DRAINAGE LINES ARE RECOMMENDED TO BE SDR 35, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
- 1.8 PIPING SHOULD BE INSPECTED AFTER TRANSPORTATION FOR CUTS, SCRATCHES, GOUGES OR SPLITS; DAMAGED SECTIONS MUST BE DISCARDED OR CUT OUT.
- 1.9 PIPE SHALL BE INSTALLED BELOW THE FROST LEVEL NOT LESS THAN 12" (ASTM F-645) UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
- 1.10 PIPE INSTALLATION MINIMUM COVER SHOULD BE EVALUATED ACCORDING TO ASTM D-2774, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
- 1.11 SPECIAL CONSIDERATIONS SHOULD BE TAKEN FOR THERMAL CONDITIONS, EXPANSION AND CONTRACTIONS DUE TO TEMPERATURE SHOULD BE EVALUATED BEFORE THE INSTALLATION BY THE CONTRACTOR.
- 1.12 VALVE NUMBER 1 IS LOCATED TO THE LEFT OF THE MANIFOLD FACING THE SOLENOID.
- 1.13 MINIMUM 50 PSI REQUIRED AT THE INLET OF THE BACKFLOW PREVENTER AND PRESSURE REGULATING DEVICE.
- 1.14 MAXIMUM FLOW CAPACITY OF MANIFOLD IS 159 GPM.
- 1.15 TOTAL FLOW OF THE FEATURE IS 215 GPM.
- 1.16 FACTORY MAXIMUM SEQUENCING FLOW IS 127 GPM. ACTUAL FLOW MAY VARY DUE TO SITE CONDITIONS.

2 ELECTRICAL

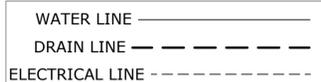
- 2.1 WIRING FROM THE CONTROLLER TO EACH PLAYSFAE DRAIN-PRESS & PLAY No3 ACTIVATOR SHALL BE #22 AWG. A TOTAL OF FIVE (5) CONDUCTORS PER ACTIVATOR. CABLE LENGTH UP TO 164', PROVIDED BY VORTEX.
- 2.2 ALL CONNECTIONS TO THE CONTROLLER AND OTHER VORTEX ELECTRICAL PANEL SHALL BE PERFORMED USING AN APPROVED NEMA 4X CONNECTOR.
- 2.3 WIRE FROM MAIN POWER TO VORTEX PANEL TO BE DETERMINED BY OTHERS RESPECTING THE LOCAL CODE.
- 2.4 MAINTAIN A MINIMUM CLEARANCE ZONE OF 36" IN FRONT OF ELECTRICAL PANEL, UNLESS OTHERWISE REQUESTED BY LOCAL CODE.
- 2.5 USE #8 BARE COPPER BONDING WIRE BETWEEN FEATURES TO A GROUNDING ROD IN THE SOIL, TIED INTO REBAR GRID, OR AS PER LOCAL CODE.
- 2.6 AS PER ELECTRICAL CONSTRUCTION AND SAFETY CODES: CONTROLLER AND ANY OTHER ELECTRICAL ENCLOSURE MUST BE HARD-WIRED TO A GROUND FAULT CIRCUIT INTERRUPTER (GFCI) FROM THE INPUT POWER SOURCE.
- 2.7 ALL ELECTRICAL WORK SHOULD BE PERFORMED BY A LICENCE ELECTRICIAN IN ACCORDANCE TO LOCAL ELECTRICAL CONSTRUCTION AND SAFETY CODES.



