MINNEAPOLIS CONVENTION CENTER RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

MINNEAPOLIS CONVENTION CENTER

MINNEAPOLIS, MINNESOTA

PROJECT MANUAL
December 11, 2015

OWNER:

City of Minneapolis

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PROJECT: **Minneapolis Convention Center**
Rainwater Storage & Irrigation System Retrofit

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Architect or Licensed Professional Engineer or Licensed Landscape Architect under the Laws of the State of Minnesota.

CIVIL ENGINEER:

LHB, INC.
Print Name: James W. Tiggelaar

Signature: James William Tiggelaar

License # 24755

MECHANICAL ENGINEER

LHB, INC.
Print Name: Elizabeth K. Tomlinson

Signature: E. Tomlinson

License # 46427

ELECTRICAL ENGINEER:

LHB, INC.
Print Name: Michael Bilben

Signature: Michael Bilben

License # 51324

END OF SECTION

CALL FOR BIDS
CITY OF MINNEAPOLIS
M I N N E S O T A

PURCHASING DEPARTMENT
330 Second Avenue South - Suite 552
Minneapolis, MN 55401

AN AFFIRMATIVE ACTION EMPLOYER

Official Publication No. 8208

December 11th, 2015

Minneapolis Convention Center

For information call
David E. Schlueter, (612) 673-2834
david.schlueter@minneapolismn.gov

"BIDS FOR RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT PROJECT"

To provide all materials, labor, equipment and incidentals necessary for the construction of the Rainwater Storage and Irrigation System Retrofit Project for the Minneapolis Convention Center, all in accordance with the provided specifications and drawings.

Complete project documents are available for electronic download at http://www.questcdn.com **for $10.00 by entering ebid doc # 4192205** on the "Search Projects" page. Please contact QuestCDN.com at (952) 233-1632 or info@questcdn.com for assistance.

All plan holders who order electronic proposals through QuestCDN will receive addenda as they are released; however, it is the Contractor's full responsibility to ensure they have received all addenda prior to the submittal of bids.

Please e-mail questions concerning this solicitation to david.schlueter@minneapolismn.gov. Questions received later than 8 days prior to bid opening may not be addressed.

No pre-bid meeting will be held.

Successful bidders with cumulative contracts exceeding $50,000 will be required to submit a written affirmative action plan (AAP) to the Minneapolis Department of Civil Rights (MDCR) in accordance with Chapter 139.50(b) of the Minneapolis Code of Ordinances.

The successful bidder shall be subject to a pre-award compliance review by the MDCR in accordance with Chapters 139.50 and 423. In addition to the pre-award review, MDCR will also monitor SUBP participation, minority and female employment participation and prevailing wage throughout all construction projects. As of May 1, 2012 the employment goals for onsite labor on all city construction contracts are 6% female and 32% minority. Employee hours and wages are required to be filed electronically with a free online account at LCPtracker.net. Information regarding Frequently Asked Questions (FAQs) may be found on the web at www.ci.minneapolis.mn.us/civilrights/contractcompliance/faq. Questions may be directed to the Department of Civil Rights at contractcompliance@minneapolismn.gov.

The City of Minneapolis hereby notifies all bidders that in regard to any invitations to bid, advertisements, solicitations, or contracts to be entered into pursuant to this Plan, businesses owned and controlled by minorities or women will be afforded maximum feasible opportunity to submit bids and/or proposals in response and will not be subjected to discrimination on the basis of race, color, creed, religion, ancestry, national origin, sex, including sexual harassment, sexual orientation, gender identity, disability, age, marital status, or status with regard to public assistance or familial status.

Prospective bidders' attention is called to Minnesota Statues 13.591 Business Data. This section states in part:

Data submitted by a business to a government entity in response to a request for bids as defined in Section 16C.02, Subdivision 11, are private or non-public until the bids are opened. Once the bids are opened, the name of the bidder and the dollar amount specified in the response are read and become public. All other data in a bidder's response to a bid are private or non-public data until completion of the selection process. For the purposes of this section, "completion of the selection process" means that the government entity has completed its evaluation and has ranked the responses.
After a government entity has completed the selection process, all remaining data submitted by all bidders are public with the exception of trade secret data as defined and classified in Section 13.37. A statement by a bidder that submitted data are copyrighted or otherwise protected does not prevent public access to the data contained in the bid.

Bidders are hereby advised that their bid document may become available to the public once a successful bidder has been chosen.

The City of Minneapolis has adopted an Environmental Purchasing Policy (EPP) that is incorporated into all bids. A copy of the policy can be found at this link:
http://www.minneapolismn.gov/sustainability/approach/policies/sustainability_purchasing

Prompt Payment: Per Minnesota Statutes 471.425 contractors shall pay all certified small subcontractors for undisputed work completed, within ten (10) days after the City of Minneapolis has paid the contractor for the completed work.

Chapter 471.895 of the Minnesota Statutes prohibits gifts from interested persons to local officials. Local Officials includes any individuals who purchase or advise or recommend on the purchase of goods and/or services.

Conflict of Interest/Code of Ethics: Contractor agrees to be bound by the City's Code of Ethics, Minneapolis Code of Ordinances, Chapter 15. Contractor certifies that to the best of its knowledge, all City employees and officers participating in this Agreement have also complied with that Ordinance. It is agreed by the Parties that any violation of the Code of Ethics constitutes grounds for the City to void this Agreement. All questions relative to this section shall be referred to the City and shall be promptly answered.

All successful bidder(s) will be required to comply fully with the Americans with Disabilities Act of 1990 (ADA).

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Published in Finance and Commerce – December 11th and December 18th, 2015

Sealed bids will be received and time stamped by receptionist until **10 AM, Local Time, January 14th, 2016** at which time they will be publicly opened and read aloud. **Do not fax** sealed bids to Purchasing.

Bids must be accompanied by a bid deposit in the amount of **2%** of the total amount bid in the form of a certified check or bidder's corporate surety bond made payable to the Minneapolis Finance Officer.

Successful bidder will be required to enter into a formal contract and provide a Performance Bond and Payment Bond in the full amount of the contract.

A contractor responding to this solicitation document shall submit to the City of Minneapolis a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in Minnesota Statutes. Section 16C.285 subdivision 3.

Envelopes must bear the name of the firm submitting the bid and be addressed as follows:

City of Minneapolis Purchasing Department
Offl. Publ. # 8208 – BIDS FOR RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT PROJECT
Bids opened 10 AM, Local Time, January 14th, 2016
330 Second Avenue South - Suite 552
Minneapolis, MN 55401

The City of Minneapolis reserves the right to waive informalities in bids, to accept or reject any or all bids or any part of any bid. Bids must be typewritten, or printed in ink, and signed in ink in handwriting.

TWO complete bid form responses, including attachments, are to be returned, one of which **must** be an original.

BIDS CONTAINING ANY ALTERATION OR ERASURE WILL BE REJECTED UNLESS ALTERATION OR ERASURE IS CROSSED OUT AND CORRECTION PRINTED IN INK OR TYPEWRITTEN AND INITIALED IN INK BESIDE CORRECTION BY THE PERSON SIGNING THE BID.

Automatic Bid/RFP Notification:
Visit the Purchasing website at - http://www.minneapolismn.gov/business/business_doing_business_with_city to sign up for e-mail updates and to view Formal Bids, Informal Bids and RFPs

Taxes:
Effective January 1, 2014, State of Minnesota requires vendors to obtain an ST-3 exemption certificate to substantiate a full (State & Local) sales tax exemption on sales to Minnesota cities, counties, and townships. This form can be found on the City of Minneapolis website at http://www.ci.minneapolis.mn.us/finance/procurement.

Instructions to Bidders

IF the Call for Bids, indicates a bid deposit is required, the bid deposit should be in the form of a certified check, cashiers check or bidder's corporate surety bond. If certified check or cashier check is used, it shall be made payable to the Party named in the Call for Bids. Said bid deposit shall be retained by the City of Minneapolis or Board as liquidated damages and not a penalty, in the event the bid is selected by the City of Minneapolis or Board and the bidder fails to execute a contract, therefore, and upon request of the City of Minneapolis or Board, a performance bond and payment bond, as may be required by the City of Minneapolis subsequent to award of contract.

By submitting a bid, bidder agrees that said liquidated damages shall cover only the damages sustained by the City of Minneapolis or Board, from additional administrative costs, expenses or re-advertising and re-bidding and other damages sustained by the City of Minneapolis or Board as a result of failure of successful bidder to execute a written contract, and a performance bond and payment bond when so required, but shall not cover nor preclude the City of Minneapolis or Board from claiming damages on account of delay, price change, loss of other contracts, loss of income, inability of City of Minneapolis or Board to fulfill other contracts, loss of other benefits of this contract, or damages, direct or consequential arising out of breach of contract by the successful bidder.

Whenever separately numbered categories as to materials, equipment or services are set forth in the specifications and in the bid form, unless specifications or bid form is qualified by the statement "ALL OR NONE", bidder may submit a bid upon each, or all, or any selected number of categories, and in such case separate category shall be considered as a separate bid letting procedure, and the City of Minneapolis shall have the right to make separate awards to the lowest and best bidder in any particular category, or to the overall lowest and best bidder where it is found to be in the best interest of the City.

Bidder is responsible to ensure they are in receipt of all addenda. Contact the buyer if questions.

Visit the MN Department of Revenue website, Sales Tax Fact Sheet 176, for tax updates for Local Governments – Cities, Counties and Townships -
http://www.revenue.state.mn.us/businesses/sut/factsheets/FS176.pdf

If a lump sum bid for materials and/or equipment includes labor and all incidentals, the bidder is responsible for all applicable sales tax on taxable items required in the performance of the bid and should be included in the total amount bid.

Specification Information

Unless qualified by the provision "NO SUBSTITUTE", the use of the name of a manufacturer brand and/or catalog description in specifying any item does not restrict bidders to that manufacturer, brand or catalog description identification. This is used simply to indicate the character, quality, and/or performance equivalence of the commodity desired, but the commodity on which bids are submitted must be of such character, quality, and/or equivalence that it will serve the purpose for which it is to be used equally well as that specified, and be acceptable to the using department.

In submitting a bid on a commodity other than specified, bidder shall furnish complete data and identification with respect to the commodity he proposes to furnish. Consideration will be given to bids submitted on commodities to the extent that such action is deemed to serve the best interest of the department or boards of the City of Minneapolis.

If a Bidder does not indicate that the commodity he proposes to furnish is other than specified, it will be construed to mean that the bidder proposes to furnish the exact commodity as described.

Bids – City General Requirements

(Revised: March 2015)

The General Conditions are terms and conditions that the City expects all of its Contractors to meet. By submitting a bid, the bidder agrees to be bound by these requirements.

1 City's Rights

The City reserves the right to reject any or all Bids or parts of Bids, to accept part or all of Bids on the basis of considerations other than lowest cost, and to create a project of lesser or greater expense and reimbursement than described in the Call for Bid, or the respondent's reply based on the component prices submitted.

2 Equal Opportunity and Non-Discrimination

The Contractor will comply with applicable provisions of applicable federal, state and city regulations, statutes and ordinances pertaining to the civil rights and non-discrimination in the its application process for and hiring of employees, sub-contractors and suppliers. Among the city ordinances, state statutes and federal statutes to which the Contractor shall be subject to and comply with under the terms of this Contract include, without limitation: Minneapolis Code of Ordinances, Chapter 139; Minnesota Statutes, Section 181.59 and Chapter 363A; 42 U.S.C. Section 2000e, et. seq. (Title VII of the Civil Rights Act of 1964), 29 U.S.C. Sections 621-624 (the Age Discrimination Employment Act), 42 U.S.C. Sections 12101-12213 (Americans with Disabilities Act or ADA), 29 U.S.C. Section 206(d) (the Equal Pay Act), 8 U.S.C. Section 1324 (Immigration Reform and Control Act of 1986) and all regulations and policies and orders promulgated to enforce these laws. The Contractor shall have submitted and had an “affirmative action plan” approved by the City prior to entering into the Contract.

3 Insurance

Insurance secured by the Contractor shall be issued by insurance companies acceptable to the City and admitted in Minnesota. The insurance specified may be in a policy or policies of insurance, primary or excess. Such insurance shall be in force on the date of execution of the Contract and shall remain continuously in force for the duration of the Contract.

Acceptance of the insurance by the City shall not relieve, limit or decrease the liability of the Contractor. Any policy deductibles or retention shall be the responsibility of the Contractor. The Contractor shall control any special or unusual hazards and be responsible for any damages that result from those hazards. The City does not represent that the insurance requirements are sufficient to protect the Contractor's interest or provide adequate coverage. The City of Minneapolis shall be named as an Additional Insured. Evidence of coverage is to be provided on a Certificate of Insurance ACORD Form. A thirty (30) day written notice is required if the policy is canceled, not renewed or materially changed. The Contractor shall require any of its subcontractors, if sub-contracting is allowable under this Contract, to comply with these provisions.

Any Contractor that fails to provide proof of insurance coverage for the Contractor or that fails to provide either coverage for its subcontractors or insurance certificates from any of its subcontractors will be deemed to have submitted a non-responsive bid. The City's award of the Contract will be contingent upon the City's receipt of the required proof of insurance coverage.

The Contractor and its sub-contractors shall secure and maintain the following insurance:

a) **Workers Compensation** insurance that meets the Minnesota statutory obligations with Coverage B- Employers Liability limits of at least $100,000 each accident, $500,000 disease - policy limit and $100,000 disease each employee.
b) **Commercial General Liability** insurance with limits of at least $2,000,000 general aggregate, with coverage for products - completed operations, personal and advertising injury, fire damage and medical expense any one person. The policy shall be on an "occurrence" basis, shall include contractual liability coverage and the City shall be named an "Additional Insured." The coverage amount may be increased if the project amount is expected to exceed $2,000,000 or involves potentially high risk activity.
c) **Commercial Automobile Liability** insurance covering all owned, non-owned and hired automobiles with limits of at least $1,000,000 per accident and the City shall be named an "Additional Insured."

4 Hold Harmless

The Contractor agrees to defend, indemnify and hold harmless the City, its officers and employees, from any liabilities, claims, damages, costs, judgments, and expenses, including reasonable attorney's fees, attributable to the negligent or otherwise wrongful acts or omissions of the Contractor, its employees, its agents, or employees of subcontractors, in the performance of the work or services provided by or through this Contract or by reason of the failure of the Contractor to fully perform, in any respect, any of its obligations under this Contract.

5 Subcontracting

The Contractor shall provide written notice to the City and obtain the City's authorization to sub-contract any work or services to be provided to the City pursuant to this Contract. As required by Minnesota Statutes, Section 471.425, the Contractor shall pay all subcontractors for subcontractor's undisputed, completed work, within ten (10) days after the Contractor has received payment from the City.

6 Assignment or Transfer of Interest

The Contractor shall not assign any interest in the Contract, and shall not transfer any interest in the same either by assignment or novation without the prior written approval of the City. **The Contractor shall not subcontract any services or work under this Contract without prior written approval of the City Department Contract Manager designated herein.**

7 General Compliance

The Contractor agrees to comply with all applicable Federal, State and local laws and regulations affecting the Contract or governing funds provided under the Contract.

8 Performance Monitoring

The City will monitor the performance of the Contractor against goals and performance standards required herein. Substandard performance as determined by the City will constitute non-compliance with this Contract. If action to correct such substandard performance is not taken by the Contractor within a reasonable period of time to cure such substandard performance, after being notified by the City, Contract termination procedures will be initiated. All work submitted by Contractor shall be subject to the approval and acceptance by the City Department Contract Manager designated herein. The City Department Contract Manager designated herein shall review each portion of the work when certified as complete and submitted by the Contractor and shall inform the Contractor of any apparent deficiencies, defects, or incomplete work, at any stage of the project.

9 Prior Uncured Defaults

Pursuant to City Code of Ordinances, Section 18.115, the City may not contract with persons or entities that have defaulted under a previous contract or agreement with the City and have failed to cure the default.

10 Independent Contractor

Nothing contained in this Contract is intended to, or shall be construed in any manner, as creating or establishing the relationship of employer/employee between the parties. The Contractor shall at all times remain an independent contractor with respect to the work and/or services to be performed under this Contract. Any and all employees of Contractor or other persons engaged in the performance of any work or services required by Contractor under this Contract shall be considered employees or sub-contractors of the Contractor only and not of the City; and any and all claims that might arise, including Worker's Compensation claims under the Worker's Compensation Act of the State of Minnesota or any other state, on behalf of said employees or other persons while so engaged in any of the work or services to be rendered or provided herein, shall be the sole obligation and responsibility of the Contractor.

11 Accounting Standards

The Contractor agrees to maintain the necessary source documentation and enforce sufficient internal controls as dictated by generally accepted accounting practices (GAAP) to properly account for expenses incurred under this Contract.

12 Retention of Records

The Contractor shall retain all records pertinent to expenditures incurred under this Contract in a legible form for a period of six years after the resolution of all audit findings. Records for non-expendable property acquired with funds under this Contract shall be retained for six years after final disposition of such property.

13 Data Practices

The Contractor agrees to comply with the Minnesota Government Data Practices Act (Minnesota Statutes, Chapter 13) and all other applicable state and federal laws relating to data privacy or confidentiality. The Contractor and any of the sub-contractors and suppliers retained by the Contractor to provide work or services under this Contract shall comply with the Act and be subject to penalties for non-compliance as though they were a “government entity.”

The Contractor must immediately report to the City any requests from third parties for information relating to this Contract. The City agrees to promptly respond to inquiries from the Contractor concerning data requests. The Contractor agrees to hold the City, its officers, and employees harmless from any claims resulting from the Contractor's unlawful disclosure or use of data protected under state and federal laws.

All Bids shall be treated as non-public information until the Bids are opened for review by the City. At that time, the names of the responders become public data. All other data is private or non-public until the City has completed negotiating the Contract with the selected Contractor. At that time, the Bids and their contents become public data under the provisions of the Minnesota Government Data Practices Act, Minnesota Statutes, Chapter 13 and as such are open for public review.

14 Inspection of Records

Pursuant to Minnesota Statutes, Section 16C.05, all Contractor records with respect to any matters covered by this Contract shall be made available to the City and the State of Minnesota, Office of State Auditor or their designees, upon notice, at any time during normal business hours, as often as the City deems necessary, to audit, examine, and make excerpts or transcripts of all relevant data. Contractor will comply with all State and local audit requirements.

15 Living Wage Ordinance

The Contractor may be required to comply with the "Minneapolis Living Wage and Responsible Public Spending Ordinance" Chapter 38 of the City's Code of Ordinances (the "Ordinance") (http://www.minneapolismn.gov/www/groups/public/@finance/documents/webcontent/convert_255695.pdf). Unless otherwise exempt from the ordinance as provided in Section 38.40 (c), any City contract for services valued at $100,000 or more or any City financial assistance or subsidy valued at $100,000 or more will be subject to the Ordinance's requirement that the Contractor and its sub-contractors pay their employees a "living wage" as defined and provided for in the Ordinance.

16 Applicable Law

The laws of the State of Minnesota shall govern all interpretations of this Contract, and the appropriate venue and jurisdiction for any litigation which may arise hereunder will be in those courts located within the County of Hennepin, State of Minnesota, regardless of the place of business, residence or incorporation of the Contractor.

17 Conflict and Priority

In the event that a conflict is found between provisions in this Contract and the Contractor's Bid, the provisions in the following rank order shall take precedence: 1) Contract including Bid specifications 2) Bid.

18 Travel

If travel by the Contractor is allowable and approved for this Contract, then Contractor travel expenses shall be reimbursed in accordance with the City's *Contractor Travel Reimbursement Conditions*, available from the City.

19 Billboard Advertising

City Code of Ordinance 544.120, prohibits the use of City and City-derived funds to pay for billboard advertising as a part of a City project or undertaking.

20 Conflict of Interest/Code of Ethics

Pursuant to Section 15.250 of the City's Code of Ordinances, both the City and the Contractor are required to comply with the City's Code of Ethics. Chapter 15 of the Code of Ordinances requires City officials and the Contractor to avoid any situation that may give rise to a "conflict of interest." A "conflict of interest" will arise if Contractor represents any other party or other client whose interests are adverse to the interests of the City.

As it applies to the Contractor, the City's Code of Ethics will also apply to the Contractor in its role as an "interested person" since Contractor has a direct financial interest in this Agreement. The City's Code of Ethics prevents "interested persons" from giving certain gifts to employees and elected officials.

21 Termination

The City may cancel this Contract for any reason without cause upon thirty (30) days written notice. Both the City and the contractor may terminate this Contract if either party fails to fulfill its obligations under the Contract in a proper and timely manner, or otherwise violates the terms of this Contract. The non-defaulting party shall have the right to terminate this Contract, if the default has not been cured after ten (10) days written notice or such other reasonable time period to cure the default, has been provided. If termination shall be without cause, the City shall pay Contractor all compensation earned to the date of termination. If the termination shall be for breach of this Contract by Contractor, the City shall pay Contractor all compensation earned prior to the date of termination minus any damages and costs incurred by the City as a result of the breach. If the Contract is canceled or terminated, all finished or unfinished documents, data, studies, surveys, maps, models, photographs, reports or other materials prepared by the Contractor under this Contract shall, at the option of the City, become the property of the City, and the Contractor shall be entitled to receive just and equitable compensation for any satisfactory work completed on such documents or materials prior to the termination.

Notwithstanding the above, the Contractor shall not be relieved of liability to the City for damages sustained by the City as a result of any breach of this Contract by the Contractor. The City may, in such event, withhold payments due to the Contractor for the purpose of set-off until such time as the exact amount of damages due to the City is determined. The rights or remedies provided for herein shall not limit the City, in case of any default by the Contractor, from asserting any other right or remedy allowed by law, equity, or by statute. The Contractor has not waived any rights or defenses in seeking any amounts withheld by the City or any damages due the Contractor.

22 Ownership of Materials

All finished or unfinished documents, data, studies, surveys, maps, models, photographs, reports or other materials resulting from this Contract shall become the property of the City upon final approval of the final report or upon request by the City at any time before then. The City, at its own risk, may use, extend, or enlarge any document produced under this Contract without the consent, permission of, or further compensation to the Contractor.

23 Intellectual Property

Neither the City nor the Contractor anticipate that any intellectual property rights will be created as a result of this Contract. For the purpose of this Contract, "intellectual property" shall include all inventions, improvements, discoveries, processes, computer programs or similar intangible interests that either the City or Contractor develop as a result of the work or project undertaken which is the subject matter of and during the term of the Contract.

Each party acknowledges and agrees that each party is the sole and exclusive owner of all right, title, and interest in and to its services, products, software, source and object code, specifications, designs, techniques, concepts, improvements, discoveries and inventions including all intellectual property rights thereto, including without limitations any modifications, improvements, or derivative works thereof, created prior to, or independently, during the terms of this Contract. This contract does not affect the ownership of each party's pre-existing, intellectual property. Each party further acknowledges that it acquires no rights under this Contract to the other party's pre-existing intellectual property, other than any limited right explicitly granted in this Contract.

24 Equal Benefits Ordinance

Minneapolis Code of Ordinances, Section 18.200, relating to equal benefits for domestic partners, applies to each contractor and subcontractor with 21 or more employees that enters into a "contract", as defined by the ordinance that exceeds $100,000. The categories to which the ordinance applies are personal services; the sale or purchase of supplies, materials, equipment or the rental thereof; and the construction, alteration, repair or maintenance of personal property. The categories to which the ordinance does not apply include real property and development contracts.

Please be aware that if a "contract", as defined by the ordinance, initially does not exceed $100,000, but is later modified so the Contract does exceed $100,000, the ordinance will then apply to the Contract. A complete text of the ordinance is available at:
http://www.minneapolismn.gov/www/groups/public/@finance/documents/webcontent/convert_261694.pdf.
It is the Contractor's and subcontractor's responsibility to review and understand the requirements and applicability of this ordinance.

25 Cardholder Data and Security Standards

Should the Contractor collect revenue on behalf of the City through the acceptance of credit cards offered by cardholders to pay for services offered under the terms of this Contract, then Contractor represents and acknowledges that the Contractor will comply with Payment Card Industry (PCI) regulatory standards including the Data Security Standards (DSS). Contractor represents that it will protect cardholder data. Contractor will be annually certified as a PCI compliant service provider and agrees to provide evidence of said certification to the City upon request. Contractor agrees at reasonable times to provide to the City or to its assigns, the audit rights contained herein for all physical locations, systems or networks that process credit cards on behalf of the City. Contractor also agrees to provide written notice to the City of any breach of a system owned, operated or maintained by the Contractor that contains cardholder data or information.

26 Small & Underutilized Business Program (SUBP)

See attached current Small & Underutilized Business Program (SUBP) Requirements incorporated herein by reference.

27 City Ownership and Use of Data

The City has adopted an Open Data Policy ("Policy"). The City owns all "Data Sets" as part of the compliance with the Policy. Data Sets means statistical or factual information: (a) contained in structural data sets; and (b) that is regularly created or maintained by or on behalf of the City or a City department which supports or contributes to the delivery of the project underlying this Contract or related programs and functions. The City shall not only retain ownership of all Data Sets, but also all information created through the City's use of software and/or software applications that are licensed by the Contractor (or any subcontractor of the Contractor) to the City

The City shall also retain the right to publish all data, information and Data Sets independently of this Contract regardless of whether the data and information originated from the Contractor or any subcontractor, using whatever means the City deems appropriate. The City shall have the right to access all project data, regardless of which party created the content and for whatever purpose it was created. The Contractor shall provide bulk extracts of data that satisfy the public release criteria for use in and within an open data solution.

28 Responsible Contractor Requirement

The Contractor represents that it is a "responsible contractor." The term "responsible contractor" as used in this document means a contractor as defined in Minnesota Statutes, Section 16C.285 subdivision 3. Any prime contractor or subcontractor that does not meet the minimum criteria in Section 16C.285 subdivision 3 or fails to verify that it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the scope of work described in the bid documents. A false statement under oath verifying compliance with any of the minimum criteria shall render the prime contractor or subcontractor that makes the false statement ineligible to be awarded a construction contract for the scope of work defined in the bid documents and may result in the termination of a contract awarded to a prime contractor or subcontractor that submits the false statement. A prime contractor shall submit to the City, upon request, copies of the signed verifications of compliance from all subcontractors of any tier pursuant to Minnesota Statutes, Section 16C.285, subdivision 3, clause (7).

Minneapolis
City of Lakes

Department of Civil Rights
350 S. Fifth St. - Room 239
Minneapolis, MN 55415
TEL 612.673.3000
www.minneapolismn.gov

Notice of Civil Rights Rules and Regulations

This notice advises City of Minneapolis contractors of their commitments under Minneapolis Code of Ordinances section 139.50. All contractors must comply with all provisions of Minneapolis Code of Ordinances Title 7 and with all rules and regulations issued by the Minneapolis Department of Civil Rights ("MDCR") director. Contractors will be subject to a pre-award compliance review. Failure to cooperate may result in denial of contract award.

1. **Non-Discrimination**:[1] The contractor will not discriminate against any employee or applicant for employment because of race, color, creed, religion, ancestry, national origin, sex, sexual orientation, gender identity, disability, age (forty (40) to seventy (70)), marital status, or status with regard to public assistance. The contractor will take affirmative action to ensure that all employment practices are free of such discrimination. Such employment practices include but are not limited to the following: Hiring, upgrading, demotion, transfer, recruitment or recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.
2. **Equal Employment Opportunity/Affirmative Action Employer**: The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that it is an equal opportunity or affirmative action employer.
3. **Affirmative Action Plan**: The contractor must have an Affirmative Action Plan approved by MDCR before it may enter into a contract over $50,000 with the City.
4. **Small and Underutilized Business Program (SUBP)**: When applicable, the contractor must comply with the SUBP program, including, but not limited to, making a good faith effort to meet the Minority-Owned Business Enterprises and Women-Owned Business Enterprises goals established on City construction and development projects.
5. **Employment Goals**:[2] The contractor must make a good faith effort to meet the City's aspirational construction workforce goals of **6%** female participation and **32%** minority participation.
6. **Prevailing Wage**:[3] When applicable, the contractor must comply with prevailing wage laws on City construction and development projects.
7. **HUD Section 3**:[4] When applicable, the contractor must comply with Section 3 of the Housing and Urban Development Act of 1968, as amended. Contractors must incorporate the Section 3 Clause into all subcontracts and to the greatest extent feasible, ensure that employment and other economic activities be directed to low income persons.
8. **Posting Requirement**: The contractor must provide this notice to its trade and labor union or representative of workers and shall post the notice in conspicuous places available to employees and applicants for employment.

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[1] Acts of discrimination are defined in the Minneapolis Code of Ordinances, Chapter 139.
[2] See Request for City Council Committee Action, Adopted March 21, 2012; incorporated into section 139.50 as a rule issued by the MDCR director.
[3] See Minneapolis Code of Ordinances section 24.220, CPED Prevailing Wage Policy (adopted by City Council June 8, 2004), and Davis-Bacon and Related Acts; enforcement authority has been delegated to MDCR.
[4] See 24 CFR Section 135.38; enforcement authority has been delegated to MDCR.

City of Minneapolis
Small and Underutilized Business Enterprise Program
Special Provisions - City Bidded Projects

I. Overview

The City of Minneapolis policy is to provide equal opportunities to all businesses, with an effort to redress discrimination in the City's marketplace and in public contracting against minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs"). This is accomplished through the Small and Underutilized Business Program ("SUBP") as detailed in the Minneapolis Code of Ordinances Chapter 423. SUBP applies to any construction or professional services project over $100,000. SUBP goals are set on projects based on the project scope, subcontracting opportunities and availability of eligible MBEs/WBEs.

The City has set the following SUBP goals to facilitate participation of MBEs/WBEs on this project:
6% MBE and 4% WBE.

Only eligible MBEs/WBEs count towards the SUBP goals. A MBE/WBE is eligible if they are:

1. Certified with the Minnesota Unified Certification Program ("MNUCP").
2. Located within the City's marketplace.[1]
3. Certified within the scope of work that they will perform.
4. Performing a commercially useful function on the contract.

II. Good Faith Efforts Evaluation

The bidder must either meet the goals listed above or demonstrate a Good Faith Effort to do so. A Good Faith Effort means that the bidder made *every necessary and reasonable effort* to subcontract with MBEs/WBEs prior to bid opening.

To determine if the bidder solicited MBEs/WBEs in good faith, the following list of *seven factors* may be considered:

1. Soliciting through all reasonable and available means (attendance at pre-bid meetings, advertising and/or written notices) the interest of all MBEs/WBEs certified in the scopes of work of the contract. The bidder must solicit MBEs/WBEs in sufficient time prior to bid opening or the proposal deadline to allow MBEs/WBEs to respond to solicitations. The bidder must determine with reasonable certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up on initial solicitations.
2. Selecting portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the project goals will be achieved. This includes, where appropriate, breaking out contract work into smaller units to facilitate MBE/WBE participation, even when a bidder might otherwise prefer to perform these work items with its own forces.
3. Providing interested MBEs/WBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
4. The bidder must negotiate in good faith with interested MBEs/WBEs and provide written documentation of such negotiation with each such business. In determining whether the bidder negotiated in good faith, the City of Minneapolis Department of Civil Rights ("MDCR") may consider a number of factors including price, scheduling and capabilities as well as the contract goal.
5. The fact that there may be some additional costs involved in finding and using MBEs/WBEs is not itself sufficient reason for the bidder's failure to meet the project goals as long as such costs are reasonable.

[1] Minnesota counties of Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Sherburne, Washington, and Wright.

6. If requested by a solicited MBE/WBE, the bidder must make reasonable efforts to assist such MBEs/WBEs in obtaining bonding, lines of credit or insurance as required by the city or by the bidder, provided that the bidder need not provide financial assistance toward this effort.
7. Effectively using the services of minority/woman community organizations; minority/woman contractors' groups; local, state and federal business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the solicitation and placement of MBEs/WBEs.

III. Required Documentation

1. The bidder must thoroughly document its efforts to solicit and incorporate MBE/WBE participation to meet the SUBP goals. The following must be submitted with the bid:
    a. *Small and Underutilized Business Program (SUBP) Participation Form:* Must include all contractors, sub-consultants, suppliers, and service providers that submitted a bid/quote for the project and were selected.
2. If the *SUBP Participation Form* does not demonstrate, or the City could not confirm, sufficient MBE/WBE participation to meet the SUBP goals, the bidder must submit documentation demonstrating that the bidder made sufficient good faith efforts to meet the goals. This includes:
    a. *Good Faith Efforts Checklist:* A checklist based on the *seven factors* that may be considered in determining whether MBE/WBE participation was solicited in good faith. The bidder must use the checklist during subcontractor bid solicitation to demonstrate the efforts that were made.
    b. *Bidders and Solicitation List:* Must include all MBE/WBE and non-MBE/WBE subcontractors, sub-consultants, service providers or suppliers that were solicited to submit a bid or quote for the project. It also indicates which MBE/WBE firms the bidder proposes to use.
    c. *Supporting Documentation to Demonstrate Good Faith Efforts:* The bidder must submit documentation evidencing the efforts taken to achieve the SUBP goals. The information may include, but is not limited to, copies of solicitation emails, bids received, faxes, and phone call logs.
3. If determined that bidder made a good faith effort to meet the goals, a *Pre-Construction Book* must be submitted prior to approval by MDCR.
    a. *Pre-Construction Book:* Collects information related to subcontracts, employment participation, construction schedules, and required wages.

IV. Post-Award Substitutions

The bidder shall not substitute any MBE/WBE subcontractor listed in the *SUBP Participation Form* without the prior written approval from MDCR. The bidder must make good faith efforts to replace an MBE/WBE subcontractor that is unable to perform with another MBE/WBE to perform the same scope of work.

V. Penalties for Non-Compliance

Compliance with SUBP is a material condition of the contract. The City may take the following actions wholly, partly, or in any combination:

a) Temporarily withhold funds pending correction of the deficiency.
b) Disallow the use of funds for all or part of the cost of the activity or action not in compliance.
c) Suspend or debar the noncompliant contractor, subcontractor, supplier or vendor as ineligible for all current or potential contracts with the City or supported by City funds.
d) Designate the noncompliant contractor, subcontractor, supplier or vendor as high-risk for future contracts and require of the contractor, subcontractor, supplier or vendor increased reporting requirements, mandatory audits and similar measures.

Please review Minneapolis Code of Ordinances Chapter 423 for more information or contact the City of Minneapolis Department of Civil Rights at (612) 673-3012 or contractcompliance@minneapolismn.gov.

Minneapolis
Department of Civil Rights

Small and Underutilized Business (SUBP)
Participation Form

Please list **all** contractors (including your company), sub-consultants, suppliers, and service providers who submitted a bid/quote and will be selected.

Please Note:

- Only Minnesota Unified Certification Program (MNUCP) certified minority-owned and women-owned business enterprises (MBEs or WBEs) count toward the SUBP goals. Please place a mark "x" in the appropriate column below.[2]
- Companies certified as both MBE and WBE count towards the MBE goal.
- If an MBE/WBE subcontracts work to a non-MBE/WBE, that value of work will not count toward the SUBP goals.
- An MBE/WBE must perform a commercially useful function[3] to count toward the SUBP goals.

Business Name	City, State	Phone & Email	Contact Method (fax, phone, email)	Date of Solicitation	Scope of Work	Bid/Quote Amount	MNUCP MBE	MNUCP WBE

[2] The MBE/WBE must be certified in the scope of work and located in the 11 county metropolitan area (Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Sherburne, Washington and Wright).

[3] Commercially useful function: Business executing a distinct element of work and carries out its responsibilities by actually performing, managing, and supervising the work involved.

Firm Name	City, State	Phone & Email	Contact Method (fax, phone, email)	Date of Solicitation	Scope of Work	Bid/Quote Amount	MNUCP MBE	MNUCP WBE

The bidder certifies that all contractors (including your company), sub-consultants, suppliers, and service providers that submitted a bid/quote and will be selected are listed.

Company Name	Contact Name & Title	Phone & Email	Date	Signature

Failure to sign and submit this form will result in a non-responsive bid.

City of Minneapolis Small and Underutilized Business Program (SUBP)

MCC Rainwater Storage and Irrigation Retrofit

This report lists MBEs and WBEs that have been certified by the Minnesota Uniform Certification Program (MnUCP) in scopes of services relevant to this project. If additional scopes of services are identified, the MnUCP online directory (http://mnucp.metc.state.mn.us/) should be utilized to find additional certified MBEs and WBEs in those scopes. Note that if a firm is certified as both MBE and WBE, that firm's participation will only count toward the MBE goal.

The scopes of services are categorized using the North American Industry Classification System (NAICS). For definitions and more information about NAICS Codes visit the U.S. Census Bureau (http://www.census.gov/eos/www/naics/).

COMPANY	CONTACT	EMAIL	PHONE	FAX	MBE	WBE
Water Supplu and Irrigation Systems (221310)						
UTILITY SALES AND SUPPLY INC	TIFFANY IMKER	ussimn@gmail.com	612-385-7529	763-287-0514	No	Yes
Water and Sewer Line and Related Structures Construction (237110)						
CASTREJON INCORPORATED	MONICA FEARING	MONICA@CASTREJONINC.COM	763-450-2055	763-450-2056	Yes	No
CI UTILITIES LLC	BERT CASTREJON	info@castrejoninc.com	763-450-2055	763-450-2056	Yes	No
DESIGNING EARTH CONTRACTING INC.	STEPHANIE NEUMANN	Stephanie@decmn.com	763-434-4131	763-434-4131		Yes
MEYER CONTRACTING INC	KATHLEEN MEYER	kmeyer@meyerci.com	763-391-5959	763-391-5960	Yes	Yes
NORTH METRO ASPHALT (DBA NMA CONTRACTING)	JAMES LARSON	Bidinvite@nmacontracting.com	763-413-4604	763-413-4606	Yes	No
PETE'S WATER & SEWER INC.	LEROY MEYER JR	lmeyer@petesws.com	763-515-7428	763-515-7428	Yes	No
STANDARD CONTRACTING INC	REBECCA SEIDENKRANZ	becky@stanconinc.com	651-463-2510	651-463-2525	No	Yes
UNIQUE CONTRACTING SERVICES CORP	ANGEL PEREZ	angelpeppy1@izoom.net	763-218-9385	763-262-1151	Yes	No
UTILITY SALES AND SUPPLY INC	TIFFANY IMKER	ussimn@gmail.com	612-385-7529	763-287-0514	No	Yes
Electrical Contractors and Other Wiring Installation Contractors (238210)						
AFS SYSTEMS INC	KATHRYN F QUIGLEY	kathrynquigley@afssystemsinc.com	763-425-8396	763-425-8397	No	Yes
ALBRECHT SIGN COMPANY INC	TOM ALBRECHT	tom@albrechtsigncompany.com	763-754-2899	763-767-7316	Yes	No
AMS CONTRACTING LLC	ANTHONY SEBURG	office@amscont.com	651-797-3685	651-797-3942	Yes	No
BIG G TECH SUPPORT LLC	GERALD BEN-AMI	Gben-ami@bgtsllc.com	763-390-1317	888-867-7126	Yes	No
COVENANT ELECTRIC INC	BARBARA GRAYDON	bgraydon@covenantelectric.com	612-554-2066	651-638-0071	Yes	Yes
CROCUS HILL ELECTRIC CO	ELIZABETH ROCCO	liz@crocushillelectric.com	651-221-0261	651-221-0354	No	Yes
ELLIOTT CONTRACTING CORP	JOHN T ELLIOTT	info@elliottcontracting.com	612-256-0000	612-256-0020	Yes	No
GUNNAR ELECTRIC INC	LAURA KAROW	Lkarow@GUNNARELECTRIC.COM	952-937-9262	952-937-1034	No	Yes
MIDWEST ELECTRIC CORP	DELORES WERMERSKIRCHEN	dwermer@msn.com	763-551-7992	763-551-7968	No	Yes
MODERN ELECTRICAL SOLUTIONS INC	TYRA DINH TRAN	lemodernesi@yahoo.com	651-313-0110	763-780-6398	Yes	Yes
MTEC ELECTRIC INC	HUONG PHAM	nick@mtecelectric.com	763-537-1570	763-537-7786	Yes	Yes

RENEWABLE ENERGY PARTNERS DBA RENEWABLE NRG PARTNERS	JAMEZ STAPLES	jstaples@renewableNRGPartners.com	612-282-2573	612-924-6514	Yes	No
ROSS ELECTRIC COMPANY INC	CEDRIC ROSS	rossfourme@yahoo.com	612-702-7840	651-776-5018	Yes	No
SUESS ELECTRIC LLC	SUSAN SUESS THOMSON	info@suesselectric.com	651-429-0968	651-429-1691	No	Yes

>

General Decision Number: MN150096 07/17/2015 MN96

Superseded General Decision Number: MN20140096

State: Minnesota

Construction Type: Heavy
Heavy including Water and Sewer Lines

County: Hennepin County in Minnesota.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of $10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is 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 $10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	05/08/2015
2	05/22/2015
3	06/12/2015
4	07/17/2015

CARP0548-002 07/01/2012

	Rates	Fringes
CARPENTER (Including Form Work)	$ 33.34	16.73

ELEC0292-024 05/01/2014

	Rates	Fringes
ELECTRICIAN	$ 36.53	26.08

ENGI0049-064 05/01/2015

	Rates	Fringes
OPERATOR: Power Equipment		
Group 2	$ 33.78	17.90
Group 3	$ 33.23	17.90
Group 4	$ 32.93	17.90
Group 5	$ 29.89	17.90
Group 6	$ 28.68	17.90

PLAS0633-004 05/09/2012

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.80	17.00

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* PLUM0015-023 05/01/2015

	Rates	Fringes
PLUMBER	$ 38.11	20.42

FOOTNOTE:
Paid Holiday: Labor Day

PLUM0539-017 05/01/2015

	Rates	Fringes
PIPEFITTER	$ 37.72	24.49

TEAM0160-016 05/01/2015

	Rates	Fringes
TRUCK DRIVER (DUMP)		
(1) Articulated Dump Truck	$ 29.10	15.20
(2) 3 Axles/4 Axles; 5 Axles receive $0.30 additional per hour	$ 28.55	15.20
(3) Tandem Axles; & Single Axles	$ 28.45	15.20

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

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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

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

CITY OF MINNEAPOLIS
SMALL AND UNDERUTILIZED BUSINESS PROGRAM (SUBP)
GOOD FAITH EFFORTS CHECKLIST

If the SUBP goals for the project have not been met, then a Good Faith Efforts Review will be conducted by the Department of Civil Rights Contract Compliance Division (CCD). The following checklist should be used during bid solicitation to demonstrate the efforts that were made to meet the SUBP goals. This checklist will need to be submitted to CCD if a Good Faith Effort Review is warranted. Per City ordinance (Chapter 423), there are seven factors that may be considered to determine whether or not MBE/WBE participation was solicited in good faith.

Do NOT return this document with your bid response.

Date:	
Company Name:	
Completed By:	
Title:	
Signature:	

Checklist Instructions:

- All factors listed below ***may*** be considered. Some factors may not be applicable to all projects or situations.
- Check all actions that were taken and enter comments for each factor explaining the actions taken.
- Documentation of all attempts to solicit MBE/WBE participation should be kept.
- Use additional sheets if necessary to supplement the responses and attach them to this form.

1. **Solicited through all Reasonable and Available Means:** As stated in 423.90(g)(1), the department may consider whether the bidder or proposer *solicited through all reasonable and available means (attendance at pre-bid meetings, advertising and/or written notices) the interest of all MBEs/WBEs certified in the scopes of work of the contract. The bidder or proposer must solicit MBEs/WBEs in sufficient time prior to bid opening or the proposal deadline to allow MBEs/WBEs to respond to solicitations. The bidder or proposer must determine with reasonable certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up on initial solicitations*.

   - ☐ Solicited to all firms listed on the MnUCP report provided by CCD that listed MBEs/WBEs certified in scopes of work related to the project (Keep copies of phone logs, emails, fax sheets, etc.) **If no, please explain here:** _____
   _____
   - ☐ Utilized the Online MnUCP Directory to identify additional MBEs/WBEs
   - ☐ Attended Pre-Bid Meeting to learn about the project and SUBP goals. **Date attended: _____**
   - ☐ Reviewed bid documents or RFP for SUBP goals and policies regarding solicitation and utilization of MBEs/WBEs
   - ☐ Solicited MBEs/WBEs in sufficient time prior to bid opening or proposal due date to allow MBEs/WBEs to respond to the bid solicitation (CCD recommends 2 weeks prior to bid opening). **Date solicited:_____**
   - ☐ Followed up with the MnUCP certified MBEs/WBEs to confirm interest in participation (Keep log of follow-up activities and provide the log to CCD)
   - ☐ Other _____

   Comments:_____
   _____
   _____
   _____

2. **Broke the Contract Work into Smaller Units:** As stated in 423.90(g)(2), the department may consider whether the bidder or proposer s*elected portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the project goals will be achieved. This includes, where appropriate, breaking out contract work into smaller units to facilitate MBE/WBE participation, even when a contractor might otherwise prefer to perform these work items with its own forces.*

   - ☐ Broke the contract into smaller scopes of work in order to facilitate MBE/WBE participation. Please list the scopes that were broken into smaller units:
     _____
     _____
   - ☐ Subcontracted/solicited scopes of work that could have been self-performed. Please list these scopes:
     _____
     _____
   - ☐ Other _____

     Comments:_____
     _____
     _____

3. **Provided MBEs/WBEs with Adequate Information:** As stated in 423.90(g)(3), the department may consider whether the bidder or proposer *provided MBEs/WBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.*

   - ☐ Bid invitations/advertisement included adequate information about the scope of work, contract requirements, deadline to submit a bid, etc. (Keep copy of invite/advertisement)
   - ☐ Provided MBEs/WBEs adequate project information and access to the plans and specifications
   - ☐ Other _____

     Comments:_____
     _____
     _____

4. **Negotiated in Good Faith:** As stated in 423.90(g)(4), the department may consider whether the bidder or proposer *negotiated in good faith with interested MBEs/WBEs and provide written documentation of such negotiation with each such business. In determining whether the bidder or proposer negotiated in good faith, the department may consider a number of factors including price, scheduling and capabilities as well as the contract goal.*

   - ☐ Negotiations with MBEs/WBEs are conducted fairly
   - ☐ Communication to MBEs/WBEs regarding pricing, scheduling and capability requirements are consistent with project plans and requirements. Communications and project information provided is the same to all potential bidders.
   - ☐ Were there any MBE/WBE firms that bid to you that you did not consider qualified to perform the work? If yes, explain here:
     _____
     _____
   - ☐ MBE/WBE bids were <u>rejected</u>. Please explain the reasons why here:
     _____
     _____
   - ☐ Other _____

     Comments:_____
     _____
     _____

5. **Used Reasonable Resources to Comply with SUBP:** As stated in 423.90(g)(5), *The fact that there may be some additional costs involved in finding and using MBEs/WBEs is not itself sufficient reason for a bidder's or proposer's failure to meet the project goals as long as such costs are reasonable.*

   ☐ Please list the resources your company used to comply with SUBP *(examples include: bid advertisements, list serves, time spent soliciting, time spent documenting efforts, and other administrative resources spent to perform good faith efforts)*

   _____
   _____
   _____

6. **Provided MBEs/WBEs with Assistance in Meeting City Contracting Requirements:** As stated in 423.90(g)(6), *if requested by a solicited MBE/WBE, the bidder or proposer must make reasonable efforts to assist such MBEs/WBEs in obtaining bonding, lines of credit or insurance as required by the city or by the bidder or proposer, provided that the bidder or proposer need not provide financial assistance toward this effort.*

   ☐ Provided reasonable assistance to help MBEs/WBEs obtain bonds, lines of credit, or insurance that is required by the City.
   ☐ Referred MBEs/WBEs in need of financial or technical assistance to City's **Business and Technical Assistance Program** (***B-TAP***). For more information on B-TAP please visit: http://www.minneapolismn.gov/business/B-TAP.
   ☐ Other _____

   Comments:_____
   _____
   _____
   _____

7. **Effectively Used Community Organizations:** As stated in 423.90(g)(6), *effectively using the services of minority/woman community organizations; minority/woman contractors' groups; local, state and federal business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the solicitation and placement of MBEs/WBEs.*

   ☐ Used services of minority/women community organizations
   ☐ Used services of minority/women professional organizations
   ☐ Other _____

   Please list the organizations that were used:

   _____
   _____

8. **Other Good Faith Efforts**

   Please explain any other good faith efforts made by your company not included above. Examples may include: identifying firms eligible to become MnUCP certified MBEs/WBEs, hosting open houses or networking events, and participation in trainings related to equity and inclusion.

   _____
   _____
   _____
   _____
   _____
   _____
   _____

For a copy of the latest Prevailing Wage Rates - visit the Federal Website:

http://www.wdol.gov/dba.aspx

Use the Rates for State of Minnesota - Hennepin County
Building
Highway

PREVAILING WAGE CERTIFICATE

SUBMIT WITH ORIGINAL COPY OF YOUR BID

Laborers and Mechanics shall be paid according to the Contracts for Public Works Ordinance, Minneapolis Code of Ordinances, Chapter 24, Section 24.200 through 24.260, as amended, and the minimum wage rates and fringe benefits paid to the various classes shall be as determined by the Secretary of Labor of the United States, for work in the City, subject to and upon compliance with all requirements provided in the Rules of the Office of the Secretary of Labor of the United States. Apprentices may be paid less than the predetermined wage rate for the work performed. Apprentices must participate in a registered apprenticeship program (See 29 CFR, Parts 5 and 29). In addition to the certificates and other evidences of compliance which are required under these specifications and under Minneapolis Code of Ordinances, Section 24.240, it shall be required that the person or company representative submitting a bid for this contract shall certify in writing that both she/he/it and their Subcontractors shall comply with the wage and labor standard provision of Minneapolis Code of Ordinances, Section 24.200 through 24.260 as amended. Failure to comply with this ordinance shall mean the City may, by written notice to the Contractor, terminate the Contractor's right to proceed with the work and the Contractor and his Sureties shall be liable to the City for any excess cost occasioned to the City for the completion of the work.