2 PLUMBING & ELECTRICAL LAYOUT
SHEET 7 SCALE: 1/2"=1'-0"



1 PLUMBING & ELECTRICAL LAYOUT
SHEET 7 SCALE: 1/8"=1'-0"



Feature Connection Table						
Manifold Output Ref.	Solenoid Valve	Feature Ref.	Feature	Qty	Line Size	Gpm Output
S01	1 1/2" Std	D	Frog N°1 VOR 7200	1	1 1/2"	11.5 IC-01
S02	1 1/2" Std	I	Luna Cannon N°1 VOR 7235	1	1 1/2"	6.5 IC-02
S03	1 1/2" Std	B	Directional Jet N°1 VOR 0305	4	1 1/2"	8 IC-03
S04	1 1/2" Std	M	Spray Loop VOR 0519	3	1 1/2"	22.5 IC-04
S05	1 1/2" Std	G	Helio N°6 VOR 7241	1	1 1/2"	13 IC-05
S06	1 1/2" Std	E	Geysier VOR 0301	3	1 1/2"	13.5 IC-06
S07	1 1/2" Std	P	Water Bloom N°1 VOR 0322	1	1 1/2"	9 IC-07
S08	1 1/2" Std	I	Luna Cannon N°1 VOR 7235	1	1 1/2"	6.5 IC-08
S09	1 1/2" Std	F	Helio N°2 VOR 7237	1	1 1/2"	6 IC-09
S10	1 1/2" Std	Q	Water Bloom N°2 VOR 0329	2	1 1/2"	18 IC-10
S11	1 1/2" Std	N	Sunspray N°1 VOR 7578	1	1 1/2"	12.5 IC-11
S12	1 1/2" Std	J	Luna N°3 VOR 7234	1	1 1/2"	6.5 IC-12
S13	1 1/2" Std	H	Jet Stream No.2 VOR 0325	1	1 1/2"	4 IC-13
S14	1 1/2" Std	S	Waterbug N°2 VOR 7581	1	1 1/2"	6 IC-14
S15	1 1/2" Std	L	Snail N°4 VOR 7217	1	1 1/2"	6.5 IC-15
S16	1 1/2" Std	R	Water Jelly N°1 VOR 7010	3	1 1/2"	14 IC-16
S17	1 1/2" Std	A	Aqua Dome N°1 VOR 0555	1	1 1/2"	18 ID-01
S18	1 1/2" Std	C	Fish N°1 VOR 7218	1	1 1/2"	4 ID-02
S19	1 1/2" Std	O	Turtle N°2 VOR 7216	1	1 1/2"	12.5 ID-03
S20	1 1/2" Std	T	Wave VOR 0327	3	1 1/2"	16.5 ID-04

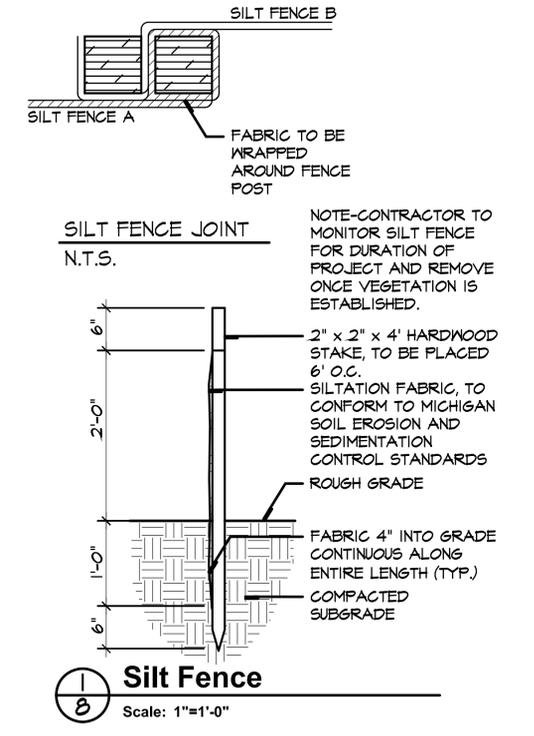
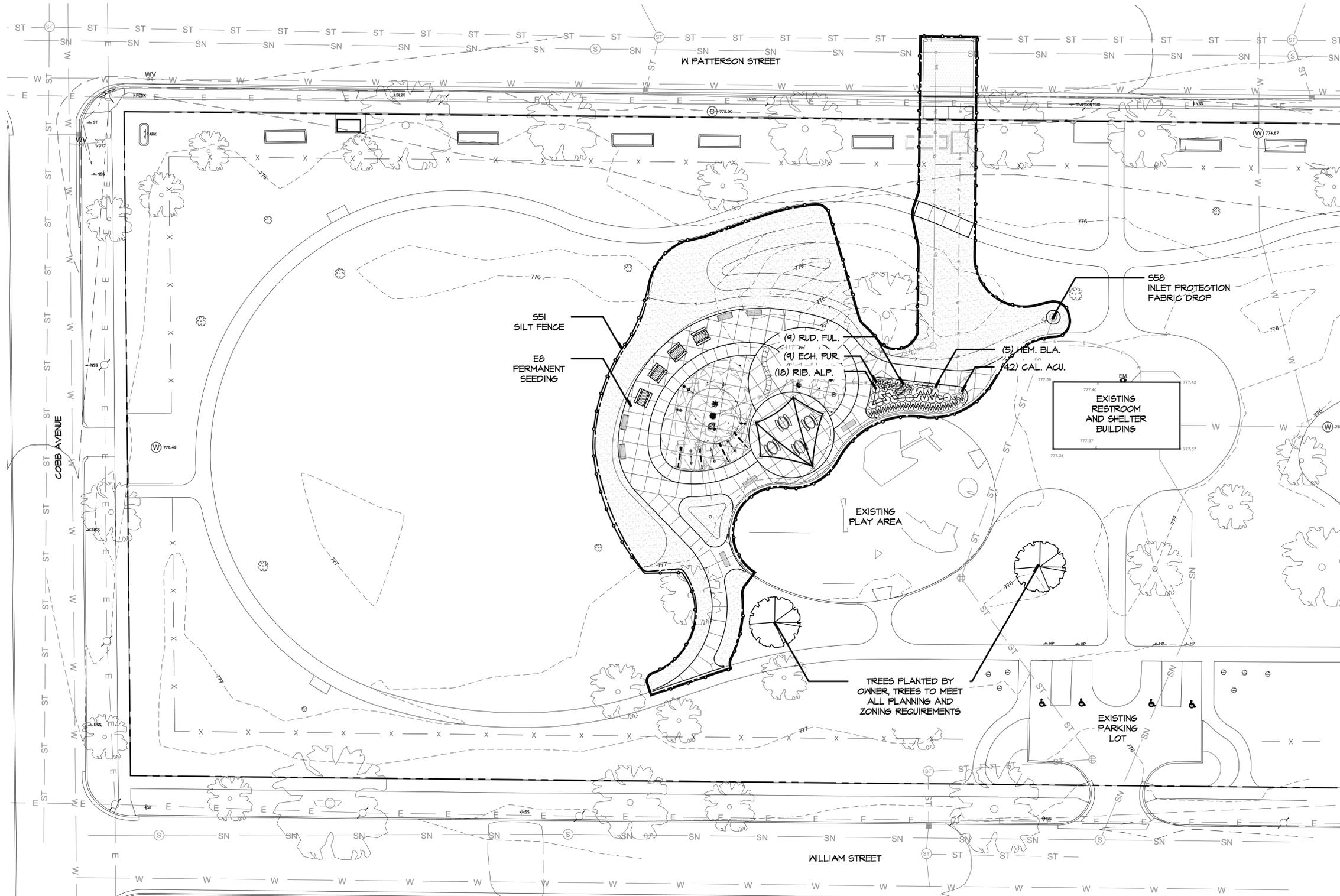
Electrical Line Connections Power					
Product Code	From	To	# Conductors	Gauge/Type	Note
PA	Main Power Line (by Owner)	IC-120VAC	3	N/A	120V, 1 Phase, 60Hz, 10Amps Breaker Recommended ± 10% Voltage Drop is Acceptable (by Installer)
PB	Main Power Line (by Owner)	ID-120VAC	3	N/A	120V, 1 Phase, 60Hz, 10Amps Breaker Recommended ± 10% Voltage Drop is Acceptable (by Installer)

Electrical Line Connections Controller Outputs					
Product Code	From	To	# Conductors	Gauge/Type	Note
EOA	IC	ID	Cable	CAT 5	Signal from Maestro Controller to Maestro Expansion (by Installer)

Electrical Line Connections Controller Inputs					
Product Code	From	To	# Conductors	Gauge/Type	Note
EIA	ID-Input 1	IA-1	5	22	Playsafe Drain - Press&Play No3 - Post Activator 24 VAC, Max 250 mA, 164' Long Cable (by Vortex)
EIB	ID-Input 2	IA-2	5	22	Playsafe Drain - Press&Play No3 - Post Activator 24 VAC, Max 250 mA, 164' Long Cable (by Vortex)

Product Legend		
Product Ref.	Product	Qty
IA (IA-1, IA-2)	Playsafe Drain - Press & Play N°3 VOR 1001.4003	2
IB	Water Distribution System: ECCC Cabinet Command Center 29281D1710R01	1
IC	Maestro Controller 16out/ 8 in	1
ID	Maestro Expansion 8 out/ 8 in	1
IE	3"City Water Line (by Installer)	1
IF	To Municipal Drain (by Installer)	1
IG	4" TYP Drain Line With Strainer Connected to Drainage System. Ensure P-Trap is Below Frost Line to Prevent Freezing. (by Installer)	1
Pressure Regulator (by other)		1
Backflow Preventer (by other)		1
Solenoid Valve 1 1/2"		20

Drawing #	Drawing Name	Rev #
PE-001	Plumbing & Electrical Layout	02



SOIL EROSION AND SEDIMENT CONTROL KEYING SYSTEM

KEY	BEST MANAGEMENT PRACTICES	SYMBOL
EROSION CONTROLS		
E8	PERMANENT SEEDING	
SEDIMENT CONTROLS		
S51	SILT FENCE	
S58	INLET PROTECTION FABRIC DROP	

SOIL EROSION AND SEDIMENTATION CONTROL GENERAL NOTES

- PLACE EROSION CONTROL MEASURES AS SHOWN TO ESTABLISH VEGETATION AND ELIMINATE SEDIMENTATION INTO NON-CONSTRUCTION AREAS. CONTRACTOR SHALL OBTAIN REQUIRED EROSION AND SEDIMENTATION CONTROL PERMIT THROUGH ALLEGAN COUNTY AND MUST POST THE PERMIT ON SITE THROUGHOUT THE DURATION OF THE PROJECT.