By submitting this bid, it is understood and agreed that if it is accepted, in whole or in part, by the City of Minneapolis or Board, as designated, that any work done by the Contractor or by the Contractor's agent or Subcontractor under a contract with the City of Minneapolis or Board as designated shall be done in conformity with provisions of Minneapolis Code of Ordinances, Chapter 24, Section 24.200 through 24.260, or, if applicable Park Board Code of Ordinances, Chapter 6, Section PB 6-1 through PB 6-5. Specifically, it is agreed that payment of wages to employees or agents of the Contractor or any Subcontractor shall be no less than the amounts set forth in the current U.S. Department of Labor, General Wage Decision for the State of Minnesota - Hennepin County.

_____
SIGNATURE

_____
Company Name

BY SUBMITTING YOUR BID AND SIGNING THE BID FORM, YOU ARE AGREEING TO ALL OF THE ABOVE

RETURN THIS FORM WITH YOUR BID

AGREEMENT #: _____

AGREEMENT

between

THE CITY OF MINNEAPOLIS

and

COMPANY NAME

SAMPLE

THIS AGREEMENT is made the _____ day of _____ 2015 between _____ ("Contractor") and the City of Minneapolis ("City");

1. The Contractor agrees:

   a. To furnish all labor, materials, equipment and incidentals necessary to accomplish _____ as directed by Public Works – Transportation Division as needed, all in accordance with bid specifications, bid form and the Contractor's bid, as follows:

      In the Amount not to exceed: $

      Terms are net 30 days. F.O.B.: Destination

2. The Contractor agrees that this Agreement will be performed in conformity with the specifications in the City's Official Publication No. XXXX, the proposal of the Contractor, and other modifications to either of those documents made by the City. All of those documents are expressly made a part of this Agreement.

3. The Contractor agrees that its performance shall be in compliance with all laws pertaining to any aspect of any operation of the Contractor.

4. The Contractor agrees that it will pay as they become due all claims for work and services, including all wages withheld and required by law to be remitted by the Contractor to federal, state or local governments.

5. The Contractor agrees that it will pay for all material and equipment necessary to complete performance of this Agreement and upon request will furnish the City with satisfactory evidence that all amounts have been fully paid. Upon default or delinquency of the Contractor in making such payments, the unpaid amounts will be first paid by the City out of amounts due the Contractor before any part is paid to the Contractor, and will be deducted from any remaining balance due to the Contractor.

6. The Contractor agrees that it will defend, indemnify and hold the City harmless from all damages and claims of damages that may arise by reason of any negligence on the part

of the Contractor, its agents, employees or subcontractors, while engaged in the performance of this Agreement.

7. The Contractor agrees that it will defend, indemnify and hold the City harmless against all claims and liens for labor or services performed, and for material or equipment furnished or subcontracted for by Contractor without authorization of the City.

8. The Contractor agrees to perform all acts and make all payments associated with this Agreement, including obligations to third persons and government entities.

9. No attempted assignment by the Contractor of any of its rights or obligations under this Agreement shall be valid, effective, or binding upon the City unless the City gives its written consent as evidenced by an action of the City Council of the City.

10. The Contractor agrees to comply with the provisions of all applicable federal, state and local statutes, ordinances and regulations pertaining to human rights and nondiscrimination.

11. This Contractor agrees that this Agreement becomes effective upon approval by the City of acceptable evidence of compliance with the workers' compensation insurance coverage requirements of Minnesota Statutes Section 176.181, Subd. 2.

12. The City agrees to pay the Contractor subject to the provisions of this Agreement upon bills or invoices approved by the City, and only after delivery and acceptance by the City of all labor, materials or services provided pursuant to this Agreement.

13. The Contractor shall provide the Performance Bond and Payment Bond as required by State statute, City ordinance and as provided for in this Agreement.

14. The Contractor represents that it is a “responsible contractor” as defined in Minnesota Statutes, Section 16C.285, subdivision 3 and will comply with the provisions contained in “Bid Terms and Conditions” incorporated in and made a part of the Contract. This section is not applicable to a contractor that is a supplier of goods and materials to the City under the terms of the Contract.

15. If the Contractor fails to perform according to the specifications contained in City Official Publication No. XXXX, the bid or proposal of the Contractor as accepted by the City, and all modifications or charges to either of these documents by the City, then the City will provide the Contractor with notice of the Contractor’s failure to perform and a description of the incident or event of nonperformance (an “Event of Default”). The Contractor will cure said Event(s) of Default within ten (10) business days or such other reasonable amount of time as determined by the City in its Notice to the Contractor. Failure to cure said Event(s) of Default will result in the contractor’s forfeiture of either or both the Performance Bond, the Payment Bond, portions of either such Bond, and such other costs and damages incurred by the City due directly or indirectly to the Event(s) of Default.

16. The City and the Contractor shall deliver all notice of Event(s) of Default to each other by U.S. mail, first class postage, prepaid at the address indicated in the specifications and the bid or proposal.

SAMPLE

TO AFFIRM THEIR AGREEMENT __COMPANY NAME__ and the City of Minneapolis now execute this document by the signatures of the proper and authorized officers of each and by their corporate seal the day and year first above written.

CONTRACTOR

By:

_____

Its:

_____

AND

By:

_____

Its:

_____

FOR THE CITY

Approved by:

_____

Department Head responsible for Monitoring this Contract

Approved as to Form by:

_____

Assistant City Attorney

Approved by:

_____

Finance Officer Designee

SAMPLE

AGREEMENT #: _____

PERFORMANCE BOND

associated with

AGREEMENT # _____

between

THE CITY OF MINNEAPOLIS

and

COMPANY NAME

WHEREAS _____, Inc, (“Principal"), and _____ ("Surety") are held and firmly bound to the City of Minneapolis ("Obligee") in the sum of $_____) for the payment of which the Principal and Surety bind themselves.

WHEREAS the Principal has executed a written Agreement with the City of Minneapolis dated _____, 2015, to perform work consisting of furnishing all labor, materials, equipment and incidentals necessary to accomplish all of the details set forth in the Agreement and the plans and specifications in City Official Publication No. XXXX;

ALL OF THE PARTIES NOW AGREE THAT If the Principal performs all of the terms and conditions of the underlying Agreement or any amendments to that Agreement within the time provided in those documents, and if the Principal defends, indemnifies and holds harmless the Obligee from any and all claims, causes of action, losses, damages, penalties, and expenses, including costs and attorney's fees, which the Obligee may sustain by reason of said Principal's failure to perform all of the terms of the Agreement, and for the costs of enforcing the terms of this bond if action is brought on the bond, including reasonable attorneys' fees; then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety agrees that no assignment, change, extension of time, alteration, addition, omission, or other modification of the terms of the underlying Agreement shall in any way affect the Surety's obligation on this Bond, and the Surety waives notice and consents to any such assignment, change, alteration, modification or amendment.

The Principal and the Surety shall not be liable to the Obligee unless the Obligee performed the obligations to the Principal in accordance with the terms of the underlying Agreement.

The Principal and the Surety shall not be liable to the Obligee in the aggregate in excess of the sum stated above.

It is agreed that this bond is intended to comply with and furnish the coverage required by Minnesota Statutes, Section 574.26.

SAMPLE

THE SURETY AND PRINCIPAL AGREE THAT THEY ARE LIABLE for the sum mentioned above for the Principal's performance of the terms and conditions of the underlying Agreement.

Principal's Address: Surety's Address:

TO AFFIRM THEIR AGREEMENT the Principal and the Surety have set their signatures and seals, this ___ day of _____, 2015.

_____ (Seal) _____ (Seal)
Principal Surety

_____ _____
Business Address Business Address

By _____ By _____
Signature and Title Signature and Title

Approved as to form:

_____
Assistant City Attorney

SAMPLE

AGREEMENT #: _____

PAYMENT BOND

associated with

AGREEMENT # _____

between

THE CITY OF MINNEAPOLIS

and

COMPANY NAME

SAMPLE

WHEREAS _____, Inc. ("Principal"), and _____ ("Surety") are held and firmly bound to the City of Minneapolis ("Obligee") in the sum of $_____for the payment of which the Principal and Surety bind themselves.

WHEREAS the Principal has executed a written Agreement with the City of Minneapolis dated _____, 2015, to perform work consisting of furnishing all labor, materials, equipment and incidentals necessary to accomplish all of the details set forth in the Agreement and the plans and specifications in City Official Publication No. XXXX;

ALL OF THE PARTIES NOW AGREE THAT if the Principal promptly pays in full the claims of all persons performing labor or furnishing materials, supplies and equipment associated with the performance of the underlying Agreement and all modifications of the Agreement, and if the Principal defends, indemnifies and holds harmless the Obligee from any and all such claims, costs, damages and penalties, including attorney's fees and expenses, for all taxes, insurance premiums, and all contributions, allowances, deductions, or other payments required by statute or labor agreements, including voluntary payment made by the Obligee to ensure the orderly performance of the underlying Agreement, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety agrees that no assignment, change, extension of time, alteration, addition, omission or other modification of the terms of the underlying Agreement assented to by the Obligee shall in anyway affect the Surety's obligation on this Bond, and the Surety waives notice and consents to any such assignment, change, alteration, modification or amendment.

The Principal and Surety agree that this Bond shall inure to the benefit of all persons performing labor or furnishing materials, supplies and equipment in the prosecution of the work provided for in the underlying Agreement, as well as to the Obligee, and that such persons may maintain independent actions upon this Bond in their own names.

The Principal and the Surety shall not be liable to the Obligee unless the Obligee has performed the obligations to the Principal in accordance with the terms of the underlying Agreement.

The Principal and Surety shall not be liable to the Obligee in the aggregate in excess of the sum above stated.

It is agreed that this bond is intended to comply with and furnish the coverage required by Minnesota Statutes, Section 574.26.

THE SURETY AND PRINCIPAL AGREE THAT THEY ARE LIABLE for the sum mentioned above for the Principal's payment in dollars ($) of the Principal's obligations pursuant to the underlying Agreement.

Principal's Address: Surety's Address:

TO AFFIRM THEIR AGREEMENT the Principal and the Surety have set their signatures and seals, this ___ day of _____, 2015.

_____ (Seal) _____ (Seal)
Principal Surety

_____ _____
Business Address Business Address

By _____ By _____
Signature and Title Signature and Title

Approved as to form:

_____
Assistant City Attorney

SAMPLE

RESPONSIBLE CONTRACTOR VERIFICATION AND CERTIFICATION OF COMPLIANCE

PROJECT TITLE: OP 8208 – RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT PROJECT

Minn. Stat. § 16C.285, Subd. 7. **IMPLEMENTATION.** … any prime contractor or subcontractor that does not meet the minimum criteria in subdivision 3 or fails to verify that it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the project or to perform work on the project…	
Minn. Stat. § 16C.285, Subd. 3. **RESPONSIBLE CONTRACTOR, MINIMUM CRITERIA**. "Responsible contractor" means a contractor that conforms to the responsibility requirements in the solicitation document for its portion of the work on the project and verifies that it meets the following minimum criteria:	
(1)	The Contractor: (i) is in compliance with workers' compensation and unemployment insurance requirements; (ii) is currently registered with the Department of Revenue and the Department of Employment and Economic Development if it has employees; (iii) has a valid federal tax identification number or a valid Social Security number if an individual; and (iv) has filed a certificate of authority to transact business in Minnesota with the Secretary of State if a foreign corporation or cooperative.
(2)	The contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 177.24, 177.25, 177.41 to 177.44, 181.13, 181.14, or 181.722, and has not violated United States Code, title 29, sections 201 to 219, or United States Code, title 40, sections 3141 to 3148. For purposes of this clause, a violation occurs when a contractor or related entity: (i) repeatedly fails to pay statutorily required wages or penalties on one or more separate projects for a total underpayment of $25,000 or more within the three-year period; (ii) has been issued an order to comply by the commissioner of Labor and Industry that has become final; (iii) has been issued at least two determination letters within the three-year period by the Department of Transportation finding an underpayment by the contractor or related entity to its own employees; (iv) has been found by the commissioner of Labor and Industry to have repeatedly or willfully violated any of the sections referenced in this clause pursuant to section 177.27; (v) has been issued a ruling or findings of underpayment by the administrator of the Wage and Hour Division of the United States Department of Labor that have become final or have been upheld by an administrative law judge or the Administrative Review Board; or (vi) has been found liable for underpayment of wages or penalties or misrepresenting a construction worker as an independent contractor in an action brought in a court having jurisdiction. Provided that, if the contractor or related entity contests a determination of underpayment by the Department of Transportation in a contested case proceeding, a violation does not occur until the contested case proceeding has concluded with a determination that the contractor or related entity underpaid wages or penalties;*

(3)	The contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 181.723 or chapter 326B. For purposes of this clause, a violation occurs when a contractor or related entity has been issued a final administrative or licensing order;*
(4)	The contractor or related entity has not, more than twice during the three-year period before submitting the verification, had a certificate of compliance under section 363A.36 revoked or suspended based on the provisions of section 363A.36, with the revocation or suspension becoming final because it was upheld by the Office of Administrative Hearings or was not appealed to the office;*
(5)	The contractor or related entity has not received a final determination assessing a monetary sanction from the Department of Administration or Transportation for failure to meet targeted group business, disadvantaged business enterprise, or veteran-owned business goals, due to a lack of good faith effort, more than once during the three-year period before submitting the verification;*
	* Any violations, suspensions, revocations, or sanctions, as defined in clauses (2) to (5), occurring prior to July 1, 2014, shall not be considered in determining whether a contractor or related entity meets the minimum criteria.
(6)	The contractor or related entity is not currently suspended or debarred by the federal government or the state of Minnesota or any of its departments, commissions, agencies, or political subdivisions; and
(7)	All subcontractors that the contractor intends to use to perform project work have verified to the contractor through a signed statement under oath by an owner or officer that they meet the minimum criteria listed in clauses (1) to (6).

Minn. Stat. § 16C.285, Subd. 5. **SUBCONTRACTOR VERIFICATION**.
A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project. If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors. A prime contractor shall submit to the contracting authority upon request copies of the signed verifications of compliance from all subcontractors of any tier pursuant to subdivision 3, clause (7). A prime contractor and subcontractors shall not be responsible for the false statements of any subcontractor with which they do not have a direct contractual relationship. A prime contractor and subcontractors shall be responsible for false statements by their first-tier subcontractors with which they have a direct contractual relationship only if they accept the verification of compliance with actual knowledge that it contains a false statement.

Minn. Stat. § 16C.285, Subd. 4. **VERIFICATION OF COMPLIANCE.**
A contractor responding to a solicitation document of a contracting authority shall submit to the contracting authority a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in subdivision 3 at the time that it responds to the solicitation document. A contracting authority may accept a sworn statement as sufficient to demonstrate that a contractor is a responsible contractor and shall not be held liable for awarding a contract in reasonable reliance on that statement. Failure to verify compliance with any one of the minimum criteria or a false statement under oath in a verification of compliance shall render the prime contractor or subcontractor that makes the false statement ineligible to be awarded a construction contract on the project for which the verification was submitted. A false statement under oath verifying compliance with any of the minimum criteria may result in termination of a construction contract that has already been awarded to a prime contractor or subcontractor that submits a false statement. A contracting authority shall not be liable for declining to award a contract or terminating a contract based on a reasonable determination that the contractor failed to verify compliance with the minimum criteria or falsely stated that it meets the minimum criteria.

CERTIFICATION	
By signing this document I certify that I am an owner or officer of the company, and I swear under oath that: **1) My company meets each of the Minimum Criteria to be a responsible contractor as defined herein and is in compliance with Minn. Stat. § 16C.285,** **2) I have included Attachment A-1 with my company's solicitation response, and** **3) if my company is awarded a contract, I will also submit Attachment A-2 as required.**	
Authorized Signature of Owner or Officer:	**Printed Name:**
Title:	**Date:**
Company Name:	

NOTE: Minn. Stat. § 16C.285, Subd. 2, (c) If only one prime contractor responds to a solicitation document, a contracting authority may award a construction contract to the responding prime contractor even if the minimum criteria in subdivision 3 are not met.

ATTACHMENT A-1

FIRST-TIER SUBCONTRACTORS LIST

SUBMIT WITH PRIME CONTRACTOR RESPONSE

PROJECT TITLE: OP 8208 – RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT PROJECT

Minn. Stat. § 16C.285, Subd. 5. A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project. …

FIRST TIER SUBCONTRACTOR NAMES **(Legal name of company as registered with the Secretary of State)**	**Name of city where company home office is located**

ATTACHMENT A-2

ADDITIONAL SUBCONTRACTORS LIST

PRIME CONTRACTOR TO SUBMIT AS SUBCONTRACTORS ARE ADDED TO THE PROJECT

PROJECT TITLE: OP 8208 – RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT PROJECT

This form must be submitted to the Project Manager or individual as identified in the solicitation document.

Minn. Stat. § 16C.285, Subd. 5. … If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors. …

ADDITIONAL SUBCONTRACTOR NAMES **(Legal name of company as registered with the Secretary of State)**	**Name of city where company home office is located**

ADDITIONAL SUBCONTRACTOR NAMES (Legal name of company as registered with the Secretary of State)	Name of city where company home office is located

SUPPLEMENTAL CERTIFICATION FOR ATTACHMENT A-2	
By signing this document I certify that I am an owner or officer of the company, and I swear under oath that: All additional subcontractors listed on Attachment A-2 have verified through a signed statement under oath by an owner or officer that they meet the minimum criteria to be a responsible contractor as defined in **Minn. Stat. § 16C.285.**	
Authorized Signature of Owner or Officer:	**Printed Name:**
Title:	**Date:**
Company Name:	

Official Publication No. 8208
Bids opened 10 AM, Local Time
January 14th, 2016

BID FORM

My /Our bid to provide all materials, labor, equipment and incidentals for the construction of the Rainwater Storage and Irrigation System Retrofit Project for the Minneapolis Convention Center, all in accordance with your specifications. Please include all applicable sales taxes in your lump sum bid.

Lump Sum Bid: **$**_____

Numbers must be legible or bid may be rejected.

UNIT PRICES:

Remove Unsuitable Materials: **$**_____/CY

Remove Unanticipated Materials to Landfill: **$**_____/CY

Select Granular (Local Source): **$**_____/CY

Successful bidder will be required to enter into a formal contract and provide Performance Bond and Payment Bond in the full amount of the contract.

A contractor responding to this solicitation document swears that they are in compliance with the minimum criteria in Minnesota Statutes, section 16C.285, subdivision 3, and shall upon request submit to the city a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria.

Please return the following documents with your bid:

Bid Form - Prevailing Wage Certificate – SUBP Participation Form – Responsible Contractor Verification Form – 2% Bid Deposit

F.O.B.: Destination

Acknowledge Addenda No. _____ _____ _____

Official Publication No. 8208
Bids opened 10 AM, Local Time
January 14th, 2016

OP 8208 – SIGNATURE PAGE

Bidder must supply Federal Tax ID No. or Social Security No. _____
If Social Security Number is provided, this individuals name must be included as Bidder.

Bidder affirms that this bid(s) has been arrived at by the bidder independently and has been submitted without collusion with, and without any agreement, understanding or planned common course of action with, any other bidder of materials, supplies, equipment and services described in the invitation to Bid, designed to limit independent bidding or competition.

TWO complete bid responses including attachments to be returned, one of which must be an **original**.

BIDDER _____
CIRCLE ONE (Corporation - Partnership - Individual)

SIGNED BY _____
(Signature) (Printed Name)

ADDRESS _____

CITY _____ STATE_____ ZIP+4 ZIP CODE_____

BUSINESS PHONE (_____)_____ FAX NUMBER_____

E-MAIL ADDRESS: _____

IF YOU ARE NOT OFFERING A BID

Please fill out company name, address, etc. above and indicate below or on back side of this form, your reason(s) for not offering a bid and return this page to City Purchasing, 330 Second Avenue South - Suite 552, Minneapolis, MN 55401. Please indicate **"NO BID"** on the outside of your mailing envelope.

BIDS RESULTS WILL NOT BE MAILED, BUT WILL BE E-MAILED TO THE E-MAIL ADDRESS ON THIS BID FORM.

Notice to Proceed

Dated _____

Project:	Owner:	Owner's Contract No.:
MCC, Rainwater Storage and Irrigation System Retrofit	City of Minneapolis	
Contract:		Engineer's Project No.:
Minneapolis Convention Center, Rainwater Storage and Irrigation System Retrofit		120383.01

Contractor:

Contractor's Address: [send Certified Mail, Return Receipt Requested]

You are notified that the Contract Times under the above contract will commence to run on 05-24-2016. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with ~~Article 4 of~~ the Agreement, the date of Substantial Completion is 08-05-2016, and the date of readiness for final payment is 08-05-2016 [(or) the number of days to achieve Substantial Completion is NA, and the number of days to achieve readiness for final payment is NA].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must [add other requirements]:

Obtain permits for work.

_____

Owner

Given by:

Authorized Signature

Title

Date

Copy to Engineer

Contractor's Application For Payment No. _____

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer)
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

APPLICATION FOR PAYMENT

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE	$	
2. Net change by Change Orders	$	
3. CURRENT CONTRACT PRICE (Line 1 ± 2)	$	
4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)	$	
5. RETAINAGE:		
a. _____ % x $_____ Work Completed	$	
b. _____ % x $_____ Stored Material	$	
c. Total Retainage (Line 5a + Line 5b)	$	
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)	$	
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	$	
8. AMOUNT DUE THIS APPLICATION	$	
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)	$	

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $_____
(Line 8 or other - attach explanation of other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $_____
(Line 8 or other - attach explanation of other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

Progress Estimate

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A		B	Work Completed		E	F		G
Item			C	D		Total Completed	%	Balance to
Specification Section No.	Description	Scheduled Value	From Previous Application (C + D)	This Period	Materials Presently Stored (not in C or D)	and Stored to Date (C + D + E)	(F) B	Finish (B - F)
	Totals							

Progress Estimate

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A				B	C	D	E	F		G
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
	Totals									

Stored Material Summary

Contractor's Application

For (contract):	Application Number:
Application Period:	Application Date:

A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
			Date (Month/Year)	Amount ($)	Amount ($)	Subtotal	Date (Month/Year)	Amount ($)	
		Totals							

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General Contractors of America

Construction Specifications Institute

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American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

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20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

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administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

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E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review**:**

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work

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(unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

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4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

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c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified

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in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

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3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any

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deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

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Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

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1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

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c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued . No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

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or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer,, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

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6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Draw-

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ings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:* Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

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with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

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arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and

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properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

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8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment , a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

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9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

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promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A.Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

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F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have

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resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation , overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

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B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

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by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times , or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

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be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

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B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

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payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

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inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

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Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

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under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

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3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. 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;

2. 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;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. 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.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

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governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SECTION 00 0800 – SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700; 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

Item 2.02.A shall be amended to read as follows:

Electronic copies of the Project Manual or portions thereof will be provided to the Contractor.

Item 2.03.A shall be amended to read as follows:

Replace the paragraph with the following sentence:

The Contract Times will commence to run on the day indicated on the Notice to Proceed. The Notice to Proceed may be given at any time after the Effective Date of the Agreement.

Item 4.02.A.1 shall be supplemented as follows:

The following reports were used in preparing the Contract Documents:

- Report of Geotechnical Exploration, by American Engineering Testing, Inc., dated September 25, 2015.

Item 4.02.A.2 shall be supplemented as follows:

The following drawings were used in preparing the Contract Documents:

- Boundary & Topographical Survey, by Harry S. Johnson Co., Inc., dated September 10, 2015 and revised October 5, 2015.

Article 5 shall be supplemented as follows:

The Contractor will, during the life of the contract, purchase and maintain insurance coverage's and limits as required by the City (see "Bids – City General Requirements," article 3, Insurance).

Additional Insurance:

> The insurance requirements as set forth in the documents are minimum requirements only, and any additional coverage's that may be necessary to further protect the Contractor are the sole responsibility of the Contractor. No Contractor shall be allowed to continue to work on site after the expiration of full insurance coverage.
>
> Owner (the City of Minneapolis, acting by and through its Minneapolis Convention Center), LHB, Inc., and Main Line Consulting, Inc. (MLC Irrigation Consultants) shall be named as an additional insured for all insurance required herein.

Item 7.02 shall be supplemented as follows:

The Owner intends to have the bituminous pavements in the marshalling yard repaved by the city Public Works Department upon completion of the Work.