- ALL TEMPORARY SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.
- ANY MUD OR DEBRIS TRACKED ONTO EXISTING ROADWAYS MUST BE REMOVED DAILY.
- ANY MATERIAL STOCKPILED ON-SITE MUST BE PROTECTED WITH TARP AND OR SILT FENCE.
- SLOPES 25% (4:1) OR GREATER SHALL BE PROTECTED WITH MULCH BLANKETS. MULCH BLANKETS SHALL BE NORTH AMERICAN GREEN SC150BN. SEE SPECIFICATIONS.

LANDSCAPE GENERAL NOTES

- PLANTING SOIL AND MULCH FOR ALL TREES SHALL BE AS PER APPROPRIATE DETAIL.
- ALL TREES TO BE STAKED BY THE CONTRACTOR FOR APPROVAL BY THE LANDSCAPE ARCHITECT.
- SEED LIMIT LINE IS APPROXIMATE, ALL DISTURBED AREAS SHALL BE SEEDED AND RESTORED, UNLESS OTHERWISE DISTURBED.
- FOR ALL AREAS TO BE SEEDED, SEE SPECIFICATION FOR SEED MIX.
- SEE PLANTING DETAILS 1 AND 2 ON SHEET 10.

PLANT MATERIAL LIST
SHRUBS, GRASSES, AND PERENNIALS

PLANT KEY	TOTAL QUANTITY	SIZE	COMMON NAME BOTANICAL NAME
CAL ACU	42	#3 CONT. MIN.	KARL FOERSTER FEATHER REED GRASS CALAMAGROTIS X ACUTIFLORA 'KARL FOERSTER'
ECH PUR	9	#1 CONT. MIN.	'POW WOW WILDBERRY' CONEFLOWER ECHINACEA 'POW WOW WILDBERRY' CONEFLOWER
HEM BLA	5	#1 CONT. MIN.	'BLACK EYED STELLA' DAYLILY HEMEROCALLIS 'BLACK EYED STELLA'

SHRUBS, GRASSES, AND PERENNIALS

PLANT KEY	TOTAL QUANTITY	SIZE	COMMON NAME BOTANICAL NAME
RIB. ALP.	18	#3 CONT. MIN.	GREEN MOUND ALPINE CURRANT RIBES ALPIMUM 'GREEN MOUND'
RUD FUL	9	#2 CONT. MIN.	'GOLDSTRUM' ORANGE CONEFLOWER RUDBECKIA FULGIDA VAR. SULLIVANTAIL 'GOLDSTRUM'