Item 9.03 shall be supplemented as follows:

A Resident Project Representative will not be a part of this project.

Item 11.03.B shall be supplemented as follows:

Estimated quantities for Unit Price Work are not included.

Item 14.02.A.1 shall be amended as follows:

Revise to read: Contractor shall submit to Engineer for review and Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied …

Item 14.02.A.3 shall be amended as follows:

Revise to read: The amount of retainage with respect to progress payments will be 5%.

Item 14.02.C.1 shall be amended as follows:

Forty five days after presentation of the Application for Payment to Owner with Engineer's recommendation, the …

END OF SECTION

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

You are directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

_____

_____

Purpose for Work Change Directive:

☐ Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

☐ Nonagreement on pricing of proposed change.

☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price $ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments: (List documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

$_____

[Increase] [Decrease] from previously approved Change Orders No._____ to No._____:

$_____

Contract Price prior to this Change Order:

$_____

[Increase] [Decrease] of this Change Order:

$_____

Contract Price incorporating this Change Order:

$_____

CHANGE IN CONTRACT TIMES:

Original Contract Times: ☐ Working days ☐ Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No._____ to No._____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable): _____ Date: _____

Prepared by the Engineers' Joint Contract Documents Committee and endorsed by the Associated General Contractors of America and the Construction Specifications Institute.

SECTION 01 1000 – SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. The Project consists of an underground stormwater storage system for collecting stormwater off of facility roofs and an irrigation system retrofit to the existing site irrigation systems of the site.

1.02 PRE-BID SITE INSPECTIONS

A. Inspect the site (including inside the underground loading dock facility where the drawings call for pipe to be disconnected and re-routed). Schedule inspections with the Owner, Mark Zirbel, Director of Event Services, 612-335-6031 w, 612-387-1641 c.

1.03 CONSTRUCTION LIMITS & OWNER OCCUPANCY

A. Miscellaneous existing equipment and materials that exist within the Construction Limits indicated on the Drawings will be removed by the Owner prior to construction initiation. This includes areas inside the MCC Storage building which is available for contractor use during the construction period.

B. Owner intends to continue to occupy the site and facility adjacent to the Construction Limits and as indicated on the Drawings during the entire construction period.

C. Coordinate and cooperate with the Owner to minimize conflicts and to facilitate Owner's operations.

1.04 CONTRACTOR USE OF SITE & PREMISES

A. Construction areas: Limited to areas noted on Drawings as "Construction Limits". Vehicle haul routes may extend outside these areas as approved by the Owner. If needed to improve the efficiency of construction; coordinate use of other areas within the Owner.

B. Assume full responsibility for protection and safekeeping of products under this Contract.

C. Public & Private Utilities:
   1. Coordinate work that affects adjacent utilities with the respective utilities. Provide and pay for all costs of temporary supports as needed to protect utilities.
   2. Prevent accidental disruption of utility services.

E. Owner's Operations & Securing Site
   1. Coordinate with Owner to understand Owner's operations and when gates will be closed and re-opened. Take responsibility for securing equipment, products, and materials from theft or vandalism by securing such items in the MCC Storage building or by providing additional security fence, as approved by the Owner.

1.05 PERMITS

A. Apply for and pay for applicable permits for the work. Permits that are required for this project include, but may not be limited to, the permits noted below. Coordination with the below regulators has been accomplished and their requirements, if any, have been incorporated into the drawings.
   1. City of Minneapolis, erosion control permit. Contact Jeremy Strehlo, 612-673-3973.
   2. City of Minneapolis, water permit. Contact Rock Rodgers, 612-673-2286.
   3. A Minnesota Pollution Control Agency permit for construction stormwater is not required since the site disturbance is less than 1 acre.

1.05 DRAWINGS GOVERN

A. Unless noted otherwise on the drawings, provide work as described in the project specifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 1100 – FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Primary benchmarks and control points.

B. Establishment of primary lines and grades.

C. Construction layout and measurement.

D. Protection of lot corners and survey monuments.

1.02 PRIMARY BENCHMARKS & CONTROL POINTS

A. Benchmarks are identified on the survey to establish primary vertical control for construction of the Work.

B. Notify LHB to request AutoCAD files in order to layout proposed work. Cross-check layouts against existing features.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRIMARY LINE & GRADE

A. The Contractor is responsible for field engineering and layout of proposed features, including staking.

B. Preserve and maintain primary bench marks and establish and preserve additional benchmarks, as needed.

C. Establish control points and offset control points for laying out the work.

D. Check primary benchmarks and control points used for consistency.

D. Provide primary line and grade.

F. Check accuracy of line and grade by visual inspection, checks between stakes, and periodic checks (with surveying equipment) with primary control points.

3.02 LOT CORNERS & SURVEY MONUMENTS

A. Provide services of registered land surveyor to replace lot corners and survey monuments disturbed by construction operations. Iron pipe control points are not survey monuments.

END OF SECTION

SECTION 01 1300 – ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Submittal procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. LHB will schedule a meeting after Notice to Proceed.

B. Attendance Required:
   1. Owner.
   2. LHB.
   3. MLC Irrigation Consultants (MLC).
   4. Contractor.
   5. Testing Agency.

C. Agenda:
   1. Introductions.
   2. Designation of personnel representing the parties to Contract, LHB, MLC and Testing Agency.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Work Change Directives, Change Orders, and Contract closeout procedures.
   7. Scheduling.
   8. Scheduling activities of geotechnical Testing Agency.
   9. Other items, as needed.

3.02 PROGRESS MEETINGS

A. Meetings will be held weekly at the site on Tuesdays at 9 am.

B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner (at their discretion), LHB, MLC, geotechnical Testing Agency (as needed).

C. Agenda:
   1. Review of Work progress.
   2. Field observations, problems, and decisions.
   3. Identification of problems which impede planned progress.
   4. Review of submittals schedule and status of submittals.
   5. Corrective measures to regain projected schedules.
   6. Planned progress during succeeding work period.
   7. Maintenance of quality and work standards.
   8. Effect of proposed changes on progress schedule and coordination.
   9. Other business relating to Work.

3.04 SUBMITTALS (GENERAL)

A. As required by the General Conditions, Supplementary Conditions, and individual specification sections.

B. When the following are specified in individual specification sections, submit them for review:
   1. Product data.
   2. Test and inspection reports.

3.05 SUBMITTALS FOR PROJECT CLOSEOUT

A. As required by the General Conditions, Supplementary Conditions, and individual specification sections.

3.07 SUBMITTAL PROCEDURES

A. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

B. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

C. Schedule submittals to expedite the Project, and coordinate submission of related items.

D. Provide space for Contractor and LHB stamps.

E. When revised for resubmission, identify all changes made since previous submission.

F. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 1400 – QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control of installation.

B. Testing and inspection services.

1.02 TESTING AND INSPECTION AGENCIES

A. The Owner will employ, coordinate and pay for the services of an independent Testing Agency to perform geotechnical inspection and testing of pavement mixes, subgrades, earthwork, and trenching and backfilling Work.

B. Employment of Testing Agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents and to execute their own quality control testing and inspection to ensure the Work is as required by the Contract documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Have Work performed by persons qualified to produce required and specified quality.

3.02 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Test and inspect mixes, materials, and subgrades.
   2. Provide qualified personnel at site.
   3. Perform specified sampling, testing, and inspection of mixes, materials, and subgrades in accordance with specified standards.
   4. Ascertain compliance of mixes, materials, and subgrades with requirements of Contract Documents.
   5. Promptly notify LHB and Contractor of observed irregularities or non-conformance of Work or products.
   6. Perform additional tests and inspections required by LHB.
   7. Submit reports of tests and inspections specified in a timely manner.
   8. Determine and verify unit price application, if required in individual specification sections (e.g., 31 0000, Earthwork).

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, or enlarge on requirements of Contract Documents without approval of LHB.
   2. Agency may not assume any duties of Contractor.
   3. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to Testing Agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

2. Schedule and cooperate with Testing Agency personnel, and provide access to the Work.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify LHB and Testing Agency 24 hours prior to expected time for operations requiring testing/inspection services.

3.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of LHB, it is not practical to remove and replace the Work, LHB will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 1500 – TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary erosion control.

B. Temporary utilities.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Vehicular and pedestrian traffic control.

F. Waste removal facilities and services.

G. Field offices.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

3.01 TEMPORARY EROSION CONTROL

A. Provide and pay for all erosion and sedimentation control measures as indicated in the drawings. Remove from site after affected areas are stabilized.

3.02 TEMPORARY UTILITIES

A. Power and water is available on-site for Contractor evaluation to determine its adequacy for construction purposes. Contractor may utilize existing on-site power (e.g., outlets) and water (e.g., hydrants) connections provided by Owner as long as Contractor connections and use does not disrupt Owner operations. Coordinate Work with Owner.

3.03 TEMPORARY SANITARY FACILITIES

A. Sanitary facilities are available inside the building adjacent to the marshalling yard at the south side of the building for Contractor evaluation to determine their adequacy for construction purposes. Contractor may utilize these facilities.

B. If Contractor provides sanitary facilities, Contractor shall maintain required facilities and enclosures at Contractor expense.

C. In either option above, maintain daily in clean and sanitary condition.

3.04 TEMPORARY VEHICULAR & PEDESTRIAN ROUTES

A. Coordinate with Owner and provide temporary routes and provisions to maintain protected vehicular and pedestrian passage adjacent to construction areas as indicated in the drawings.

B. Provide access to and from site as required by law and by Owner:
   1. Coordinate with Owner for blocking existing vehicular and pedestrian building doors or paths and provide clear signage and directions for temporary alternative routes.
   2. Keep areas outside of building emergency exits clear at all times, unless provisions have been made with Owner that will restrict the public from occupying spaces for subject exits.
   3. Do not obstruct roadways, sidewalks, or other public ways without permit or written permission from the owner of same.

3.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public accesses that must be maintained as indicated in the drawings.

C. Protect vehicular traffic, stored materials, site, and structures from damage.

3.06 TEMPORARY FENCING

A. As indicated in the plans, or as needed by the Contractor and coordinated with the Owner.

3.07 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with the Owner.

B. Provide and maintain access to fire hydrants and other areas requiring continuous access, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering parking lot and streets.

D. Coordinate with Owner for temporary parking areas to accommodate construction personnel.

3.08 FIELD OFFICES

A. Contractor's option. Coordinate with Owner.

3.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary erosion control, utilities, equipment, facilities, materials, etc. prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work to original or better condition.

C. Restore existing facilities used during construction to original or better condition.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Storm water.
   2. Flanges, unions, and couplings.
   3. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

A. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

C. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2013a.

D. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.

E. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011 (ANSI/AWWA C606).

F. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2011

G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

H. NSF 61 - Drinking Water System Components - Health Effects; 2014.

I. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective coating on cast iron and steel valves.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.06 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

2.03 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

2.04 FLANGES, UNIONS, AND COUPLINGS

A. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Housing Material: Provide ductile iron, galvanized.
   3. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F.
   4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   5. When pipe is field grooved, provide coupling manufacturer's grooving tools.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
      a. Cold and Hot Pipe Sizes 6 Inches and Over: Double hangers.
   3. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   2. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

C. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Establish elevations of buried piping outside the building to ensure not less than 3.5 ft of cover.

E. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.
2. Place hangers within 12 inches of each horizontal elbow.
3. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

3.06 SERVICE CONNECTIONS

A. Provide new storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.07 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe size: 4 inches to 6 inches:
         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 5/8 inch.
      b. Pipe size: 8 inches to 12 inches:
         1) Maximum hanger spacing: 14 ft.
         2) Hanger rod diameter: 7/8 inch.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

F. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).

H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

J. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

K. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

G. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
2. Control Circuits: 14 AWG.

H. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
3. Color Code:
a. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
b. Equipment Ground, All Systems: Green.
c. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
a. Cerro Wire LLC: www.cerrowire.com.
b. Encore Wire Corporation: www.encorewire.com.
c. Southwire Company: www.southwire.com.
d. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
a. Burndy: www.burndy.com.
b. Ilsco: www.ilsco.com.
c. Thomas & Betts Corporation: www.tnb.com.
d. Substitutions: See Section 01 6000 - Product Requirements.

D. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy: www.burndy.com.
      b. Ilsco: www.ilsco.com.
      c. Thomas & Betts Corporation: www.tnb.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   2. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted.
      a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required to account for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   3. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

F. Install conductors with a minimum of 12 inches of slack at each outlet.

G. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

H. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

I. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

K. Insulate ends of spare conductors using vinyl insulating electrical tape.

L. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Notify LHB of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:

1. Grounding electrode system is existing to remain.

F. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
   1. Use insulated copper conductors unless otherwise indicated.

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
      a. Exceptions:
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
      a. Exceptions:
         1) Use exothermic welded connections for connections to metal building frame.
   4. Manufacturers - Mechanical and Compression Connectors:
      a. Advanced Lightning Technology (ALT); _____: www.altfab.com.
      b. Burndy; _____: www.burndy.com.
      c. Harger Lightning & Grounding; _____: www.harger.com.
      d. Thomas & Betts Corporation; _____: www.tnb.com.
      e. Substitutions: See Section 01 6000 - Product Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy; _____: www.burndy.com.
      b. Cadweld, a brand of Erico International Corporation; _____: www.erico.com.
      c. ThermOweld, a brand of Continental Industries, Inc; _____: www.thermoweld.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 26 0534
CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. PVC-coated galvanized steel rigid metal conduit (RMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

B. Section 26 0537 - Boxes.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2013.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); National Electrical Contractors Association; 2003.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.

I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; National Electrical Manufacturers Association; 2013.

J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2015.

K. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Notify LHB of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

D. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

E. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet.

G. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.

H. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

I. Connections to Vibrating Equipment:
   1. Damp, Dry, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com.
   2. Republic Conduit: www.republic-conduit.com.
   3. Wheatland Tube Company: www.wheatland.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com.
      b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
      c. Thomas & Betts Corporation: www.tnb.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.
   4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com.
   2. Republic Conduit: www.republic-conduit.com.
   3. Wheatland Tube Company: www.wheatland.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com.
      b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
      c. Thomas & Betts Corporation: www.tnb.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.

4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Thomas & Betts Corporation; _____: www.tnb.com.
   2. Robroy Industries; _____: www.robroy.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

D. Interior Coating: Urethane, minimum thickness of 2 mil.

E. PVC-Coated Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
   5. Interior Coating: Urethane, minimum thickness of 2 mil.

F. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
   1. AFC Cable Systems, Inc; _____: www.afcweb.com.
   2. Electri-Flex Company; _____: www.electriflex.com.
   3. International Metal Hose; _____: www.metalhose.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com.
      b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
      c. Thomas & Betts Corporation: www.tnb.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit; _____: www.alliedeg.com.
   2. Republic Conduit: www.republic-conduit.com.
   3. Wheatland Tube Company; _____: www.wheatland.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com.

b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
c. Thomas & Betts Corporation: www.tnb.com.
d. Substitutions: See Section 01 6000 - Product Requirements.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use compression (gland) or set-screw type.
   a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
   1. Cantex Inc: www.cantexinc.com.
   2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com.
   3. JM Eagle: www.jmeagle.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

G. Conduit Routing:

1. When conduit destination is indicated and routing is not shown, determine exact routing required.
2. Arrange conduit to maintain adequate headroom, clearances, and access.
3. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
4. Arrange conduit to provide no more than 150 feet between pull points.
5. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

H. Conduit Support:
1. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
2. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

I. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

K. Underground Installation:
1. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

O. Provide grounding and bonding in accordance with Section 26 0526.

P. Identify conduits in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0537
BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0534 - Conduit:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).

C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2013 (ANSI/NEMA OS 1).

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

I. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

J. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Notify LHB of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Use nonmetallic boxes where exposed rigid PVC conduit is used.
   5. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   6. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   7. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
   8. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation; _____: www.cooperindustries.com.
      b. Hubbell Incorporated; Bell Products; _____: www.hubbell-rtb.com.
      c. Hubbell Incorporated; RACO Products; _____: www.hubbell-rtb.com.
      d. O-Z/Gedney, a brand of Emerson Industrial Automation; _____: www.emersonindustrial.com.
      e. Thomas & Betts Corporation; _____: www.tnb.com.
      f. Substitutions: See Section 01 6000 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
      a. Indoor Clean, Dry Locations: Type 1, painted steel.
      b. Outdoor Locations: Type 3R, painted steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that mounting surfaces are ready to receive boxes.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
   2. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0534.

E. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

F. Install boxes plumb and level.

G. Install boxes as required to preserve insulation integrity.

H. Close unused box openings.

I. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Underground warning tape.

E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; National Fire Protection Association; 2015.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not install identification products until final surface finishes and painting are complete.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify existing fused switches, disconnects, and panelboards at or near location where new electrical branch circuits and feeders originate. Coordinate naming with owner. Field verify existing feeder source and include identification of "Fed From" portion of existing fused switch where this projects branch circuit/feeder(s) originate.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil. Provide updated circuit directory to reflact additions to existing panelboards.
         4) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces. Provide updated circuit directory to reflact additions to existing panelboards.

b. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
4. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized. Include warning labels on existing electrical equipment, where labels are not already present.
a. Minimum Size: 3.5 by 5 inches.
b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
3. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
4. Use underground warning tape to identify direct buried cables.

D. Identification for Boxes:
1. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.

E. Identification for Devices:
1. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
2. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
      a. Use only for indoor locations.
   2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Text: All capitalized unless otherwise indicated.
   3. Minimum Text Height:
      a. Equipment Designation: 1/2 inch.
      b. Other Information: 1/4 inch.
   4. Color:
      a. Normal Power System: White text on black background.

D. Format for Caution and Warning Messages:
   1. Minimum Size: 2 inches by 4 inches.
   2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 1/2 inch.

E. Format for Receptacle Identification:
   1. Minimum Size: 3/8 inch by 1.5 inches.
   2. Legend: Power source and circuit number or other designation indicated.
      a. Include voltage and phase for other than 120 V, single phase circuits.
   3. Text: All capitalized unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Legend: Power source and circuit number or other designation indicated.

2.04 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.05 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
3. Elevated Equipment: Legible from the floor or working platform.
4. Branch Devices: Adjacent to device.
5. Interior Components: Legible from the point of access.
6. Boxes: Outside face of cover.
7. Conductors and Cables: Legible from the point of access.
8. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 31 0000
EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Phasing plan requirements.

B. Erosion control.

C. Demolition.

D. Excavation, filling, grading, and compaction for underground stormwater storage system.

E. Importing of specified soil materials not present on-site.

F. Disposal of excess soils and Unsuitable Soils.

G. Disposal of Unanticipated Materials to Landfill.

H. Tests and inspections.

I. Cleanup and disposal.

1.02 RELATED SECTIONS

A. Section 31 0001 - Trenching and Backfilling.

B. Section 31 0002 - Liner.

C. Section 32 1200 - Bituminous Paving.

D. Section 32 1300 - Sitework Concrete.

1.03 BASIS FOR UNIT PRICES

A. Base Bid:
   1. Earthwork: Excavations and filling in order to provide new proposed features within lowest anticipated subgrades as indicated in the drawings and specifications, including poor soils within these limits. Work includes removal and disposal of excess materials and Unsuitable Soils within these limits.
   2. Demolition Features: Features ascertainable from reports, drawings, specifications, or site observation (e.g., surfacing, pipes). These features typically require landfilling.

B. Unit Price Application: Application of unit prices is determined by the Testing Agency for removals not part of the base bid, measured by the Contractor, and approved by LHB and the Owner.

1.04 UNIT PRICES

A. Remove Unsuitable Soils
   1. Definition: Poor soils that exist at or below the lowest anticipated subgrade of proposed features that are incompetent to support the proposed features.
   2. Measurement: cubic yard (in-place)
   3. Includes: Removal of Poor Soils

B. Remove Materials to Landfill
   1. Definition: Mixtures of materials containing organic and inorganic matter such as humus, spongy matter, roots, stumps, muck, peat, cobbles, boulders, rubbish and debris within or beyond the limits of anticipated subgrades that must be disposed of via landfilling. These types of materials are sometimes found in uncontrolled existing fill.
   2. Measurement: ton, as weighed at landfill
   3. Includes: Removal of materials to a landfill.

C. Select Granular (Local Source)
   1. Definition: Material meeting the gradation requirements for Select Granular Material that is located on-site or within a relatively short distance of the site.
   2. Measurement: cubic yard (in-place)

3. Includes: Subgrade preparation and supplying, loading, stockpiling, placing, and compacting soil material meeting the requirements for Select Granular Material. Obtain material from local area of construction or other on-site or near-site source.

D. Incidental Work: Work incidental to all unit prices includes, but is not limited to, erosion control, stormwater management, equipment rental, pre-cleaning, post-cleaning, protections of existing features outside area of new construction or repair, restoration of areas impacted by construction operations, off-site disposal of excess and landfill materials, field measurements for unit price payment, balancing the earthwork for the site, and other items necessary to the proper execution of the unit price item.

E. Quantity and Price Substantiation:
   1. Provide Testing Agency determination, and estimated total quantities and costs for initial LHB and Owner approval prompty upon discovery of need for unit price application.
   2. Provide Testing Agency substantiation, and actual total quantities and costs for final LHB and Owner approval promptly upon completion of final documentation.

1.05 SUBMITTALS

A. Phasing plan: Identify major work phases (e.g., install stormwater by-pass piping, excavate and install west half of underground stormwater system, excavate and install east half of underground stormwater storage system). Include a sketch for each phase indicating the major work, estimated start and stop dates, and use of site requirements for LHB and Owner approval.

B. Test reports for testing as specified herein.

1.06 QUALITY CONTROL, TESTS AND INSPECTIONS

A. Equipment: Utilize equipment of proper size and in good working condition to prosecute the Work to full completion in a satisfactory manner.

B. Personnel: Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

C. Delivery, Storage, and Handling: Protect moisture sensitive materials against wetting by rain, snow or ground water and against intermixture with earth or other types of materials.

D. Testing Agency:
   1. Responsibilities:
      a. Inspect, test and accept subgrades, material types and placement to determine competency for support. Tests, inspections, and frequencies are described in the "Tests and Inspections" article near the end of Part 3.
      b. Determine unit price application as described in the "Unit Prices" article in Part 1.
   2. Coordination: Coordinate construction activities and schedule the Testing Agency representative to perform field tests and inspections to assure compliance with this specification.

1.07 REFERENCES

A. Minnesota Department of Transportation (Mn/DOT), Standard Specifications for Construction, 2014 edition.

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2001.

C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3); 2000a.

D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

E. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.

G. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.

H. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2000.

I. American Association of State and Highway Transportation Officials (AASHTO) tests equivalent to ASTM tests referenced above may be used in place of the ASTM tests.

J. Geotechnical Report: A report titled "Report of Geotechnical Exploration and Review" was prepared by American Engineering Testing, Inc. (AET), dated September 25, 2015. This report contains information on site soils, groundwater, and recommendations. These specifications are intended to supplement the report, not change the recommendations. Contact LHB for clarification if there is any conflicting direction.

1.08 DEFINITIONS

A. Primary Support Material - Soil material placed beneath pavement areas or non-structural interior concrete slabs (building floors). Primary Support Material extends below the subgrade elevation of the pavement or floor section (i.e., pavement and base material) with no depth limitation, unless noted on the drawings.

B. Storage Pipe Backfill - Fill material placed around underground stormwater storage pipes as indicated on the drawings.

C. Lift - The maximum thickness of loose material that may be placed prior to compaction.

PART 2 PRODUCTS

2.01 MATERIALS

A. UNSUITABLE MATERIAL
   1. Soils judged to be incompetent for supporting proposed features, as designated by the Testing Agency.

B. GRANULAR MATERIAL
   1. 100% passing the 3" sieve.
   2. Less than 12% passing the No. 200 sieve.
   3. This material is anticipated to be present on-site.

C. SELECT GRANULAR MATERIAL
   1. 100% passing the 1.5" sieve.
   2. Less than 5% passing the No. 200 sieve.
   3. This material is anticipated to be present on-site.

D. SIZE RESTRICTIONS
   1. Primary Support Material - 3 inches
   2. Storage Pipe Backfill - 1.5 inches

2.02 GEOTEXTILE FILTER FABRIC

A. Mn/DOT, specification section 3733, Type V geotextile fabric for use as separation fabric.

2.03 FLOWABLE FILL

A. Lean Concrete: The lean concrete mixture must consist of the following quantities of dry material per cubic yard.
   1. Cement 100 pounds
   2. Fly Ash 250 pounds
   3. Sand (SSD) 2800 pounds
   4. Water (maximum) 500 pounds
   5. Provide fine grained sand to the extent that it will stay in suspension in the mortar to obtain a flowable consistency. 100 percent passing 3/4 inch sieve; 0 - 10 percent passing the No. 200 sieve.

PART 3 EXECUTION

3.01 PREPARATION & PRECAUTIONS

A. Examination: Review slopes, elevations, grade, drainage, above and below grade utilities, and other conditions affecting the Work. Notify LHB of conditions which are unsatisfactory or detrimental to the proper and timely completion of the Work before starting Work. The start of Work constitutes that the Contractor is satisfied with the existing conditions.

B. Precautions
   1. Buildings and Structures:
      a. Exercise extreme care near buildings or structures (e.g., walls, manholes) to prevent damage.
      b. Where backfilling will occur adjacent to existing or new below grade building walls, provide adequate bracing prior to backfilling in order to avoid damage to the wall. Use a walk-behind compactor to backfill within 5-feet of below grade building walls.
   2. Utilities: Locate existing utilities that may be disturbed by excavation operations. Determine utility locations by notifying Gopher State One (1-800-252-1166) and by coordinating with the respective utility companies and Owner. Excavate discrete test pits to determine exact utility locations, if necessary. Excavate by hand near existing utilities. Pay costs for repairing utilities damaged by construction operations.
   3. Water: Prevent water from ponding in construction areas, or areas affected by construction, by carefully scheduling excavation and fill procedures, establishing and maintaining appropriate grading, and providing diversion ditches or other means.
   4. Cobbles, Boulders, Rubble, and Debris
      a. According to the geotechnical report, the coarse alluvial soils may contain some cobbles and possibly boulders; and, within the existing fill soils rubble / debris could exist.
      b. If removal of such materials is directed by the Testing Agency and authorized by the Owner, the additional Work is subject to compensation with unit prices as specified in Part 1.
   5. Excavation Cutback Slopes:
      a. Water: The existing soils (e.g., fine grained sands) may be sensitive to erosion from concentrated flows of water (e.g., rainwater) running over them when exposed as excavation cutback slopes. Therefore, take great care to prevent water from running over these slopes by creating small berms or using rock logs near the top of slope to direct water away from the excavation. Provide large sheets of reinforced plastic or similar anchored at the top of the slope and draped to the bottom of the excavation. Secure sheeting with sandbags or similar to prevent uplift from wind events.
      b. Buckets without teeth: Excavate cutback slopes using buckets without teeth to minimize loosening the sands at the face of the cutback slope.
   6. Sensitive Soils:
      a. Silty and clayey soils are anticipated to be encountered in the existing fill soils. These soils are sensitive to disturbance by construction traffic, especially if the soils are wet, and may lose strength if improper construction equipment or techniques are employed. Do not allow water to pond on these soils.
      b. Excavate using an excavator or backhoe.
      c. Anticipate considerable drying of existing exposed soils using discing and drying techniques.
      d. Coordinate with Testing Agency to determine areas where sensitive soils may exist and proper work techniques for working in these areas.

3.02 DUST CONTROL

A. Prevent dust from construction operations by regularly watering access drives and other dust prone areas as needed during construction.

3.03 EROSION AND SEDIMENT CONTROL

A. Reference drawings for other erosion and sediment control information.

3.04 DEMOLITION

A. Clear Site: Completely remove curbs, sidewalks, pavements, and other items or obstructions within the area of new construction. Do not remove items that must remain, such as active utilities or other items designated in the drawings to remain. For questionable items, notify LHB to determine if they are to be removed.

B. Pipe Demolition: Inactive pipe encountered in areas of new construction may be left in place if it does not interfere or intersect with the proposed construction. Bulk head ends of 6 inch diameter pipe and smaller to remain in place using Flowable Fill or similar seal to prevent water intrusion. For pipe greater than 6 inch diameter, fill entire length of pipe with Flowable Fill or blown sand.

C. Pavement & Curb Demolition
   1. For new pavement installed to match existing pavement provide a uniform sawcut edge for new pavement to be placed against. Locate sawcut edge in sound material a minimum of 1 foot all around area of pavement requiring removal.
   2. Sawcut in a neat and straight edge perpendicular to the surface a minimum of 3 inches in depth. Do not use jack hammers for top 3 inches of the edge. Jack hammering may be used below this depth to remove remaining bituminous pavement provided jack hammering is done vertically without a rocking back and forth motion, in order to provide a neat vertical edge perpendicular to the pavement surface.

D. Explosives Prohibited: The use of explosives is prohibited.

3.05 EXCAVATION

A. General Requirements
   1. Excavate to proper depth with allowance made for structures, aggregate base, bituminous pavement sections, and other surfacing (e.g., concrete pavement sections) that may be specified elsewhere, and so that positive drainage is achieved.
   2. Remove Unsuitable Material encountered in the excavation where loading will be superimposed (e.g., utilities, pavements).
   3. If excavation or construction operations disturb the subgrade, as determined by the Testing Agency, remove the disturbed soils and make corrections according to the Testing Agency. Correction of soil disturbed by Contractor's operations is the Contractor's responsibility and no additional compensation will be provided.
   4. Work adjacent to structures with equipment that will not damage the structure.

B. Excavation for Pavements:
   1. Pedestrian and vehicular pavement sections consist of pavement overlying a granular or aggregate base material.
   2. Excavate for the given pavement section by removing the Unsuitable Materials below the pavement section.
   3. In areas where filling is required below the pavement section, remove the Unsuitable Materials in the areas below the section and forming a volume extending 1 foot horizontally beyond the edge of the pavement edge (back of curb edge, for pavements with curb and gutter) and extending downward at a 1:1 slope to component approved subgrade.

3.06 SUBGRADE PREPARATION

A. Pavements:
   1. Compact to 100 percent Standard Proctor Density and 2% optimum moisture content. Moisture condition as necessary to achieve these results.
   2. Proof roll in the presence of Testing Agency according to MnDOT standard specification section 2111. If the subgrade is incapable of passing proof roll, scarify and recompact or subcut and replace with Select Granular Material.

B. Underground Stormwater Storage System:
   1. Compact to 92 percent Standard Proctor Density.

3.07 FILLING

A. General Requirements:
   1. When more than one type of soil is available on-site, use the type(s) exhibiting the better structural and drainage characteristics in fill areas where some type of loading will be superimposed (e.g., buildings, pavements).
   2. Place fill in a manner to prevent stones nesting and forming voids.
   3. Moisture condition as necessary. Wet subgrade soils or wet soils used as fill may require considerable drying in order to achieve specified compactions, especially for cohesive soils.
   4. Do not place fill in standing water, over softened soils, or on frozen ground where frost has penetrated greater than 2 inches.
   5. Do not place, spread, or roll frozen fill. Do not place fill on frozen ground or during unfavorable weather.
   6. When Work is interrupted by unfavorable weather, do not resume fill operations until the Testing Agency indicates that the density and moisture content of previously placed fill is as specified.
   7. Backfill immediately adjacent to structures with equipment that will not damage the structure. This includes, but is not limited to, utility structures, curbs, poles, foundations.
   8. Compaction with non self-propelled compaction equipment is limited to maximum lifts of 6 inches.
   9. If soil analysis, compaction tests, or inspections indicate that the materials specified have not been furnished, placed, and compacted in compliance with these specifications, remove the material, replace, recompact, and retest.

B. Compaction Standard: ASTM D698 for densities established by the Standard Proctor Method. Below compaction values are minimums.

C. Fill Types:
   1. Primary Support Material
      a. Allowable Materials:
         1) Select Granular Material.
         2) Granular Material.
      b. Maximum Lift: 8 inches.
      c. Compaction: 100%.
   2. Storage Pipe Backfill
      a. Allowable Materials: Select Granular Material.
      b. Maximum Lift: 8 inches.
      c. Minimum Lift: 6 inches.
      d. Compaction: 95%.

3.08 GRADING

A. Cut, fill and grade to transform site to elevations and contours indicated on the drawings with allowances made proposed features.

B. Remove debris, building materials, stones in excess of limits specified herein, branches, or other obstructions.

C. Hand level around permanent obstructions.

D. Ease new grades into existing grades without awkward or abrupt transitions.

E. Blade, drag, and rake to uniform slopes. Remove all sticks, branches, roots, rocks, and other debris from the surface and remove from site.

3.09 EARTHWORK BALANCE

A. The site earthwork is not intended to balance. Determining the need for import or export of materials to balance the site is the responsibility of the Contractor.

3.10 TESTS AND INSPECTIONS

A. The following testing and inspection, and related Work are required.
   1. In the presence of the Testing Agency, proofroll the compacted subgrades of undergrond stormwater storage system and pavement areas to determine soft areas and areas of excessive deflection which require removal and replacement.
   2. Mechanical analysis and classification (ASTM C136 and D2487): Provide a minimum of two representative tests for each type of on-site soils used for filling.
   3. Standard Proctor analysis (ASTM D698): Provide a minimum of two representative tests for each type of on-site soil used for filling or compaction.
   4. Density test (ASTM D1556 and D 2922):
      a. Pavement Areas: One representative test for subgrade, and one for each 2 vertical feet of fill per 2,500 square foot area in the upper three feet below the pavement subgrade. Provide a minimum of two tests for each isolated fill area.
      b. On any given project, limit nuclear method to 90 percent of the total test number, with location mixed such that correlation with sand cone method can be easily made.
   5. If tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.11 CLEANUP & DISPOSAL

A. Cleanup: Thoroughly police and rake the site and adjacent areas as required to provide neat clean surfaces. Restore areas disturbed by construction operations to original or better condition.

B. Disposal: Remove excess materials from the site. Recycle appropriate excess materials to the maximum extent practicable and as specified herein.

END OF SECTION

SECTION 31 0001
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trenching and backfilling.

B. Quality control, tests and inspections.

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork.

B. Section 33 3000 - Sewerage.

1.03 UNIT PRICES

A. Same as specification section 31 0000, Earthwork.

1.04 SUBMITTALS

A. Test reports for testing as specified herein.

1.05 QUALITY CONTROL, TESTS AND INSPECTIONS

A. Equipment: Utilize equipment of proper size and in good working condition to prosecute the Work to full completion in a satisfactory manner.

B. Personnel: Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

C. Delivery, Storage, and Handling: Protect moisture sensitive materials against wetting by rain, snow or ground water and against intermixture with earth or other types of materials.

D. Testing Agency:
   1. Responsibilities: The Testing Agency must inspect, test and accept subgrades, material types and placement to determine competency for support. Tests, inspections, and frequencies are described in the "Tests and Inspections" article near the end of Part 3.
   2. Coordination: Coordinate construction activities and schedule the Testing Agency representative to perform field tests and inspections to assure compliance with this specification.

1.06 REFERENCES

A. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3); 2000a.

B. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

C. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2004.

D. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2004.

1.07 DEFINITIONS

A. Pipe Bedding: Soil material placed in the trench to form a foundation for the piping.

B. Initial Backfill: Soil material placed over the pipe bedding and around the pipe to a level of 12 inches above the top of pipe.

C. Select Trench Backfill: Backfill material above the initial backfill when the trench is under buildings or paved areas.

D. Lift - The maximum thickness of loose material that may be placed prior to compaction.

PART 2 PRODUCTS

2.01 MATERIALS

A. UNSUITABLE MATERIAL - same as specification section 31 0000.

B. SUITABLE MATERIAL - same as specification section 31 0000.

C. GRANULAR MATERIAL - same as specification section 31 0000.

D. SELECT GRANULAR MATERIAL - same as specification section 31 0000.

2.02 PIPE INSULATION

A. Extruded closed-cell polystyrene conforming to AASHTO M230.

2.03 FLOWABLE FILL - SAME AS SPECIFICATION SECTION 31 0000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities, if necessary, for the proper execution of the Work.

3.02 LOCATION TOLERANCES

A. Accurately locate structures per the coordinates given on the plans. The following tolerances are required.
   1. Inlet or catch basin or manhole: 0.25 feet horizontal

3.03 PREPARATION & PRECAUTIONS

A. Invert verifications: Prior to ordering structures or placing any pipes or structures, verify the following:
   1. Inverts at structures to which connections are to be made.
   2. Inverts at utility crossings, including but not limited to watermains, sewers, gas, electric, communications, telephone, and connection points.
   3. Place gravity piping beginning at lower end and progressing up the flow line.
   4. Notify LHB of discrepancies.

B. Other items as described in Preparations and Precautions article of specification 31 0000.

3.04 TRENCHING

A. Notify LHB of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.

B. Do not interfere with area where building foundations or other foundations superimpose loading (generally 45 degrees from edge of foundation or as directed by the Testing Agency, whichever is stricter).

C. Stockpile excavated material suitable for backfill in an orderly manner at a distance from the trench edge to prevent slides or cave-ins. Do not allow stockpile to become contaminated with other materials.

D. Meet OSHA requirements for depth, width, side slopes, and benches.

E. Remove Unsuitable Material encountered during trenching according to Testing Agency requirements. Apply unit prices as described in specification section 31 0000.

3.05 PIPE BEDDING & BACKFILLING

A. Manufacturer Requirements: Provide pipe bedding and backfilling according to the pipe manufacturer's requirements or as described herein, whichever is stricter.

B. Backfill to contours and elevations indicated using unfrozen materials.

C. Employ a placement method that does not disturb or damage other Work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. When more than one type of soil is available on-site, use the type(s) exhibiting the better structural and drainage characteristics in fill areas where some type of loading will be superimposed (e.g., buildings, pavements).

F. Place fill in a manner to prevent stones nesting and forming voids.

G. Moisture Content: 2% of optimum. Moisture condition as necessary.

H. Do not place, spread, or roll frozen fill. Do not place fill on frozen ground or during unfavorable weather.

I. When Work is interrupted by unfavorable weather, do not resume fill operations until the Testing Agency indicates that the density and moisture content of previously placed fill is as specified.

J. Backfill immediately adjacent to structures with equipment that will not damage the structure. This includes, but is not limited to, utility structures, curbs, poles, foundations.

K. Compaction with non self-propelled compaction equipment is limited to maximum lifts of 6 inches.

L. Structures: Backfill adjacent to structures with hand held equipment. This includes, but is not limited to, foundations, walls, and utility structures.

M. Testing Agency Responsibilities: Reference Part 1 and "Tests and Inspections" article near the end of this specification section.

N. If soil analysis or compaction tests indicate that the materials specified have not been furnished, placed, and compacted in compliance with these specifications, remove the material, replace, recompact, and retest.

O. Compaction Standard: ASTM D698 for densities established by the Standard Proctor Method. Below compaction values are minimums. A lift is as defined in specification section 31 0000.

P. Pipe Bedding
   1. Allowable Materials: Select Granular Material.
   2. Maximum Lift: 6 inches.
   3. Compaction: 98%

Q. Initial Backfill
   1. Allowable Materials: Select Granular Material.
   2. Maximum Lift: 6 inches.
   3. Compaction: 98%

R. Select Trench Backfill
   1. Allowable Materials: Granular Material, Select Granular Material.
   2. Maximum Lift: 8 inches.
   3. Compaction: 100%

S. Pipe Insulation: Provide insulation as indicated on the drawings or as required by the piping system supplier.

3.06 RESTORATION

A. Where new surfacing is not indicated, restore area to pre-existing or better condition.

B. Pavements: Where construction requires removal of pavement, remove pavement to nearest joint or cut pavement vertically and horizontally in a straight line. Remove pavement at least one foot back from each side of trench. Replace the removed pavement section to the same thickness of pavement and aggregate base, and the same or better quality of materials. Do not provide less than the pavement section indicated in the drawings for the project.

C. Clean-up: Remove debris and Unsuitable or excess soil materials off the limits of the site.

3.07 TESTS AND INSPECTIONS

A. The following testing and inspection, and related Work are required.

1. Inspect trench subgrades to determine soft areas and areas of excessive deflection which require removal and replacement.
2. Mechanical analysis and classification (ASTM C136 and D2487): Provide one representative test of each type of fill from each source, including a representative test for on-site soils used for filling or compaction.
3. Standard Proctor analysis (ASTM D698): Provide one representative test of each material and from each source, including a representative test for on-site soils used for filling or compaction.
4. Density tests (ASTM D1556 and D 2922):
   a. Pipe Bedding: One test for every 200 lineal feet of trench. Provide a minimum of one test for each isolated trench area.
   b. Initial Backfill: One test for every 200 lineal feet of trench. Provide a minimum of one test for each isolated trench area.
   c. Select Trench Backfill: One test for every 200 lineal feet per lift of trench. Provide a minimum of one test per lift for each isolated trench area.
   d. On any given project, limit nuclear method to 90 percent of the total test number, with location mixed such that correlation with sand cone method can be easily made.
5. If tests indicate Work does not meet specified requirements, remove work, replace and retest.

END OF SECTION

SECTION 31 0002 – LINER

PART 1 GENERAL

1.01SECTION INCLUDES

A. This specification covers the technical requirements for the Manufacturing and Installation of a watertight liner (geomembrane) for below the underground stormwater storage system.
B. All materials must meet or exceed the requirements of this specification, and all work must be performed in accordance with the procedures provided in these project specifications.

1.02RELATED SECTIONS

A. Section 31 0000 – Earthwork.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
   2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
   3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
   4. D 1603 Test Method for Carbon Black in Olefin Plastics
   5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
   6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds
   7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
   8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
   9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
   10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
   11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
   12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
   13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
   14. D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)
B. Geosynthetic Research Institute

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1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

1.04 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.
B. Panel - Unit area of a geomembrane that will be seamed in the field that is larger than 100 ft2.
H. Patch - Unit area of a geomembrane that will be seamed in the field that is less than 100 ft2.
I. Subgrade Surface - Soil layer surface which immediately underlies the geosynthetic material(s).

1.05 SUBMITTALS

A. Furnish the following information prior to installation:
   1. Installation layout drawings
      a. Must show proposed panel layout including field seams and details.
      b. Drawings will be for concept only and actual panel placement will be determined by site conditions.
   2. Installer's Geosynthetic Field Installation Quality Assurance Plan.
B. Upon completion of installation:
   1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents.
   2. Material and installation warranties.

1.06 QUALIFICATIONS

A. Manufacturer
   1. Geomembrane shall be manufactured by the following:
      a. GSE Lining Technology, LLC (www.gseworld.com)
      b. Solmax (www.Solmax.com)
      c. Approved equivalent.
   2. Manufacturer shall have manufactured a minimum of 10,000,000 square feet of polyethylene geomembrane during the last year.
B. Installer
   1. Installation shall be performed by an installation company approved by the manufacturer.
   2. Installer shall have installed a minimum of 1,000,000 square feet of HDPE geomembrane during the 5 last years.
   3. Installer shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and with at least 50,000 square feet of HDPE geomembrane installation on each project.
   4. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
   5. The Installer shall provide a minimum of one Master Seamer for work on the project.

a. Must have completed a minimum of 1,000,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on the Project.

1.07 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the Manufacturer. The label will identify:
   a. manufacturer's name
   b. product identification
   c. thickness
   d. length
   e. width
   f. roll number
B. Delivery - Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.
C. Storage - The on-site storage location for geomembrane material, provided by the Contractor to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:
   a. level (no wooden pallets)
   b. smooth
   c. dry
   d. protected from theft and vandalism
   e. adjacent to the area being lined
D. Handling - Materials are to be handled so as to prevent damage.

1.08 WARRANTY

A. Material shall be warranted, on a pro-rata basis against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.
B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

PART 2 PRODUCT

2.01 GEOMEMBRANE PROPERTIES

A. Material shall be textured polyethylene geomembrane at the locations indicated in the drawings.
B. Resin
   1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
   2. Natural resin (without carbon black) shall meet the following requirements:

Table 1.9B: Raw Material Properties

Property	Test Method	HDPE	LLDPE
Density (g/cm3)	ASTM D 1505	$\geq$0.932	$\geq$0.915
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	$\leq$1.0	$\leq$1.0
OIT (minutes)	ASTM D 3895 (1 atm/200^{0}C)	$\geq$100	$\geq$100

C. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width and Manufacturer.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 1.09 D and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

D. Provide white or black 60 mil geomembrane textured on both surfaces meeting the requirements shown in the following data sheets below. White is preferred since it will expand less in seasonal heat and may therefore provide more efficient installation.
   1. Table 2.1 for black coextruded textured HDPE
   2. Table 2.3 for white coextruded textured HDPE
      a) The geomembrane shall be a white-surfaced, coextruded geomembrane.
      b) The white surface shall be installed upwards.

Table 2.1: Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load(2), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)NCTL for GSE HD Textured is conducted on representative smooth geomembrane samples.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

Table 2.3: White Textured Geomembrane (English)

Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content(1), % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(2)	Note(2)	Note(2)	Note(2)	Note(2)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load(3), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(4), ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width(4), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)GSE White may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- (2)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (3)NCTL for GSE White Textured is conducted on representative smooth geomembrane samples.
- (4)Roll lengths and widths have a tolerance of ±1%.
- GSE White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

F. Extrudate Rod or Bead
   1. Extrudate material shall be made from same type resin as the geomembrane.
   2. Additives shall be thoroughly dispersed.
   3. Materials shall be free of contamination by moisture or foreign matter.

PART 3 EXECUTION

3.01 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:
   1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
   2. An adequate number of welding apparati shall be available to avoid delaying work.
   3. Power source must be capable of providing constant voltage under combined line load.

3.02 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.
C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
   1. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
   2. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
   3. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
   4. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 8 psi.
   5. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.
D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

3.03 FIELD SEAMING

A. Seams shall meet the following requirements:
   1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
   2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.

3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-inch overlap is commonly suggested.

B. During Welding Operations
1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding
1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding
1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds
1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. Trial weld specimens shall pass when the results shown in the following tables for HDPE is achieved in both peel and shear test.

Table 1.12.6A: Minimum Weld Values for HDPE Geomembranes (English)

Property	Test Method	30	40	60	80	100	120
Peel Strength (fusion), ppi	ASTM D 6392	49	65	98	130	162	196
Peel Strength (extrusion), ppi	ASTM D 6392	39	52	78	104	130	157
Shear Strength (fusion & ext.), ppi	ASTM D 6392	61	81	121	162	203	242

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
b. The break is ductile.

7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. Installer shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs
   1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
   2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

3.04 FIELD QUALITY ASSURANCE

A. Installer shall provide quality assurance testing and will provide results to Engineer upon request.
B. Field Testing
   1. Carry out non-destructive testing as the seaming progresses or at completion of all field seaming.
      a. Vacuum Testing
         1) Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
      b. Air Pressure Testing
         1) Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
   2. Failed Seam Procedures
      a) If the seam fails, Installer shall follow one of two options:
         1) Reconstruct the seam between any two passed test locations.
         2) Trace the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.
      b) The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.
      c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
      d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

3.05 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.
C. Installer shall be responsible for repair of defective areas.
D. Agreement upon the appropriate repair method shall be one of the following repair methods as determined by the Installer:
   1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
   2. Abrading and Re-welding- Used to repair short section of a seam.
   3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
   4. Capping- Used to repair long lengths of failed seams.

5. Flap Welding - Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
6. Remove the unacceptable seam and replace with new material.

E. The following procedures shall be observed when a repair method is used:
1. All geomembrane surfaces shall be clean and dry at the time of repair.
2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

F. Repair Verification
1. Non-destructively test each repair using methods specified in this Specification.

END OF SECTION

SECTION 32 1200
BITUMINOUS PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation and precautions.

B. Traffic control and protections.

C. Establishment of grade.

D. Utility adjustments.

E. Subgrade preparation and earthwork.

F. Aggregate base.

G. HMA paving.

H. Tolerances.

I. Quality control, tests and inspections.

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork.

B. Section 31 0001 - Trenching & Backfilling.

C. Section 32 1300 - Sitework Concrete.

1.03 SUBMITTALS

A. Test reports for testing as specified herein.

B. Report(s) that summarize pertinent field observations and determinations of material suitability, construction methods and operations, detailed test reports for testing as specified herein, and other applicable testing as determined by LHB or Testing Agency during the course of construction.

C. Documentation for the source of the materials incorporated in the Work.

D. Job Mix Formula (JMF) for HMA prepared by an independent testing laboratory for acceptance. A JMF from a current project may also be acceptable. Engineer supplied mix designs and similar recommendations are not part of this specification. Provide and pay for Work required to develop the JMF. Do not place the bituminous courses prior to acceptance of the JMF by LHB.

1.04 REFERENCES

A. Minnesota Department of Transportation (Mn/DOT), Standard Specifications for Construction, 2014 edition. For HMA, reference section 2360.

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2001.

C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

D. ASTM D 1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens; 1996.

E. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

F. ASTM D 2401 - Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures; 2000.

G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

H. ASTM D 2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures; 1996.

I. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.

J. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.

K. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2000.

L. American Association of State and Highway Transportation Officials (AASHTO) tests equivalent to ASTM tests referenced above may be used in place of the ASTM tests.

1.05 DEFINITIONS AND ABBREVIATIONS

A. Additive - Any material added to an asphalt mixture or material, such as mineral filler, asphalt additives, anti-strip, stabilizers, and similar products.

B. Aggregate Base - A well graded granular material placed over a stable subgrade as an integral component of the pavement section and to provide a base on which the pavement is constructed.