PLANTING LEGEND

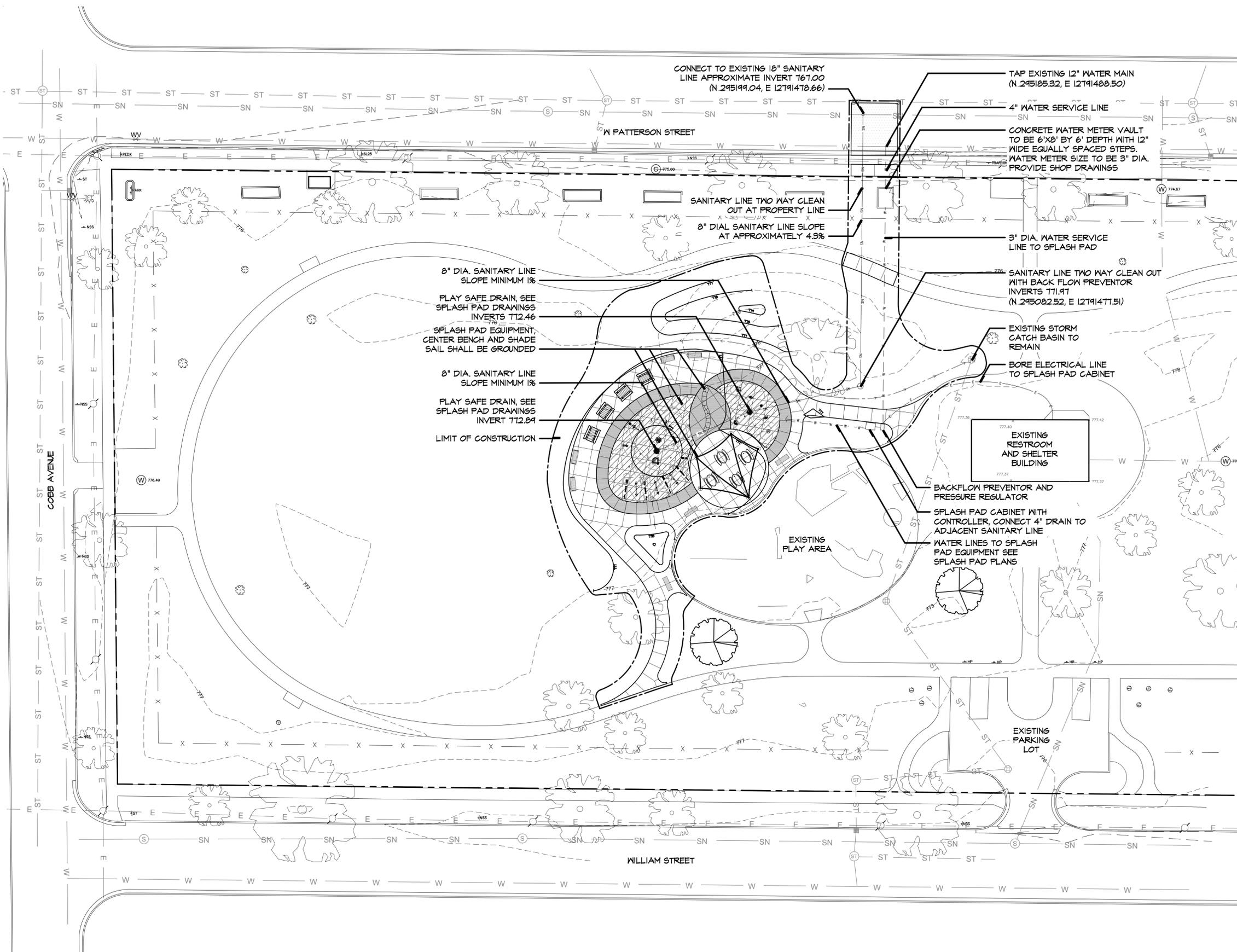
- SHRUB AND PERENNIAL
- SEEDING LIMIT LINE
- LAWN SEEDING
- SILT FENCE

SOIL EROSION AND SEDIMENTATION CONTROL LEGEND

- SILT FENCE

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SANITARY SEWER DESIGN FLOW INFORMATION

- + 216.5 GPM @ FULL CAPACITY
- + AVERAGE OF 50,920 GALLONS PER DAY DURING SPLASH PAD SEASON
- + APPROXIMATELY 4,277,280 GALLONS PER SEASON (12 WEEKS)

ELECTRICAL NOTES:

1. ALL ELECTRICAL WORK TO MEET NEC AND LOCAL CODES.
2. CONTRACTOR TO ACQUIRE ALL NECESSARY PERMITS.
3. CONNECT TO EXISTING PANEL IN EXISTING RESTROOM BUILDING.
4. ALL WIRE TO BE PLACED IN CONDUIT, ALL WIRE TO BE THHN COPPER.
5. PROVIDE ELECTRICAL POWER LINE TO SPLASH PAD CONTROLLER AS DETAILED ON SHEET 7.

SITE UTILITY GENERAL NOTES:

1. UTILITY IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF KALAMAZOO STANDARD CONSTRUCTION REQUIREMENTS AND 2012 INTERNATIONAL BUILDING CODE.
2. COORDINATE WITH CITY OF KALAMAZOO UTILITY DEPARTMENT AS NECESSARY FOR WATER AND SANITARY SERVICE CONNECTIONS.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL OTHER PERMITS REQUIRED FOR UTILITY WORK. CONTRACTOR SHALL ALSO PAY FEES FOR WATER LINE TAP, INSPECTION, AND METER BY CITY.
4. THE CONTRACTOR IS TO LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION OPERATIONS. CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGES TO UTILITIES CAUSED BY THEIR WORK. CONTACT MISS DIG FOR CONFIRMATION OF UTILITY LOCATIONS (1-800-482-7171).
5. 3" DIAMETER WATER PIPES SHALL BE TYPE K ANNEALED SEAMLESS COPPER WATER TUBING WITH COMPRESSION TYPE FITTINGS. 4" DIAMETER WATER SERVICE LINE TO BE CLASS 52 DUCTILE IRON PIPE.
6. PLACE WATER LINE WITH 5' COVER MINIMUM.
7. SANITARY PIPE SHALL BE PVC CONFORMING TO ASTM D3033 OR ASTM D3213. MINIMUM WALL THICKNESS SHALL BE SDR-26. JOINTS SHALL BE OF THE ELASTOMERIC GASKET PUSH-ON TYPE CONFORMING TO ASTM D3212.
8. ENSURE 10' OF SEPARATION BETWEEN WATER AND SEWER LINES.