C. Asphalt Cement - A dark brown to black cementitious material in which the predominating constituents are bitumen's which occur in nature or are obtained in petroleum processing.

D. Cold Mix Asphalt - Typically, a mixture of cutback asphalt and aggregate mixed in a plant which may be used immediately, or stockpiled for future use. Used for temporary repairs when HMA is unavailable due to seasonal constraints.

E. Fine Aggregate (FA) - Fine aggregate as designated for use in pavement seal coats.

F. Hot Mix Asphalt (HMA) - A high quality, thoroughly controlled hot mixture of asphalt cement and well graded, high quality mineral aggregate used to construct bituminous pavements.

G. Lift - The maximum thickness of loose material that may be placed prior to compaction.

1.06 QUALITY CONTROL, TESTS AND INSPECTIONS

A. Perform Work as specified herein and according to Mn/DOT requirements, except as modified herein. Where this specification differs from Mn/DOT requirements, the more stringent requirement governs.

B. Equipment: Utilize equipment of proper size and in good working condition to prosecute the Work to full completion in a satisfactory manner.

C. Personnel: Utilized experienced personnel familiar with the equipment, methods, and procedures for the job.

D. Delivery, Storage, and Handling: Protect moisture sensitive materials against wetting by rain, snow, or ground moisture, and against intermixture with earth or other types of materials.

E. Testing Agency:
   1. Responsibilities: The Testing Agency is responsible to inspect, test, and accept subgrades, material types and placement to determine their competency for support. Inspections, tests and frequencies are described in the "Tests and Inspections" article near the end of Part 3.
   2. Coordination: Coordinate construction activities and schedule the Testing Agency representative to perform field tests and inspections to assure compliance with this specification.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Mn/DOT standard specification section 3138, Class 5, 100 percent crushed.

2.02 TACK COAT

A. Mn/DOT standard specification section 2357.

2.03 HMA

A. Bituminous Base Course: Mn/DOT standard specification section 2360, mixture designation SPNWB330B except as amended in the "Modifications" below. Asphalt content of mixture per result of job mix formula. Design asphalt content in accordance with current Mn/DOT standard.

B. Recycled material may be used in the HMA according to Mn/DOT standard specification 2360.

2.04 MN/DOT MODIFICATIONS

A. General modifications to Mn/DOT standard specifications are described in this article. Specific modifications are specified elsewhere in this specification.

B. The Department is equivalent to LHB.

C. The Engineer is equivalent to LHB.

D. Material source approvals are not part of this specification. Provide material and mixture quality control data to LHB affirming quality of materials specified as required in "Submittals" article herein.

E. Sampling and testing as specified herein. Acceptance schedules are not part of this specification.

F. Method of measurements and basis of payment as specified in contract documents.

PART 3 EXECUTION

3.01 PREPARATION & PRECAUTIONS

A. Examination: Review slopes, elevations, grade, drainage, above and below grade utilities, and other conditions affecting the Work. Notify LHB of conditions which are unsatisfactory or detrimental to the proper and timely completion of the Work before starting Work. The start of Work constitutes that the Contractor is satisfied with the existing conditions.

3.02 TRAFFIC CONTROL AND PROTECTIONS

A. Prior to performing Work, erect barricades to protect Work and traveling public, both vehicular and pedestrian in accordance with Mn/DOT specification section 1710. Protect Work until fully cured.

B. Develop, provide, maintain, and remove traffic controls to the satisfaction of the regulatory authority having jurisdiction for the subject street or paved area (e.g., parking lot, or loading dock).

C. LHB will not approve plans for technical competence.

D. Completely remove traffic control barricades and other temporary measures after completion of the Work, including applicable curing times. Assume responsibility for damage to the Work due to premature removal of traffic control and protective measures.

E. A "Contract Traffic Control Plan" is not part of this specification.

3.03 ESTABLISHMENT OF GRADES

A. Establish grades and set grade stakes as necessary to complete the Work.

B. Grade paved areas uniformly to match surrounding existing pavement without awkward or abrupt transitions and to provide positive drainage free of puddling. Grade at a continuous positive slope of 2 percent (minimum) and 5 percent (maximum) to drainage provisions (e.g., curbs, catch basins, swales) to prevent puddles immediately after rain events. Additionally, do not allow standing water at pavement edges immediately after rain events for finished condition.

3.04 SUBGRADE PREPARATION & EARTHWORK

A. Reference specification section 31 0000 for subgrade preparation.

3.05 UTILITY ADJUSTMENTS

A. Coordinate Work with existing or proposed utility surface features such as manhole and inlet rims, and valve boxes. Make adjustments, up or down, to these features so that finish grade of

paving Work is flush with top of these features and to provide positive drainage of pavement. Make all adjustments prior to performing paving Work.

B. Notify LHB of discrepancies immediately and prior to performing Work.

3.06 AGGREGATE BASE

A. Thickness for new paving: Reference drawings.

B. Place in maximum 4 inch loose lifts and compact to 100% Standard Proctor density.

C. Extend aggregate base course a minimum of 1 foot beyond outside edge of new pavement and curb, unless noted otherwise in the drawings.

3.07 HMA PAVING

A. Thickness for new paving: Reference drawings.

B. Place the bituminous pavement in accordance with Mn/DOT standard specification section 2360. Place non-wear course in two lifts for total thickness greater than or equal to 2 inches.

C. Provide a tack coat between lifts as specified herein.

D. Maximum lifts: 4 inches for static steel-wheeled rollers, plate compactors, and tampers. 6 inches for pneumatic and vibratory rollers.

E. Minimum lifts (non-overlays): 1.5 inches

F. Compaction for New Paving: Compact to a minimum of 90% of the maximum theoretical densities (Rice test, ASTM D2401). Perform rolling as soon as the hot mix material can be compacted without displacement. Continue rolling with consecutive passes to achieve even and smooth finish without roller marks.

G. Small areas: For areas too small for a roller, compaction of bituminous pavement may be accomplished with vibrating plate compactor or hand tamper.

3.08 TACK COAT

A. Perform Work according to Mn/DOT standard specification section 2357.

3.09 TOLERANCES

A. Finish Grade Uniformity: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Variation from plan elevation (if applicable): Within 1/2 inch.

3.10 TESTS AND INSPECTIONS

A. The following tests and inspections are required.
   1. In the presence of the Testing Agency, proofroll the compacted subgrade to determine soft areas and areas of excessive deflection which require removal.
   2. Standard Proctor test:
      a. Virgin aggregate: 1 representative tests (minimum).
      b. Recycled/reclaimed mix: 3 representative tests (minimum).
   3. Density test (ASTM D2922): Provide one representative test for subgrade and for each lift of fill soil per every 2500 square feet of pavement.
   4. Mechanical analysis and classification (ASTM C136 and D2487): Provide one representative test of each type of fill from each source, including a representative test for on-site soils used for filling or compaction. Include 2 representative tests for reclaimed recycled mixes, for both imported material and material mixed by on-site operations.
   5. The Owner may execute cores to independently verify minimum pavement densities and thicknesses.
   6. If tests indicate Work does not meet specified requirements, remove work, replace and retest.

B. If required by LHB, provide certification that material furnished is in accordance with the contract.

3.11 MN/DOT MODIFICATIONS

A. General modifications to Mn/DOT specifications are described in this article. Specific modifications are specified elsewhere in this specification.

B. The Department is equivalent to LHB.

C. The Engineer is equivalent to the LHB.

D. Sampling and testing as specified herein. Acceptance schedules are not part of this specification.

E. Growth curves and nuclear density testing is not required.

F. Method of measurements and basis of payment as specified in contract documents.

END OF SECTION

SECTION 32 1300
SITEWORK CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparations and precautions.

B. Traffic control and protections.

C. Establishment of grade.

D. Utility adjustments.

E. Subgrade preparation and earthwork.

F. Aggregate base.

G. Cast-in-place concrete, cement, aggregates, and admixtures for the following:
   1. Curb, walks, and other concrete surfaces.

H. Tolerances.

I. Quality control, tests and inspections.

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork and Erosion Control.

B. Section 32 1200 - Bituminous Paving.

1.03 SUBMITTALS

A. Test reports for testing as specified herein.

B. Documentation for the source of the materials incorporated in the Work.

1.04 QUALITY CONTROL, TESTS AND INSPECTIONS

A. Equipment: Utilize equipment of proper size and in good working condition to prosecute the Work to full completion in a satisfactory manner.

B. Personnel: Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

C. Delivery, Storage, and Handling: Protect moisture sensitive materials against wetting by rain, snow or ground water and against intermixture with earth or other types of materials.

D. Testing Agency:
   1. Responsibilities: The Testing Agency must inspect, test and accept subgrades, material types and placement to determine competency for support. Tests, inspections, and frequencies are described in the "Tests and Inspections" article near the end of Part 3.
   2. Coordination: Coordinate construction activities and schedule the Testing Agency representative to perform field tests and inspections to assure compliance with this specification.

1.05 REFERENCES

A. Minnesota Department of Transportation (Mn/DOT), Standard Specifications for Construction, 2014 edition.

B. Minnesota Department of Transportation (Mn/DOT), standard plates updated at www.dot.state.mn.us/tecsup/splate.

C. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

E. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1999.

F. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988.

G. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.

H. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2004a.

I. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2004a.

J. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2001.

K. ASTM C 150 - Standard Specification for Portland Cement; 2004a.

L. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2001.

M. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2001.

N. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2003.

O. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2004.

P. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2003.

Q. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2001.

R. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil In Place by the Sand-Cone Method; 2000.

S. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 2004.

T. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Mn/DOT standard specification section 3138, Class 5, 100 percent crushed.

2.02 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

B. Wood form material, profiled to suit conditions.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C 150 Normal - Type I Portland type, grey color. Use different color as necessary to best match existing adjacent concrete pavement or as required by Owner.

B. Fine and Coarse Mix Aggregates: ASTM C 33, and the following additional requirements:

1. Deleterious substances:
   a. Maximum of 0.5% by weight of clay lumps and friable particles.
   b. Maximum of 3.0% by weight of material finer than No. 200 sieve.
   c. Maximum of 0.5% by weight of lignite and shale.
2. When fine aggregate is tested for potential reactivity by chemical method in accordance with ASTM C 289, relationship between quantity Rc (reduction in alkalinity) and quantity Sc (dissolved silica) must indicate that material is innocuous.
3. Aggregate for exterior concrete must be ASTM C 33 size number 67 (3/4 inch to No. 4) and must be 100 percent crushed quarry rock composed of basalt, quartzite, granite, limestone or dolomite. For toppings or repairs less than 2 inches in thickness use ASTM C33 size number 9.
4. When subjected to 5 cycles of soundness test using magnesium sulfate in accordance with ASTM C 88, coarse aggregate must have a loss of not more than 18 percent.
5. Coarse aggregate must have maximum abrasion loss of 40 percent by weight when tested in accordance with ASTM C 131, Grading B.

C. Admixtures
   1. Meet requirements of ASTM C494 or ASTM C 260.
   2. Fly Ash
      a. Addition of fly ash to regular weight and lightweight concrete mixes to reduce amount of cement is permissible as specified herein.
      b. ASTM C 618, Class C
      c. When used in exposed concrete it must be used throughout for uniform color.
      d. Weight of fly ash added to mixes must be greater than reduction of weight of cement, with proportions of cement and fly ash selected for 28 day compressive strengths equal to those specified. Maximum reduction in weight must not exceed 15 percent of specified amount.
   3. Water Reducing Admixtures: ASTM C494, Type A.
   4. Water Reducing, Retarding Admixture: ASTM C 494, Type D.
   5. High Range Water Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G.
   6. Non-corrosive, Non-chloride Accelerator: ASTM C 494, Type C or E.
   7. Air-entraining Admixture: ASTM C 260.

D. Water: Potable, and not detrimental to concrete.

E. Curing Compound: ASTM C 309, Type 1, Class A.

F. Expansion Joint Fillers and Sealant:
   1. Filler: MnDOT standard specification 3702 (asphaltic Type I for non-sealed expansion joints).
   2. Silicone Joint Sealant: MnDOT standard specification 3722.

2.04 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

C. Concrete Properties:
   1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 4000 psi.
   2. Air entrainment: 6 percent entrained air with maximum tolerance of plus or minus 1.0 percent.
   3. Maximum slump: 4 inches, except those mixes containing super plasticizer.
   4. Minimum slump: 1 inch.

2.05 CONCRETE MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C 94/C 94M.

2.06 MN/DOT MODIFICATIONS

A. General modifications to Mn/DOT standard specifications are described in this article. Specific modifications are specified elsewhere in this specification.

B. The Department is equivalent to LHB.

C. Material source approvals are not part of this specification. Provide material and mixture quality control data to LHB affirming quality of materials specified as required in "Submittals" article herein.

D. Sampling and testing as specified herein. Acceptance schedules are not part of this specification.

E. Method of measurements and basis of payment as specified in contract documents.

PART 3 EXECUTION

3.01 PREPARATION AND PRECAUTIONS

A. Examination: Review slopes, elevations, grade, drainage, above and below grade utilities, and other conditions affecting the Work. Notify LHB of conditions which are unsatisfactory or detrimental to the proper and timely completion of the Work before starting Work. The start of Work constitutes that the Contractor is satisfied with the existing conditions.

B. Precautions
   1. Buildings and Structures: Exercise extreme care near buildings or structures (e.g., manholes, retaining walls) to prevent damage.
   2. Utilities: Locate existing utilities that may be disturbed by excavation operations. Determine locations by notifying Gopher State One (1-800-252-1166) for locations of utilities. Excavate with discrete test pits to determine exact utility locations, if necessary. Excavate by hand near existing utilities. Pay costs for repairing utilities damaged by construction operations.
   3. Water: Prevent water from ponding in construction areas, or areas affected by construction, by carefully scheduling excavation and fill procedures, establishing and maintaining appropriate grading, and providing diversion ditches or other means.

3.02 TRAFFIC CONTROL AND PROTECTIONS

A. Prior to performing Work, erect barricades to protect Work and traveling public, both vehicular and pedestrian in accordance with Mn/DOT specification section 1710. Protect Work until fully cured.

B. Develop, provide, maintain, and remove traffic controls.

C. LHB will not approve plans for technical competence.

D. Completely remove traffic control barricades and other temporary measures after completion of the Work, including applicable curing times. Assume responsibility for damage to the Work due to premature removal of traffic control and protective measures.

E. A "Contract Traffic Control Plan" is not part of this specification.

3.03 ESTABLISHMENT OF GRADES

A. Establish grades and set grade stakes as necessary to complete the Work.

B. Grade paved areas uniformly to match surrounding existing pavement without awkward or abrupt transitions and to provide positive drainage free of puddling. Grade at a continuous positive slope of 2 percent (minimum) and 5 percent (maximum) to drainage provisions (e.g., catch basins, swales) to prevent puddles immediately after rain events. Additionally, do not allow standing water at pavement edges immediately after rain events for finished condition.

3.04 SUBGRADE PREPARATION AND EARTHWORK

A. Reference specification section 31 0000.

3.05 AGGREGATE BASE

A. Thickness for new paving: As indicated in the drawings. If no thickness is specified in the drawings, place a minimum of 6 inches.

B. Place in maximum 4 inch loose lifts and compact to 100% Standard Proctor density.

C. Extend base course a minimum of 1 foot beyond outside edge of new pavement and curb, unless noted otherwise in the drawings.

3.06 PREPARATION FOR CONCRETE APPLICATION

A. Soil Base
   1. Moisten top 3 inches of base soils to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

3.07 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.08 PLACING CONCRETE

A. Layout and Dimensions: Reference drawings. If drawings do not indicate thickness, provide 5-inch minimum thickness for walks and 8-inch minimum thickness for vehicular pavements. If pavement is replacing existing paving, place to meet these minimums or to match the existing pavement thickness, whichever is stricter.

B. Place concrete in accordance with ACI 304R.

C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.09 EXPANSION AND CONTROL JOINTS

A. Expansion Joints: Place 3/8 inch wide expansion joints between curbs and walks, at 30 foot (minimum) intervals in walks and other paved areas, and to separate paving from vertical surfaces and other components. Drawings indicate layout intent.

   1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface. Seal with joint sealant.
   2. Secure to resist movement by wet concrete.
   3. Provide space for top part of joint to be sealed.

B. Control Joints (sawed): 8-foot maximum joint spacing or as indicated in the drawings. Sawcut to 1/4 the depth of the pavement thickness. Seal with joint sealant.

3.10 CONCRETE FINISHING

A. Provide light broom texture parallel to pavement direction.

B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.11 CURB TAPERS

A. The drawings indicate locations for curb tapers where the curb is intended to taper to a condition where the grade is essentially the same as that of the gutter (i.e., flush through the curb).

B. Where curbs abut pavements, taper curb from full height to flush so that the slope of adjacent pavements is 5 percent maximum (measured in any direction).

C. Where curbs abut turf areas, taper curb at any convenient slope.

3.12 TOLERANCES

A. Finish Grade Uniformity: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Variation from Plan Elevation: Within 1/2 inch.

3.13 TESTS AND INSPECTIONS

A. The following testing and inspection, and related Work are required.

   1. In the presence of the Testing Agency, proofroll the compacted subgrade to determine soft areas and areas of excessive deflection which require removal.
   2. Mechanical analysis and classification (ASTM C136 and D2487): Provide one representative test of the aggregate base material.
   3. Air content: Determine in accordance with ASTM C 173 or ASTM C 231. Do not use concrete used for air content testing in fabricating test specimens.

4. If tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.14 MN/DOT MODIFICATIONS

A. General modifications to Mn/DOT specifications are described in this article. Specific modifications are specified elsewhere in this specification.

B. The Department is equivalent to LHB.

C. Sampling and testing as specified herein. Acceptance schedules are not part of this specification.

D. Growth curves and nuclear density testing is not required.

E. Method of measurements and basis of payment as specified n contract documents.

END OF SECTION

SECTION 32 8400 - LANDSCAPE IRRIGATION

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope of work: Furnish and install the complete Irrigation system specified herein including: New wet tap from existing City main water line with restoration to pavement, Watertronics Pump Station, relocate an existing controller (Owner to provide), Baseline decoders, wire, valves, piping and sleeving throughout site; including labor, materials, equipment, apparatus, and services for the testing, adjusting, retesting and readjusting as required to place the system in an approved operating condition.

Unless otherwise specified, the plans and specifications are intended to include everything obviously requisite and necessary for the proper installation and completion of the work whether each necessary item is mentioned herein or not.

The plans and specifications are intended to be cooperative and any item called for in one and not the other shall be as binding as if called for in both.

Any Contractor alterations to the plan, details, or specifications will need to be submitted 14 days prior to bid date to be considered by the Owner and/or Consultant – materials shown in design documents reflect existing equipment in use and it is the desire of the Owner to match with this project.

The irrigation systems shall include the following:

1. Source Locations – New 3" wet tap, meter, backflow and swing check valve as shown in the design documents. Contractor to field verify location, quality and available flow characteristics. Contractor to inform Owner's Representative of any perceived issues with source location.
2. Watertronics pump station (SHSTV-1-15-208-3-140-90) as shown in the design documents. Pump station (see details) shall pull from wet well, by Others, be level controlled, have self-cleaning filter and flush line terminated down stream of storage system and new main line to feed existing irrigation as shown in design documents. Pump station shall automatically switch from rainwater storage to domestic backup as needed. Contractor responsible for all control cable/conduit to/from wet well. 208V 3PH power for pump station will be provided to within 5' of pump station location.
3. Contractor is responsible for the restoration of all pavement and turf/plantings areas that may be disrupted during installation.
4. Control System – Baseline 3200, supplied by Owner, location shown in design documents
   - Baseline 3200 Controllers and AC Baseline Decoders.
5. Pipe and Sleeving as required. All sleeving shown to be placed under existing walks/pavement and will require piercing/directional drilling for installation. Provide a line item add/deduct to place main by cutting/Trenching existing pavement (Area shown in design documents) in lieu of directional boring. Contractor would be responsible for backfilling/compaction and replacement of pavement in this area.
6. Irrigation Equipment as shown.
7. Valves and Valve boxes as required
8. Control wiring & Conduit
9. Fittings
10. Electrical connections
11. Quick-couplers
12. All other necessary accessories
13. System Manuals
14. Instructional walk-through with Owner

B. Limits of work: Area within project limits as delineated on the design documents.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 02318 – Excavating, Backfilling & Compaction
2. Section 02900 – Landscaping

1.3 QUALITY ASSURANCE

A. Irrigation contractor must be able to provide "Verifiable Documentation" that they have the technical qualifications, experience, trained personnel and facilities to perform the specified work and have been engaged in sprinkler design and installation, of systems of similar size and scope for a minimum of five years. Contractor must submit, along with bid, a list of five projects of similar scope completed within the last three years.

B. As a prerequisite of qualification to bid, the irrigation construction company shall provide verifiable documentation that such person and company is licensed by the Minnesota State Board of Electricity as a Technology Systems Contractor and that company employs not less than one Power Limited Technician and that such licenses are considered "in good standing" by the Minnesota State Board of Electricity. "Verifiable Documentation" shall include but not be limited to submission of copies of Technology System Contractor and Power Limited Technician credentials and proof of insurance.

C. Quality Control Criteria:
1. Provide irrigation products as described in this specification and according to manufacturer's specifications.
2. Comply with requirements of the State of installation for prevention of backflow and back-siphonage.
3. Comply with requirements of the State of installation for plumbing and other regulations affecting site irrigation.
4. Comply with National Plumbing Code, National Electric Code, and all other applicable city or state codes.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Submit manufacturer's literature, technical data, and recommendations for the system as specified including:
1. Pipe
2. Fittings
3. Valves
4. Drip Components
5. Wiring
6. Valve boxes

C. Closeout Submittals – Submit the following:
1. As-built drawings: Following construction of system, submit two (2) reproducible hard line sets of as-built drawings and an electronic copy (AutoCAD release 2010 or newer).

D. Submit color-coded print of controller chart including zone descriptions, locations and suggested run times.

1.5 JOB CONDITIONS

A. Contractor shall carefully examine the work site, local conditions, specifications and plot plan for any existing conditions and limitations that may apply to the work. Submission of a proposal shall be considered evidence than an examination has been conducted and that any questions and/or concerns have been satisfied.

B. Utilities: Determine location of utilities and perform work in a manner which will avoid possible damage. When necessary the Contractor shall make any minor adjustments in location or alignment of the new work. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. Contact Owner if potential conflicts are apparent.

1.6 SEQUENCING AND SCHEDULING

A. Schedule and coordinate to facilitate the most expeditious completion of the project in a workmanlike manner.
B. Consult all other relevant specification sections to determine the extent of work specified elsewhere but related to that included herein.
C. Schedule and coordinate all required irrigation utility connections with other project trades and/or utility companies.
D. Obtain information pertaining to location of all proposed lines and accessories prior to irrigation installation.
E. Contractor shall assume responsibility for locating all site utilities, and perform work in a manner to avoid damage.

1.7. PROTECTION OF EXISTING CONDITIONS

A. Any existing structures, equipment, utilities, pavement, landscaping, etc., damaged by Contractor during the course of the work including any subsequent damage caused by leakage or settling of piping shall be restored at Contractor's expense.

1.8 HANDLING

A. Deliver irrigation system components in manufacturer’s original undamaged and unopened containers with labels intact and legible.
B. Deliver plastic piping in bundles, packed to provide adequate protection of pipe ends, both threaded and plain. Pipe and accessories shall be handled in such manner as to ensure delivery to the trench in sound, undamaged condition. Before installation, the pipe shall be inspected for defects. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method.
C. Store and handle materials to prevent damage and deterioration.
D. Provide secure, locked storage for valves, sprinkler heads, and similar components that cannot be immediately replaced to prevent installation delays.
E. Manufacturer’s Specifications: The latest printed specifications of approved manufacturer of materials shall become part of these specifications.

1.9 EXTRA MATERIALS

A. Provide extra materials as follows:
1. Two valve keys for manual valves

PART 2 - PRODUCTS

2.1 MAIN LINE

A. Piping on pressure side of irrigation control valves:
1. Polyvinyl chloride (PVC) 1120-1220, SDR 21 Class 200, and conform to ASTM standards D2241-05 & D2672 or latest revision. Materials shall conform to all requirements of D1784, or latest revision.
2. Main line size 4” and above shall be gasket type pipe & fittings. Gasket fittings can be either ductile iron or PVC gasket fittings with joint restraints.

2.2 LATERALS

A. Piping on non-pressure side of irrigation control valves:
1. Polyvinyl chloride (PVC) 1120-1220, SDR 26 Class 160, and conform to ASTM standards D2241-05 & D2672 or latest revision. Materials shall conform to all requirements of D1784, or latest revision.
2. Pipe 1-1/4" and smaller pipe may also be flexible non-toxic polyethylene pipe made for 100% virgin material meeting N.S.F. (National Sanitation Foundation) standard #14 for use in pressure potable water applications, for 800 design stress. All sizes shall have a minimum 100 P.S.I. working pressure rating. All polyethylene pipes shall be continuously and permanently marked with the manufacturer's name, material, size, and schedule. Pipe shall conform to A.S.T.M., D2239, and D1248 (3C5PE34) or latest revision.

2.3 FITTINGS

A. Solvent welded socket fittings conforming to ASTM D 2467 (Schedule 80 PVC) and ASTM D 2466 (Schedule 40 PVC). Threaded type fittings shall conform to ASTM D 2464 (Schedule 80 PVC). Solvent cement shall conform to ASTM D 2564. Swing Joints for all rotary/gear driven sprinkler heads shall be minimum schedule 40, as manufactured by Dura or approved equal. Burst strength of fittings shall equal or exceed that of the pipe on which they are installed.

2.4 CONTROL VALVES

A. Remote control valves shall be Rain Bird Toro P220 Series. Valves shall have Heavy-duty solenoid, High grade construction, and Manual bleed, Flow control with non-rising handle, rigid diaphragm support, Single piece diaphragm, Globe and angle configurations, Captive bonnet bolts and solenoid plunger.

2.5 CONTROLLER

A. Baseline 3200 Series supplied by Owner.
B. Baseline AC decoders as required.

2.6 QUICK-COUPLING VALVES

A. Provide quick coupling valves as shown in design documents.
B. Provide two (2) valve keys fitted with 3/4" swivel hose cells.
C. Quick Coupling Equipment:
1. Valves: One-piece body constructed from heavy-duty cast bronze with a 1" FIP riser connection.
2. Quick Couplers: Single lug coupler of heavy cast bronze and detachable handle.
3. Swivel Hose ELL: Heavy cast bronze, connected to quick couplers for hose connection. Hose ells shall be 1" FIPX 1" Male Hose Threads.
4. Each quick coupler should be installed in a valve box by Carson (or approved equal) and packed with pea gravel, 4" in depth.

2.7 VALVE BOXES

A. Provide box and cover, with open bottom and openings for piping; designed for installing flush with grade. Include size as required for valves and service. The box shall be of plastic construction with UV protection. Boxes shall be vandal resistant including lockable

lid. Permanently label valve box cover with zone number. Box and lid assembly color shall be green color.

B. 10" Round Minimum size, 1 - 1" valve only.

C. All drip valve assemblies shall be contained in 12" rectangular box, one valve per valve box.

D. Accepted manufacturers: Carson.

E. All valve boxes shall be permanently labeled with brass/stainless tag indicating zone number and/or equipment enclosed.

F. If working on, modifying existing valve/valve box, the valve and valve box must follow installation details.

2.8 CONTROL WIRE

A. Electrical control wires shall be minimum of #14 gauge wire jacketed wire - #12 gauge on any run over 2000 feet. Run additional "extra" wires as indicated on design documents of different color consisting of #14 gauge wire.

B. Provide separate wire path, different color, for each controller.

C. Provide "shielded" sensor cable from flow sensor to controller. Sensor decoder acceptable if supported by controller/software.

D. The wire path shall be grounded, to 10 ohm or less, and at a maximum of 500 foot intervals. Grounding locations and ground readings shall be shown on as-built drawings.

E. Future wire jacket shall be a different color than initial "field" wires. Provide a minimum of 3' loop for ease of connection at valves and six to ten feet extra at controller location.

2.9 BACKFLOW PREVENTER

A. As shown in design documents.

2.10 RAIN SENSOR

A. Rain Bird Wireless Rain/Freeze Sensor.

2.11 MANUAL VALVES

A. Manual valves shall be bronze gate type. Manual valves shall be sized according to the line size they are being installed on.

B. Manual valve location(s) - refer to plan.

C. Manual valves shall be "push-on" type with joint restraints 3" and larger.

2.12 DRIP IRRIGATION - NIC

A. Drip pipe and all components are to be specifically manufactured for underground drip irrigation by Rain Bird.

B. Drip control valves shall have basket type, pressure regulating filter assembly, with visible gauge on top of basket.

C. System is to be self-cleaning, pressure compensating and UV resistant. Drip line *shall be buried a minimum of 4" and a maximum of 6" deep in planting soil*. Staple drip lines a minimum of every four feet and at every change in direction.

D. All "headers" for drip line shall be PVC – minimum 1".

E. At least one shut-off valve, flush valve, operation indicator and Disc filter is to be installed at each drip irrigation bed.

F. Drip valve assemblies shall be placed in a 12" rectangular valve box – one valve per valve box.

PART 3 - EXECUTION

3.1 PERMITS, LICENSES AND CERTIFICATES

A. The Contractor shall procure all permits and licenses, except as otherwise indicated, pay all charges and fees and give all notices necessary and incident to the proper and lawful prosecution of the work.

B. He shall also obtain and supply the Owner all certificates required to show that the work has been performed in accordance with the building, plumbing, other authorities, the Board of Fire Underwriter's, or such other like bodies, as the specifications may require directly or by implication.

C. When the work performed affects the property of facilities of public utility or other corporations or of private persons, he shall obtain and supply from such corporations or person if required, statements that the work has been performed satisfactorily so far as their interests are affected and that all claims therefore have been settled by the Contractor.

3.2 RIGHTS OF WAY

A. The Contractor shall acquire the necessary right of way or lawful authority that may be necessary for approved crossings or occupation of any roads, street or alleys upon which the contract work will be done.

3.3 UNDERGROUND STRUCTURE

A. The Contractor shall be responsible for all necessary information regarding the exact location of existing underground structures and utilities and shall mark their location, at the site.

B. The Contractor shall be liable for the damages to and the cost of repairing or replacing any buried conduit, cables or piping encountered during the installation of the work, unless they were not marked or the Contractor was not previously informed of such underground utilities. If the Contractor is aware of such utilities, he shall immediately have the incurred damages repaired at his own expense. Conversely, the Owner shall be liable for the cost of repairing to any of those existing utilities of which the Contractor had not been previously informed.

3.4 EXCAVATING AND TRENCHING

A. Perform excavations as required for installation of work. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations, to their original condition.

B. Dig trenches wide enough to allow a minimum 6" between parallel pipelines. Trench sufficient depth to provide minimum cover (18” for all main lines and 12” for all laterals) as measured from finish grade as shown on drawings.

C. Contractor responsible for removal of all debris from job site.

3.5 SLEEVING

A. Install PVC (Schedule 40) sleeves where any control wire and/or pipe pass through or under walls.

B. Install PVC (Schedule 40) sleeves for control wiring and pipe under walks and paving.
C. Main line shall be placed in PVC (Schedule 40) sleeving that is a minimum of two sizes larger than pipe contained. Lateral line sleeving shall be a minimum of two pipe sizes larger than pipe contained.
D. Sleeves to be provided and extend a minimum of 12" beyond edges of walls, walks, and paving.
E. Mark the sleeve ends with an iron post.
F. Place wires in separate sleeve (1 ½" minimum).
G. Coordinate sleeve installation with other trades as required.

3.6 PIPE INSTALLATION

A. Install pipe in accordance with manufacturer's instructions.
1. Solvent-weld PVC pipe and fittings, using primer, solvents, and methods recommended by manufacturer, except where screw connections are required. Clean pipe and fittings of dirt and moisture before assembly. Snake pipe from side to side of trench bottom to allow for expansion and contraction. Make all connections between PVC pipe and metal valves or pipe with threaded fittings using PVC male adapters.
2. Use Teflon tape only on threaded joints, plastic to plastic and/or plastic to metal. Assemble threaded PVC fittings finger-tight plus one to two turns - no more.

B. Install thrust blocks on main lines (larger than 3") at locations that make a change of direction.
C. Avoid following piping layout situations:
1. Avoid piping layout along sides of structures.
2. Avoid odd angles in piping layout.
3. Avoid unbalanced friction losses.
4. Avoid high friction losses.
5. Avoid excessive trenching.

3.07 CONTROL WIRING

A. Install control wires with sprinkler mains and laterals in common trenches wherever possible. Lie to the side of pipeline and tie wires in bundles at 10' intervals and allow slack for contraction between ties.
B. Provide a minimum of 3' of looped extra ground and control wire at each valve and at 200' intervals on long wire runs. Snake wires in trench to allow for contraction of wires.
C. Control wire splices at remote control valves to be sealed with a Direct Burial Splice Kit - 3M DBY-6/DBR-6.

3.08 VALVE BOXES

A. All valve boxes shall be supported in the ground by using paver style bricks in every corner or side.
B. See valve box detail on plan for installation directions.
C. Provide sufficient clearance (minimum 4") between valve box cover and the automatic valve, to prevent damage if the valve box is driven over.
D. Wood supports of any kind are not allowed.
E. All valve boxes shall be permanently labeled with brass/stainless tag indicating zone number and/or equipment enclosed.
F. Artificial Turf may be used on valve box covers to provide protection of the playing surface – coordinate this with the Owner's Rep.

3.09 IMPROPERLY OPERATING OR LOCATED EQUIPMENT

A. Any equipment which fails to operate properly and/or is located incorrectly shall be promptly corrected or relocated at the Contractor's expense. If the Contractor wishes to make any field changes, he must receive written permission from both the Owner and Consultant.

3.10 THRUST BLOCKS

A. Provide thrust blocks at all changes in size or direction of mainline piping (3” and larger unless otherwise specified). Elbows, reducers, plugs, and the opposite side of tee branches all require thrust blocks. Concrete thrust blocks are constructed by pouring concrete between the fitting and the undisturbed bearing wall of the trench.

3.11 FLUSHING AND TESTING

A. Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.
B. Thoroughly flush out all water lines before installing heads, valves, and other hydrants.
C. Testing: All instruments, equipment, facilities, and labor required to conduct the tests shall be provided by Contractor. Piping shall be tested hydrostatically before backfilling and proved tight at a hydrostatic pressure of 100 psi without pumping for a period of one hour with an allowable pressure drop of 5 psi. If hydrostatic pressure cannot be held for a minimum of 1 hour, Contractor shall make adjustments or replacements and the tests repeated until satisfactory results are achieved and accepted by the Owner.
D. Upon satisfactory completion of testing, complete assembly and adjust all heads for proper arc and radius.

3.12 BACKFILL AND COMPACTING

A. After system is operating and required tests and inspections have been made, backfill excavations and trenches with clean soil, free of rubbish.
B. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to minimum 95% density under pavements, 85% under planted areas.
C. Compact trenches in areas to be planted by thoroughly flooding the backfill. Jetting process may be used in those areas.
D. Dress off all areas to finish grade.

3.13 CLEANUP

A. Keep areas of work clean, neat, and orderly at all times. Keep paved areas clean during installation. Clean up and remove debris from the entire work areas prior to final acceptance.
B. Protect irrigation system and materials from damage due to performance of work, operations by other contractors, trades and trespassers. Maintain protection during installation and testing period.
C. The Contractor shall be responsible for all damage caused by his operations to trees, turf, shrubs, curbs, paving, structures, utilities, etc., on the site or adjacent to the site of the work and shall repair, replace or otherwise make good any damage caused by their work.

3.14 WINTERIZATION AND SPRING START-UP OF IRRIGATION SYSTEM

A. The contractor shall prepare the entire irrigation system for one winter by removing all water within the mainline and lateral piping. Water shall be diverted so as not erode existing landscaping or final grades. If damage does occur, the contractor shall make repairs to the owner's satisfaction at no additional cost.

B. The contractor shall provide one Spring Start-up of the entire irrigation system by filling the mainline and lateral piping with water and operate all control valves with the automatic controller. The contractor shall also set the controller timing for spring irrigation.

C. During Wintering and Spring Start-up the contractor shall contact the owner and current landscape maintenance provider responsible for the project site and educate them to the operations of the system. Also, the contractor shall provide a written copy to the owner of the irrigation timing required for establishing plants during late spring, summer and fall schedules.

D. The contractor shall coordinate and assemble a written instruction manual that indicates step by step the winterizing and start-up operations. The instructions shall be included in the O & M manuals.

PART 4 - ACCEPTANCE

4.1 ACCEPTANCE

A. Demonstrate operation of all irrigation zones for the Owner and/or Consultant, a current As-Built is to be provided to the Owner/Consultant for purposes of the walk-thru. All irrigated areas are to have 100% coverage. Contractor shall add additional heads, as necessary, at no cost to the Owner. Adjust all heads as required for proper operation, alignment, elevation, radius, and arc

B. A field training course shall be provided for designated operating and maintenance staff members. Training shall be provided for a total period of up to 16 hours of normal working time and shall start after the central control system, weather station and field components of the irrigation system are functionally complete and major adjustments to controller, due to establishment of materials, is substantially complete. Field training shall cover all of the items contained in the operating and maintenance manuals.

C. The Contractor will provide on-site consultation with the Owner's operating personnel for a period of 6 months, not to exceed 8 hours per month, at no cost to the Owner. This consultation will be provided at the Owner's request.

D. All future visits required by the Irrigation Consultant, after initial punch list, will be charged to the irrigation contractor.

4.2 GUARANTEE

A. The entire sprinkler system will be unconditionally guaranteed against defects in material and workmanship, including settling of backfilled areas below grade and adjusting heads to proper level for a period of one year from date of acceptance.

B. In addition to minor adjustments, any defective electrical controls, valves, sprinkler heads or other working parts will be repaired or replaced without cost to the Owner for a period of one year from date of acceptance.

C. Contractor to provide one winterization and spring start up of irrigation system.

D. Damage by others during the one-year guarantee period will be the Owner's responsibility.

4.3 RECORD INFORMATION

A. Furnish record drawings of the complete irrigation system.

B. Record Drawings and Controller Chart:

1. Provide a complete set of up-to-date as built drawings, and an electronic copy (AutoCAD release 2010 or newer).
2. Prepare a controller chart showing:
   a. Location of all sections, valves, lateral lines, and routes of control wires.
   b. Identify all valves as to size, station, number, and type of irrigation.
   c. Provide chart as a black-line print with a different color used to show area of coverage for each station.
   d. Locate chart inside controller door. Seal chart between two pieces of plastic.
   e. Provide suggested irrigation schedule at time of acceptance.
   f. Complete chart and receive approval prior to final inspection of irrigation system.

END OF SECTION

SECTION 33 1000
WATER DISTRIBUTION

PART 1 GENERAL

1.01 SUMMARY

A. The Work covered under this section includes providing a complete in place buried piping system as designated in the drawings and specified herein, including material, labor, tools, and equipment. This specification covers Work 5 feet or more outside of perimeter building walls.

B. Section includes, but is not limited to:
   1. Staking and alignment.
   2. Excavation, backfilling and compaction of trenches.
   3. Protective provisions including sheeting, shoring, bracing, pumping and bailing.
   4. Pipe materials, appurtenances, etc. including installation.
   5. Hydrostatic leakage testing.
   6. Testing to comply with State Health Department requirements and local government regulations and requirements.
   7. Maintaining water and sewer separation.
   8. Notification of city inspector and payment of inspection and permit fees as applicable.

1.02 RELATED SECTIONS

A. Section 31 0001 - Trenching and Backfilling.

B. Section 33 3000 - Sewerage.

1.03 SUBMITTALS

A. Data certified by the pipe and/or fitting manufacturer that the pipe, fitting, accessories and linings are as specified.

1.04 QUALITY CONTROL

A. Furnish new, best quality pipes, fittings, valves, hydrants, etc., of specified weight and dimensions.

B. Utilize equipment of proper size and in good working condition to prosecute Work to full completion in a satisfactory manner.

C. Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

D. Coordinate obtaining city permits and inspections with applicable city officials.

E. Test per City requirements.

1.05 REFERENCES

A. Standard specifications: City of Minneapolis, Standard Supplemental Specifications For The Construction of Public Infrastructure In The City of Minneapolis, 2015 Edition, dated January 2, 2015.

B. Standard Utilities Specifications published by the City Engineers Association of Minnesota, 2013 Edition, Specification No. 2600 and 2611.

1.06 PERFORMANCE REQUIREMENTS

A. Perform Work according to requirements of above referenced specification sections. This includes, but is not limited to materials, construction requirements, pipe laying operations, service installation, connections,disinfecting system, restoration, operational inspection, conductivity and leakage tests.

B. Coordinate work with the city.

1.07 EXISTING UTILITY INTERRUPTIONS

A. Coordinate Work, required shutdowns, and duration of outages to existing water service with the city and Owner. Ensure this coordination is initiated at least 2 weeks prior to the Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED.

SECTION 33 3000
SEWERAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping and installation requirements for gravity piping (e.g., storm sewerage) for sewerage and appurtenances, including underground stormwater storage system.

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork.

B. Section 31 0001 - Trenching & Backfilling.

1.03 SUBMITTALS

A. Shop drawings for structures.

B. Shop drawings for complete underground stormwater storage system, signed by a professional engineer registered in Minnesota. Designer

C. Check valve drawings indicating opening head, backwater head, curl and pipe connection.

D. Test reports for testing as specified herein.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Reinforced Concrete Pipe (RCP)
   1. Conform to requirements of ASTM C76 for Class 3.
   2. Either of the following joints may be used:
      a. Bell and spigot sealed with "O" ring type seals meeting ASTM C 361 and C443.
      b. Modified tongue and groove joints sealed with preformed butyl rubber sealant meeting requirements of ASTM C-990.

B. Corrugated Metal Pipe (CMP)
   1. Conform to AASHTO M36 and ASTM A-760 hot-dip coated in a bath of commercially pure aluminum with less than 0.35% silicon providing an ALUMINIZED STEEL Type 2 coating meeting AASHTO M274 and ASTM A-929 1.1.4.
   2. Provide watertight gasketed joints using minimum 24-inch corrugated bands secured with rods and lugs.
   3. Provide Hel-Cor pipe manufactured by Contech (www.conteches.com), or approved equivalent. Determine gauge and corrugations based on cover depth and understanding that heavy truck traffic typical of a loading dock facility will regularly traverse the overlying pavement (minimum 12 gauge with 5" x 1" corrugations for pipe equal to or greater than 48 inch diameter, minimum 16 gauge with 2 2/3" x 1/2" corrugations for pipe less than 48 inch diameter).

C. Poly-vinyl Chloride (PVC)
   1. Pipe 6 inch and smaller: Conform to ASTM 2665, Schedule 40.
   2. Pipe larger than 6 inches: Conform to ASTM D 3034, SDR 26.
   3. Provide gasketed joints.

D. Dissimilar Pipe Joints
   1. Provide Fernco or approved equivalent fittings for joints of dissimilar pipe (e.g., from CMP stormwater storage system stub to PVC).

2.02 STORM SEWER STRUCTURES:

A. General: Construct structures using precast reinforced concrete to the maximum extent practicable, in combination with cement, mortar, gaskets, precast adjusting rings, castings and steps as necessary to complete the structure. Segmental blocks are allowed if use of precast sections is not feasible.

B. Concrete:

1. Minimum Compressive Strength: 3000 psi at 28 days of age.
2. Air Content: 5 to 7 percent by volume of concrete.

C. Mortar for connections to other drainage structures, between adjusting rings, or for block construction.
1. ASTM C270, Type M, except the maximum placement time is one hour.
2. Add enough potable water in the mixture to produce a stiff workable mortar without exceeding 5 gallons of water per sack of cement. Use mortar within 30 minutes after mixing with water.

D. Precast Reinforced Concrete Manholes: ASTM C 478 and AASHTO M199.

E. Joint Gaskets: Flexible, watertight, butyl rubber or an "O"-ring gasket in accordance with ASTM C 443.

F. Precast Concrete Segmental Blocks: ASTM C 139, maximum thickness of 8 inches and at least 8 inches long, and of such shape that joints can be sealed effectively and bonded with cement mortar. Plaster both inside and outside of the structure with mortar. Hollow concrete block is not permitted.

G. Steps: Aluminum of poly-propylene coated1/2 inch diameter grade 60 steel per ASTM C 478.

H. Adjusting Rings: Precast and reinforced.

2.03 CHECK VALVES

A. Custom-made rubber check valves manufactured by Tideflex Technologies (www.tideflex.com), model TF-1. Design criteria: opening head of 1", backwater head of 10', curl in the predominant flow direction of other pipes that discharge into the manhole structure.

2.04 CASTINGS

A. Manufactured by Neenah Foundry Company. Type and model as indicated in the drawings.

PART 3 EXECUTION

3.01 TRENCHING & BACKFILLING

A. Reference specification section 31 0001.

3.02 ALIGNMENT & PROFILE

A. Curb Alignment: Establish accurate alignment of curb to locate casting correctly in the curb and gutter. Locate casting edges at edges of curb and gutter for a precise fit.

B. Sewer Structure Locations: Reference drawings or electronic files of same.

C. Sewer Line Alignment:
1. Minimum separation from water lines equals 10 feet (from outside edge of pipes).
2. Construct lines straight and such that they intersect the center of structures.
3. Construct profile uniformly to the grades indicated in the plans.

3.03 STRUCTURES

A. Except for monolithic bases, place concrete bases on a 3 inch (minimum) thickness of cast-in-place concrete poured on undisturbed earth or a prepared subgrade approved by the Testing Agency.

B. Pour and form inverts inside the structures to channel the flow from inlet pipes to the outlet pipe and minimizes areas for debris to collect.

C. Do not extend end of pipe beyond the inside wall of structures except for pipes laid continuously through the manhole in a straight line with the tops removed as described below, or for pipes with check valves that require a minimum length of pipe to extend beyond the inside wall.

D. Where precast manhole sections cannot be used, manhole block, solid concrete block, or a combination of such materials may be used. Finish the outside and inside of block structures constructed in the field with a 1/2 inch (minimum) thickness of Portland cement grout. Clearly illustrate the method of intended construction in the shop drawings and product data.

3.04 LAYING PIPE

A. Prior to placing pipe, verify inverts at connection points and crossings. This procedure may require independent discrete excavations to expose pipe crossings. If conditions are not as anticipated, or result in conflicts, notify Engineer immediately. Allow up to 1 week for Engineer to revise profiles, therefore, schedule verifications accordingly.

B. Handle pipes and structures in a manner to prevent damage. Maintain a clean pipe interior at all times.

C. Lay pipe proceeding upgradient with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of flow. Maintain accurate control of location and profile. Provide pipe with a uniform slope between given invert elevations.

D. Prior to joining pipes, clean and dry surfaces and apply proper lubricants as recommended by the manufacturer.

E. Join pipes according to manufacturer.

3.05 SEWER & WATERMAIN CROSSINGS

A. If watermain piping passes over sewer piping and 18 inches (minimum) of separation is maintained, there are no additional requirements.

B. If watermain piping passes under the sewer, or an 18 inch (minimum) separation distance cannot be maintained, the following construction requirements apply:

1. Construct the entire segment of the sewer from structure to structure using PVC piping. With specific written approval for special situations, the Engineer may reduce this requirement to a distance of 10 feet on either side of the crossing provided the joint system is compatible with the connecting sewer lines.
2. Minimize the number of joints within 10 feet either side of the crossing. Center sewer over point of crossing such that the joints are equal distance and as far apart as possible from the point of crossing.
3. Maintain 5 psi for 15 minutes air pressure test of the segment of piping within 10 feet (minimum) of the crossing.
4. Provide adequate structural support for sewer to prevent settling and excessive deflection of joints.

C. When watermain crosses below a storm sewer that has a storm inlet (e.g., structure with open grate) within 25 feet of the crossing, provide a 2 inch (minimum) thickness of 4 foot wide insulation centered 6 inches above the watermain pipe within 10 feet of both sides of the crossing with the storm sewer. Reference Section 31 0001, "Trenching and Backfilling" for the insulation specification.

3.06 ADJUSTING RINGS

A. Provide full bed mortar between rings, between rings and structure, and between rings and casting.

B. Provide a minimum of three 2" adjusting rings, and a maximum of six 2" adjusting rings.

C. Cover surface of the rings inside the manhole to provide a smooth surface approximately 1/2 inch thick.

D. Provide a 4 inch (minimum) "collar" of concrete over the outside surface of the rings.

3.07 CLEANING & PROTECTIONS

A. Cleaning: Clean sewers of silt, debris, and other foreign matter prior to requesting substantial completion site observations.

B. Protection: Protect surface and underground features that are intended to remain. If damage occurs, notify Engineer immediately. Pay for costs associated with repair and replacement of structures damaged by construction.

3.08 TESTING

A. Conduct air tests of sewer lines per Minnesota Administrative Rule 4715.2820 (www.revisor.mn.gov/rules), and as required by the pipe system manufacturer.