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La Crone Park Splashpad Improvements
Kalamazoo, MI

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Landscape Architecture • Park & Recreation Planning • Architecture
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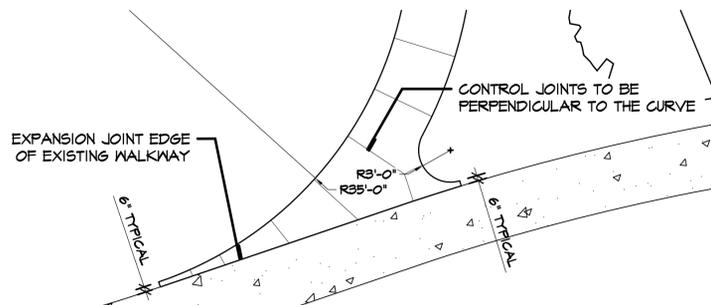
SCALE:
1" = 20'

Utility Plan

DATE	REVISIONS
09.24.2020	

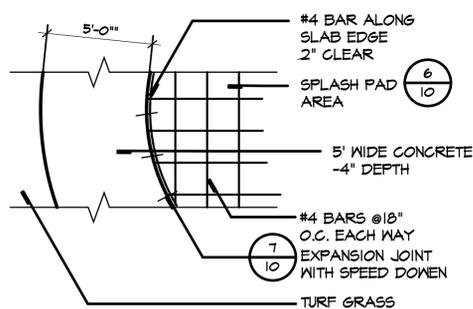
PROJECT NO.	SHEET NO.
2029	9

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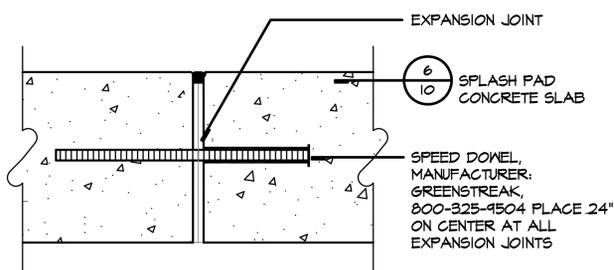
9 Walkway Intersection Detail

Scale: 1/8" = 1'-0"



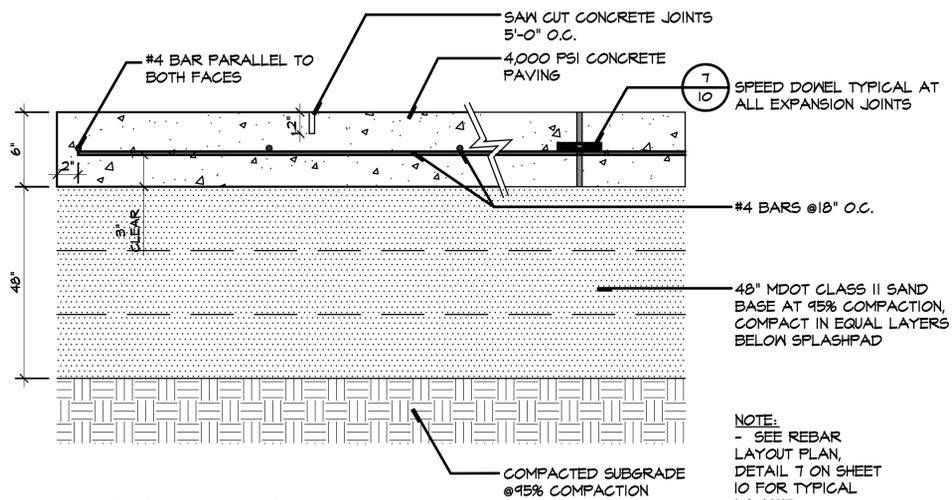
8 Rebar Layout

Scale: 1/4" = 1'-0"



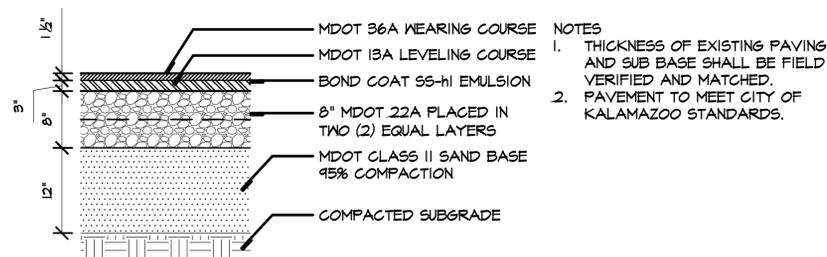
7 Speed Dowel

Scale: 3" = 1'-0" SUBMITTAL REQUIRED



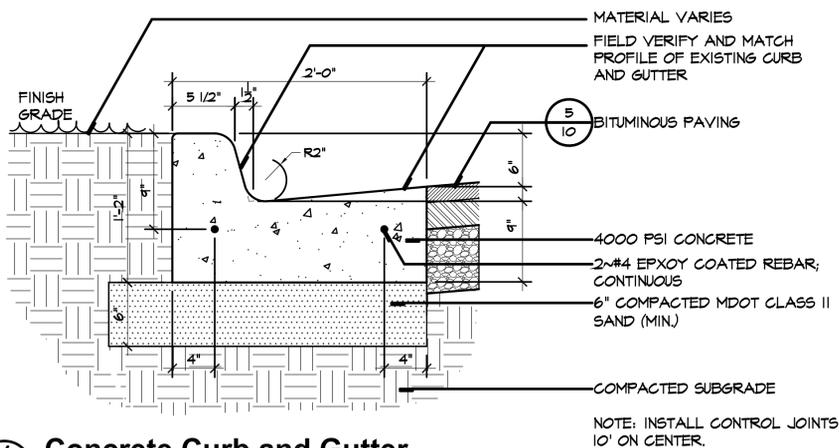
6 Splashpad Concrete

Scale: 1 1/2" = 1'-0"



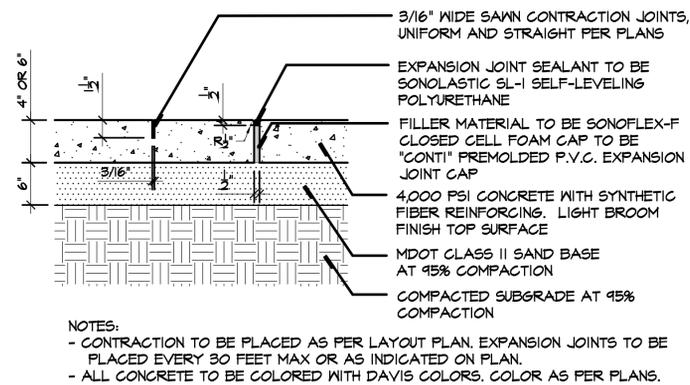
5 Bituminous Paving

Scale: 1" = 1'-0"



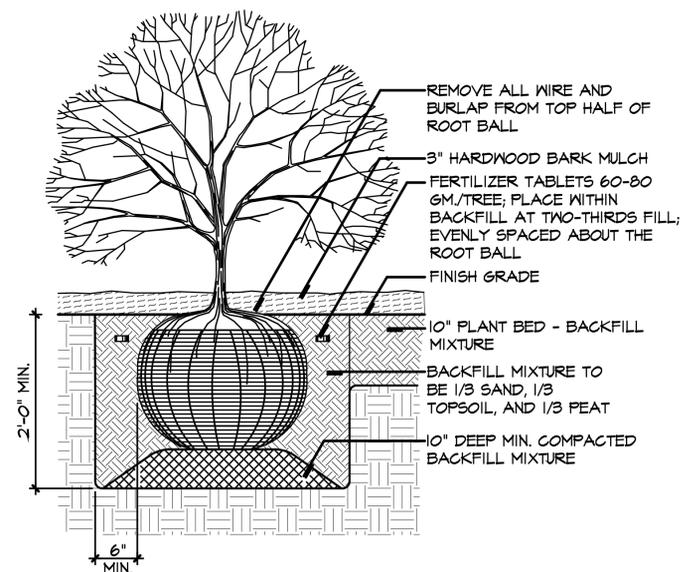
4 Concrete Curb and Gutter

Scale: 1 1/2" = 1'-0"



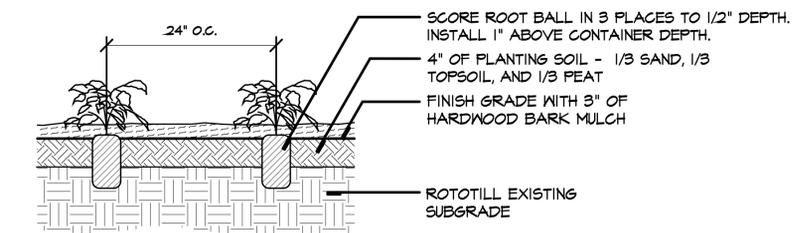
3 Concrete Paving & Joints

Scale: 1-1/2" = 1'-0"



2 Shrub Installation

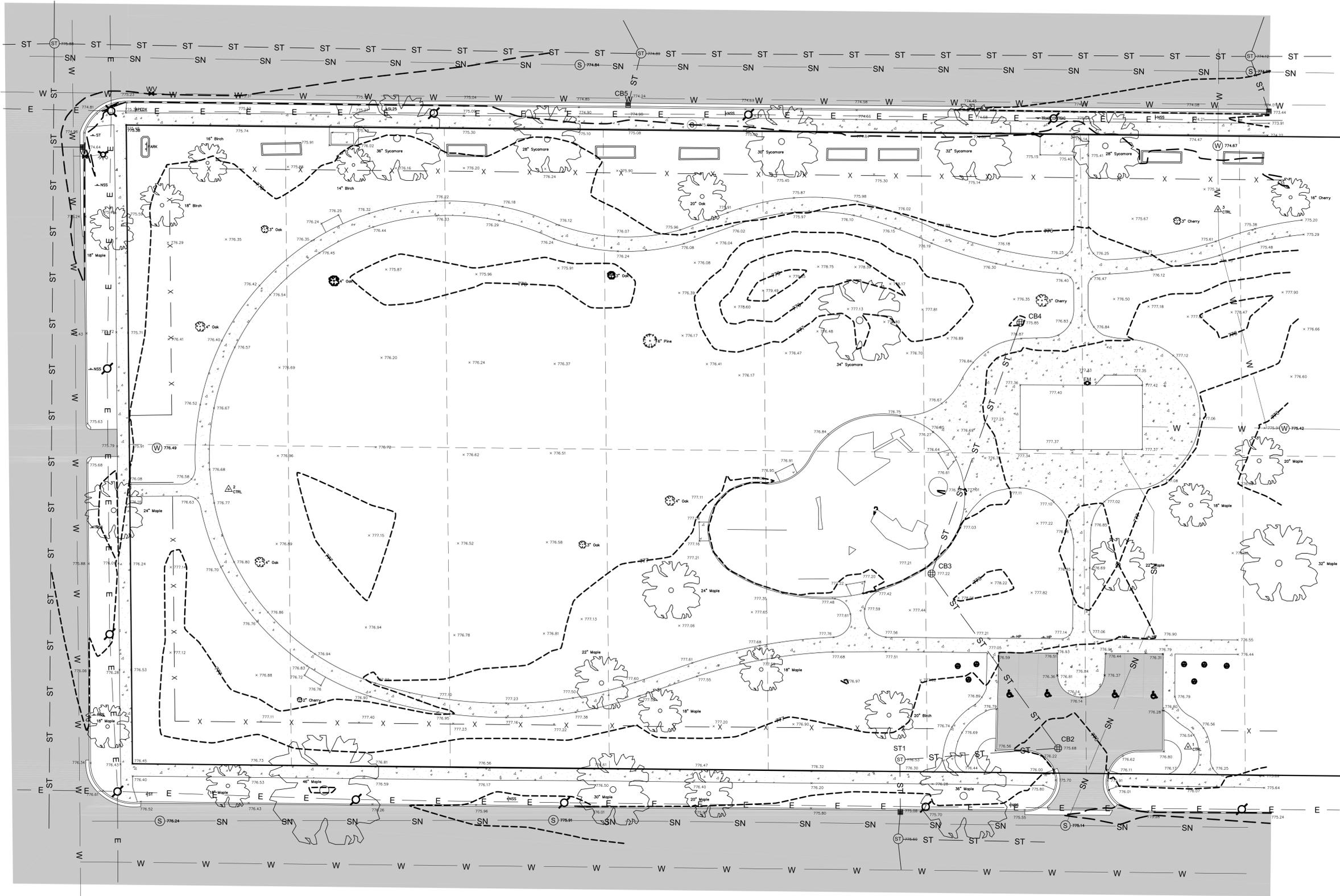
Scale: 1" = 1'-0" SHOP DRAWINGS REQUIRED



1 Perennial Installation

Scale: 1" = 1'-0"





GENERAL NOTES:

- Utilities shown are approximate locations derived from actual measurements. They should not be interpreted to be exact locations nor should it be assumed that they are the only utilities in this area.
- Reference points are 18" rebar with red "Summit Surveying" caps.

Point	Northing	Easting	Elevation
1	294,918.65	12,791,595.04	776.25
2	295,025.04	12,791,197.09	776.83
3	295,140.59	12,791,607.43	775.33
- Coordinates are Michigan State Plane South and elevations are NAVD83 (Geoid 12A) utilizing MDOT CORS.
- Per City of Kalamazoo Department of Parks and Recreation there are no assessments of concern.
- Property Description: Lots 16 thru 40 of Austin and Tomlinson's Addition to the Village (now City) of Kalamazoo, Liber 3 of Plats, Page 3.

Symbol Legend

- Symbol Denotes
- ⊙ Communication MH
 - ⊙ Coniferous tree
 - ⊙ Deciduous tree
 - ⊙ Electric meter
 - ⊙ Hydrant
 - ⊙ Found iron
 - ⊙ Power pole
 - ⊙ Reference point
 - ⊙ Round CB
 - ⊙ Sanitary MH
 - ⊙ Shrub
 - ⊙ Sign
 - ⊙ Sign
 - ⊙ Square CB
 - ⊙ Storm MH
 - ⊙ Water meter pit
 - ⊙ Water valve

Existing Storm Sewer

Number	Rim	Invert
ST1	776.53	12" S.E. - 771.25
CB2	775.68	12" W.W. - 771.34
CB3	777.22	12" S.E. - 771.77
CB4	775.85	8" S.W. - 772.58
CB5	774.24	12" N. - 773.32



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Site Survey

DATE	REVISIONS
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PROJECT NO.	SHEET NO.
2029	12