END OF SECTION

APPENDIX A

GEOTECHNICAL REPORT

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

REPORT OF GEOTECHNICAL EXPLORATION AND REVIEW

Minneapolis Convention Center
Site Sustainability Improvements

1301 2nd Avenue South
Minneapolis, Minnesota

Report No. 01-06605

Date:

September 25, 2015

Prepared for:

Minneapolis Convention Center
1301 2nd Avenue South
Minneapolis, Minnesota 55403

www.amengtest.com

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
• ENVIRONMENTAL
• GEOTECHNICAL
• MATERIALS
• FORENSICS

September 25, 2015

Minneapolis Convention Center
1301 - 2nd Avenue South
Minneapolis, Minnesota 55403

Attn: Lane Carlson

RE: Geotechnical Exploration and Review
Minneapolis Convention Center
Site Sustainability Improvements
1301 - 2nd Avenue South
Minneapolis, Minnesota
Report No. 01-06605

Dear Mr. Carlson:

American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for the proposed improvements at the Minneapolis Convention Center. These services were performed according to our proposal to you, dated August 26, 2015 and the subsequently issued MCC & TC Project Management – Consultant Pool Scope of Services.

We are submitting two (2) copies of the report to you (one PDF electronic copy and one hard copy). Additional copies are being sent on your behalf as noted below.

Please contact me if you have any questions about the report or need anything else.

Sincerely,
American Engineering Testing, Inc.

Michael P. McCarthy, PE
Principal Engineer
Phone: 651.659.1364; Cell: 612.685.0058
mmccarthy@amengtest.com

pc: 1 to LHB - Attn: Jim Tiggelaar (Jim.Tiggelaar@lhbcorp.com)

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SIGNATURE PAGE

Prepared for:

Minneapolis Convention Center
1301 - 2nd Avenue South
Minneapolis, Minnesota 55403

Attn: Mr. Lane Carlson

Prepared by:

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Authored by:

Michael P. McCarthy, PE
Principal Engineer

Reviewed by:

Megan J. L. Hoppe, PE
Senior Engineer

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under Minnesota Statute Section 326.02 to 326.15

Date: 9/25/15 **License #16688**

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Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1 - Boring Locations
Subsurface Boring Logs (B1-15 to B4-15)
Gradation Curves

APPENDIX B
Geotechnical Report Limitations and Guidelines for Use

1.0 INTRODUCTION

Improvements to the Minneapolis Convention Center storm water control are proposed. To assist in planning and design, American Engineering Testing, Inc. (AET) was authorized to conduct a subsurface exploration program and perform a geotechnical engineering review for the storm water and rain water facilities. This report presents the results of the above services and provides our engineering recommendations based on this data.

2.0 SCOPE OF SERVICES

AET's services were performed according to our proposal to you, dated August 26, 2015. Subsequently, a MCC & TC Project Management – Consultant Pool Scope of Services document was issued as formal authorization of our services. The authorized scope consisted of the following:

- Drilling four (4) standard penetration test borings, to depths of 30 in the Phase 1 area and to a depth of 51 feet in the Phase 2 area.
- Performing laboratory testing of soil boring samples.
- Conducting a geotechnical engineering analysis based on the obtained data and preparing this report.

These services are intended for geotechnical purposes. The scope is not intended to explore for the presence or extent of environmental contamination.

3.0 PROJECT INFORMATION

We understand two areas are being considered for rain water storage at the Minneapolis Convention Center (MCC). Phase 1, at the rear of the MCC, will be south of the building loading docks and will consist of an underground storage facility. According to the Schematic

Rainwater Storage Plan provided by LHB, this facility will have 33,000 ft^3 of storage capability from the placement of 1,180 linear feet of 6-foot diameter storage pipes. The pipes will be placed at an invert elevation of 836 feet, supported on native soils. A liner will be placed around the perimeter of the excavation for the facility for extra protection, extending up the slopes from the bottom of the storage basin to approximately elevation 843 feet.

Phase 2, located at the northeast corner of the MCC, will consist of a single at-grade storage tank or multiple at-grade storage tanks. The exact location(s) and size(s) of tank(s) are not finalized at this time. We understand the tank(s) may range from several thousand gallons to as much as 20,000 gallons. For a 20,000 gallon tank, the total weight of the stored water, the tank, and the tank foundation could approach 225,000 pounds.

Our foundation design assumptions include a minimum factor of safety of three with respect to localized shear or base failure of the foundations. We assume the structure can tolerate total settlements of up to 1-inch and differential settlements of up to ½-inch over 30 feet.

Heavy-duty pavements with either a bituminous surface or a concrete surface will be constructed in the loading dock area, including over the storm water facility. Traffic patterns are variable throughout the year, but can be heavy prior to shows and conventions. The pavements will be constructed for truck traffic with axle loads up to 10 tons.

The above stated information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 Field Exploration Program

Our subsurface exploration program consisted of four (4) standard penetration test borings drilled on September 8 and 9, 2015. Subsurface boring logs and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic description, and moisture condition. Relative density or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The boring locations were selected by others, and are shown on Figure 1 in Appendix A. The borings were located in the field by AET personnel, by spotting them based on existing site features and general location information provided by LHB. Figure 1 is a Google Earth map showing the boring locations based on the GPS coordinates obtained at the drilled locations. The Hennepin County coordinates (sub-meter accuracy, not land surveyor accuracy) for each boring location are presented on the boring logs.

The surface elevations at the boring locations were measured in the field by the AET drilling crew using an engineer's level. The benchmark used for Borings B1-15 through B3-15 was the top rim of a manhole located very near the southwest corner of the Phase 1 underground storage/treatment area. The elevation of this manhole was shown to be 852.33 feet on the Schematic Rainwater Storage Plan provided by LHB. The elevation at Boring B4-15 was the floor slab of the existing building at a doorway near Boring B4-15. We understand the finished floor elevation of the MCC at this location is 855.5 feet; as taken from as-built plans for the MCC.

5.0 SITE CONDITIONS

5.1 Surface Observations

The Phase 1 construction will take place at the rear of the building, in pavement areas which service Loading Docks C and D. This area has bituminous pavements and relatively flat to gradually sloping terrain. Surface elevations at Borings B1-15 through B3-15 range from 852.5 to 853.0. Phase 2 construction will take place near the northeast corner of the Minneapolis Convention Center. Parts of this area are landscaped with some trees, and other parts have concrete sidewalks. This area has relatively flat terrain. The ground surface elevation recorded at Boring B4-15 was 854.9 feet.

5.2 Subsurface Soils/Geology

The borings indicate a general soil profile consisting of fill overlying alluvial (water-deposited) soils and till (glacially-deposited) soils to the final depths of the borings.

5.2.1 Fill

At Borings B1-15 through B3-15, bituminous pavements exist which vary in thickness from 4¼ inches to 5 inches at the boring locations. The bituminous is underlain by about 7 to 8 inches of crushed limestone aggregate base. Fill soils, consisting of silty sands, sands, and a mixture of lean clay and silty sand exist to depths of about 2 to 6 feet, but could be as deep as 8 to 10 feet at Borings B2-15 and B3-15. Layers of "Coarse Alluvium or Fill" exist at each boring location; consisting of sands which could not be positively identified as naturally deposited or previously placed fill. The N-values recorded in the fill are variable; therefore, we judge the fill soils to have variable strength and compressibility. The fill is judged to be moderately slow to moderately fast draining and at least moderately susceptible to freeze-thaw movements.

5.2.2 Coarse Alluvium

Coarse alluvial soils are the primary deposit at this site. The coarse alluvium consists of sands (USCS Classification Symbol SP) and sands with silt (SP-SM). The coarse alluvial soils contain variable amounts of gravel, and they could also contain cobbles and/or boulders. The N-values recorded in the coarse alluvial soils indicate they range from loose to very dense. We judge the coarse alluvium to have moderate to high strength and low compressibility. The sands and sands with silt are judged to be fast-draining soils that have low susceptibility to freeze-thaw movements.

5.2.3 Till

Layers of sandy lean clay and clayey sand glacial till soils are present in each borings, interbedded within the coarse alluvial sands. The till soils are judged to have moderately high to high strength and low compressibility. The glacial till clays and clayey sands are slow draining and susceptible to freeze-thaw movements if exposed to freezing temperatures.

5.3 Ground Water

Ground water levels were not measured in the boreholes during our drilling activities. Because the soils in the borings consist of mostly free-draining sands and sands with silt, these readings can be considered a reliable indication of the steady-state water level at the times and locations they were recorded. It is our judgement that the hydrostatic water level is present below the depths of our borings. However, water can perch above the slower draining clayey till soils found at various elevations within the borings.

Ground water levels will fluctuate seasonally and annually due to varying amounts of rainfall and snow melt, as well as other factors.

6.0 RECOMMENDATIONS

6.1 Phase 1 Rain Water Storage

6.1.1 Excavation

Excavation to design invert elevation of 836 feet for the underground rain water storage facility should expose naturally deposited alluvial sands and gravel. At this elevation, it is our judgment that the naturally deposited sands should provide adequate support of the proposed storage pipes.

6.1.2 Backfill

After placing the pipes for the storage facility, we recommend using on-site sands as fill around and above the pipes. The sands should have no more than 12% of the particles (by weight) finer than the #200 sieve (Unified Soil Classification symbols SP or SP-SM). These backfill soils should be available from the excavation for the storage facility. We recommend the earthwork contractor separate the sands from the siltier and clayey soils during excavation to avoid contaminating the proposed sand fill with fine grained soils.

Because the fill will be placed below future pavement areas, the soils should be compacted per MnDOT Specification 2105.3F1 (Specified Density Method). Using ASTM terminology, this specification requires soils placed within the upper 3 feet of the pavement section (*critical subgrade zone*) be compacted to a minimum of 100% of the Standard Proctor maximum dry density (ASTM: D698). Below the *critical subgrade zone*, the compaction level can be reduced to a minimum of 95%. Refer to our standard sheet entitled "Bituminous Pavement Subgrade Preparation and Design" at the end of this report for further details.

6.1.3 Soil Resistivity

The naturally deposited sands supporting the rain water storage pipes and the (SP) or (SP-SM) fill soils are judged to have low corrosion potential.

6.1.4 Pavement Restoration

After backfilling the rain water storage basin with sand fill, as recommended previously, the sand fill should adequately support the new pavements.

6.1.5 Estimated R-value

After completion of the subgrade preparation as presented above, and assuming the soils in the upper 3 feet of the subgrade in the restored pavement area will consist of the sand fill recommended previously, we recommend using an R-value of 60 for design of the new pavements.

6.1.6 Pavement Thicknesses

For design of the heavy duty pavements in the restored pavement area, assuming an R-value of 60 for the sand subgrade, we recommend the following pavement thicknesses:

Table 6.1.6 – Pavement Thickness Design (Heavy-Duty; R-value = 60)

Pavement Material	Heavy Duty Traffic
Bituminous Wear	2 inches
Bituminous Non-Wear	3 inches (2 lifts)
Class 5 Aggregate Base	8 inches
Total Section	**13 inches**

6.1.7 Concrete Pavements

Concrete pavements are being considered in lieu of the existing bituminous pavements. Because concrete provides more rigidity and better flexural strength than flexible bituminous pavements, it is our judgment that concrete can be placed over the existing crushed limestone aggregate base and the silty sand subgrade.

The existing bituminous should be milled and removed prior to paving with concrete. Alternatively, the bituminous and existing crushed limestone aggregate base can be milled and crushed together to form a base material having a gradation meeting MnDOT Specification 3138 for Class 5 or 6 and can be used as common fill or as the aggregate base layer immediately below the concrete pavements. All fill placed in the upper 3 feet of the subgrade should be compacted to at least 100% of the Standard Proctor maximum dry density (ASTM: D698) prior to paving.

Prior to paving, the compacted subgrade should be evaluated by performing a test roll procedure. The test roll should be conducted using a loaded tandem-axle dump truck to drive over the soils and observing the fine grained soils for excessive deflection or instability. Soils which are judged to be too weak or too unstable should be removed and replaced, or they should be aerated, dried, and recompacted back into place. AET geotechnical personnel should be present to observe the test roll procedure.

Assuming the subgrade soils pass the test roll procedure, it is our opinion that the prepared subgrade should have a Modulus of Subgrade Reaction (k-value) of 200 psi per inch. Based on this, we recommend the concrete pavements have a minimum thickness of 7 inches. The concrete should be placed over 6 inches of compacted Class 5 or 6 aggregate base.

The concrete used for the pavements should have a minimum 28-day compressive strength of 4,000 psi and entrained air contents of 5% to 7%.

6.1.8 Pavement Maintenance

Even if placed and compacted properly on stable subgrade conditions, bituminous pavements will still experience cracking in 1 to 3 years, primarily due to temperature-related expansion and shrinkage. We recommend implementing a regularly scheduled maintenance program which includes patching of cracks and local distressed areas. Seal coating of the pavement surface after 3 to 5 years often helps prolong the pavement life.

6.2 Phase 2 Rain Water Storage

6.2.1 Discussion

The soil conditions shown by Boring B4-15 consist of existing fill soils that have variable density and load bearing capabilities; generally becoming weaker and more compressible at depth. The weaker fill soils are not suitable to support the proposed tank foundations. To support the proposed tank foundations, the weaker fill soils should be removed to expose the underlying naturally deposited sands and foundation grades can be re-established by placing and compacting sand fill.

This excavation and refill operation may be economically unfeasible; therefore, the use of helical piles could be considered for support of the rain water storage tanks. The helical piles can be drilled from design foundation grade through the existing fill soils to bear in the naturally deposited sands. Depending on the type of helical pile used, ultimate capacities can range from 40 kips to about 100 kips.

6.2.2 Tank Foundation Excavations

For support of the rain water storage tanks, we recommend the excavations extend through the existing fill soils to the underlying coarse alluvial sands. At Boring B4-15, the recommended excavation depth is estimated to be about 12 feet.

The estimated excavation depth is based on the soil conditions at Boring B4-15. Conditions can vary away from the boring location; therefore, we recommend that AET geotechnical personnel observe and confirm the competency of the soils in the excavation bottom prior to fill placement.

After excavation, we recommend the sands in the excavation bottom be surface compacted with vibratory compaction equipment, such as a remote-propelled compactor or a large, "turtle" type compactor. The compactor should make at least 5 passes over the soils to improve their load bearing capabilities.

If fill will be placed to support the tank foundations, the excavation bottoms should be extended laterally beyond each edge of the footings at least 1-foot for each vertical foot of fill needed below the footing (1:1 lateral oversizing). The oversizing is necessary to allow distribution of the foundation loads through the compacted fill. The 1:1 oversizing will not be required if the foundations are constructed directly on the competent naturally deposited soils, or the amount of oversizing can be reduced by lowering footing elevations.

6.2.3 Tank Foundation Fill and Compaction

We recommend that all fill placed below the tank footings, including the oversize areas, be compacted to at least 100% of the Standard Proctor maximum dry density (per ASTM: D698). All backfill placed above footing grades, which will support only exterior slabs or sidewalks, should be compacted to at least 95%. This includes all wall backfill and utility trench backfill.

Fill placed above footings which will be in landscaped areas should be compacted to at least 90%.

We recommend that the fill which is placed and compacted below the tank foundations and exterior slabs or sidewalks, consist of inorganic sands (SP) or sands with silt (SP-SM) having no more than 12% of the particles (by weight) finer than the #200 sieve. Clayey and silty soils should not be used because of their potential frost heave potential and moisture sensitivity. All fill soils should be free of debris, rubble, and organics. All fill soils should be compacted with equipment which will densify the entire lift of fill. The sand fill can be placed in loose lifts up to 12 inches thick, depending on the size of the compactor. Fill should not be placed over frozen soils and frozen soils should not be used as fill.

6.2.4 Spread Footings for Tank Support

Assuming the earthwork is performed as recommended above, it is our opinion that the tank foundations can be supported on conventional spread footings placed on the competent naturally deposited soils or the new compacted fill. We recommend the tank foundations be placed at least 60 inches below exterior grades for protection against frost penetration below the footings.

Based on the conditions encountered, it is our opinion the foundations for the proposed tank foundations can be designed using a net maximum allowable soil bearing pressure of 5,000 psf. It is our judgment this design pressure should have a factor of safety of at least three against localized shear or base failure. We estimate that total settlements should be 1-inch or less and differential settlements under these loads should not exceed ½-inch.

Given the proximity of the Minneapolis Convention Center, and the below-grade level of this building, the tank foundations should be located such that lateral loads distributed from the tank foundations do not impact the basement walls of the building.

6.2.5 Helical Pile Foundation Alternative

Helical piles consist of a small diameter steel shafts or steel bars that have one or more steel helices at the tip and along the shaft. The helical piles are rotated into the ground until competent bearing soil is encountered. If used for the tank foundations, we recommend that all of the helical piles be drilled through the fill to bear within the underlying medium dense coarse alluvial sands or the underlying glacial till.

Because various helical pile types are available on the market by various proprietary vendors, the specialty contractors can best determine the appropriate pile type, the required installation depths, and the load carrying capacities for their various pile types. Two local contacts for firms that install helical anchors are Mr. Mike Moeller with Atlas Foundation Company (Atlas), and Mr. Greg Norris with Veit & Company (Veit). We would be glad to contact them and further assist in the design.

Based on the conditions encountered at Boring B4-15, we estimate that a 1½-inch square shaft helical pile provided by Atlas could develop a service resistance of about 25 kips (50 kips ultimate), when drilled to a depth of about 20 to 25 feet, using a 10, 12, and 14 lead helical section. Higher or lower allowable resistances could be achieved by varying the pile lengths, shaft size, and/or number and sizes of helices. Based on the conditions at Boring B4-15, we estimate that a 2-7/8 inch diameter round shaft helical pile (0.217 inch wall) provided by Veit could develop a design resistance of about 45 to 50 kips (90 to 100 kips ultimate) if drilled to depths of about 20 to 25 feet below grade. If the required resistance is not achieved within the

medium dense sands and the bottoms of the helical piles are extended below a depth of about 25 feet into the clayey till soils, it is possible the helical pile resistance will decrease. If this occurs, the helical pile may need to be extended to the lower dense sand and gravel layers below a depth of about 42 feet.

It is our judgment these design pressures should provide a factor of safety of at least two against pile failure. We estimate that total settlements should be 1-inch or less and differential settlements under these loads should not exceed ½-inch.

In our opinion, it would not be necessary to factor a negative (down-drag) load into the pile design.

The installation of the helical piles by the rotation method is a "proof test" in which the capacity of the pile is estimated by monitoring the torque of the motor as the pile is installed. For verification of capacity, we recommend that a static load test be completed on at least one (1) test pile. We recommend that the installation of all helical piles and the load test be observed by AET geotechnical personnel.

The piles should be installed with a minimum center-to-center spacing of at least three times the diameter of the largest helix of the lead pile section. With this minimum spacing, it is our opinion that there should be no reduction in individual pile capacity due to group effects.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Potential Difficulties

7.1.1 Cobbles, Boulders, Rubble, and Debris

The coarse alluvial soils may contain some cobbles and possibly boulders. Rubble and/or debris could exist within the existing fill soils. These larger materials may also be present in other areas, away from our boring locations. A contingency should be included in the budget to deal with removal of rubble and debris to a demolition landfill. These larger particles will make excavating procedures more difficult than normal if they are encountered. The larger particles may also cause helical piles to deflect or obstruct above bearing depths.

7.1.2 Disturbance of Soils

The silty and clayey fill soils can become disturbed by construction traffic, especially if the soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill. Excavation using a backhoe is recommended.

7.2 Excavation Backsloping

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (which can be found at www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce sideslope erosion or running which could require slope maintenance.

7.3 Observations and Testing

The recommendations in this report are based on the conditions found at our test boring locations. Because the soil conditions may vary away from the soil boring locations, we recommend AET geotechnical personnel observe soils in excavations during construction to evaluate these potential changes. Soil density testing should also be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

If helical piles are used, we recommend full time observation of the pile installation by AET geotechnical personnel to evaluate the depths of the piles and their capacities. AET geotechnical personnel should also observe the installation of the test pile and the performance of the pile load test.

8.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, either expressed or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix B entitled "Geotechnical Report Limitations and Guidelines for Use".

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible sands (with less than 5% passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the sand layer may need a thickness transition away from the area where movement is critical. With sand placement over slower draining soils, subsurface drainage would be needed for the sand layer. High density extruded insulation could be used within the sand to reduce frost penetration, thereby reducing the sand thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

Adfreezing can occur on exterior piers (such as deck, fence, or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which include tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement or compaction. This should be considered in the project scheduling, budgeting and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working larger areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

BITUMINOUS PAVEMENT SUBGRADE PREPARATION AND DESIGN

GENERAL

Bituminous pavements are considered layered "flexible" systems. Dynamic wheel loads transmit high local stresses through the bituminous/base onto the subgrade. Because of this, the upper portion of the subgrade requires high strength/stability to reduce deflection and fatigue of the bituminous/base system. The wheel load intensity dissipates through the subgrade such that the high level of soil stability is usually not needed below about 2 feet to 4 feet (depending on the anticipated traffic and underlying soil conditions). This is the primary reason for specifying a higher level of compaction within the upper subgrade zone versus the lower portion. Moderate compaction is usually desired below the upper critical zone, primarily to avoid settlements/sags of the roadway. However, if the soils present below the upper 3 feet subgrade zone are unstable, attempts to properly compact the upper 3 feet zone to the 100% level may be difficult or not possible. Therefore, control of moisture just below the 3 feet level may be needed to provide a non-yielding base upon which to compact the upper subgrade soils.

Long-term pavement performance is dependent on the soil subgrade drainage and frost characteristics. Poor to moderate draining soils tend to be susceptible to frost heave and subsequent weakening upon thaw. This condition can result in irregular frost movements and "pop-outs," as well as an accelerated softening of the subgrade. Frost problems become more pronounced when the subgrade is layered with soils of varying permeability. In this situation, the free-draining soils provide a pathway and reservoir for water infiltration which exaggerates the movements. The placement of a well-drained sand subbase layer as the top of subgrade can minimize trapped water, smooth frost movements and significantly reduce subgrade softening. In wet, layered and/or poor drainage situations, the long-term performance gain should be significant. If a sand subbase is placed, we recommend it be a "Select Granular Borrow" which meets Mn/DOT Specification 3149.2B2.

PREPARATION

Subgrade preparation should include stripping surficial vegetation and organic soils; where the exposed soils are within the upper "critical" subgrade zone (generally 2 feet deep for "auto only" areas and 3 feet deep for "heavy duty" areas), they should be evaluated for stability. Excavation equipment may make such areas obvious due to deflection and rutting patterns. Final evaluation of soils within the critical subgrade zone should be done by test rolling with heavy rubber-tired construction equipment, such as a loaded dump truck. Soils which rut or deflect 1" or more under the test roll should be corrected by either subcutting or replacement; or by scarification, drying, and recompaction. Reworked soils and new fill should be compacted per the "Specified Density Method" outlined in Mn/DOT Specification 2105.3F1 (a minimum of 100% of Standard Proctor density in the upper 3 feet subgrade zone, and a minimum of 95% below this).

Subgrade preparation scheduling can be an important consideration. Fall and Spring seasons usually have unfavorable weather for soil drying. Stabilizing non-sand subgrades during these seasons may be difficult, and attempts often result in compromising the pavement quality. Where construction scheduling requires subgrade preparation during these times, the use of a sand subbase becomes even more beneficial for constructability reasons.

SUBGRADE DRAINAGE

If a sand subbase layer is used, it should be provided with a means of subsurface drainage to prevent water build-up. This can be in the form of draintile lines which dispose into storm sewer systems, or outlets into ditches. Where sand subbase layers include sufficient sloping and water can migrate to lower areas, draintile lines can be limited to finger drains at the catch basins. Even if a sand layer is not placed, strategically placed draintile lines can aid in improving pavement performance. This would be most important in areas where adjacent non-paved areas slope towards the pavement. Perimeter edge drains can aid in intercepting water which may infiltrate below the pavement.

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1 – Boring Locations
Subsurface Boring Logs (B1-15 to B4-15)
Gradation Curves

Appendix A
Geotechnical Field Exploration and Testing
Report No. 01-06605

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling four (4) standard penetration test borings. The approximate locations of the borings appear on Figure 1, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586 with one primary modification. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

The most recent drill rigs incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. By using the PDA energy measurement equipment, we are able to determine actual energy generated by the drop hammer. With the various hammer systems available, we have found highly variable energies ranging from 55% to over 100%. Therefore, the intent of AET's hammer calibrations is to vary the hammer weight such that hammer energies lie within about 60% to 65% of the theoretical energy of a 140-pound weight falling 30 inches. The current ASTM procedure acknowledges the wide variation in N-values, stating that N-values of 100% or more have been observed. Although we have not yet determined the statistical measurement uncertainty of our calibrated method to date, we can state that the accuracy deviation of the N-values using this method is significantly better than the standard ASTM Method.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as "DS" or "SU" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of "topsoil" layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests

Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.5.2 Sieve Analysis of Soils (thru #200 Sieve)

Conducted per AET Procedure 01-LAB-040, which is performed in general conformance with ASTM: D6913, Method A.

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days. After this time period, the soils are then discarded.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AR:	Sample of material obtained from cuttings blown out the top of the borehole during air rotary procedure.
B, H, N:	Size of flush-joint casing
CAS:	Pipe casing, number indicates nominal diameter in inches
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
DP:	Direct push drilling; a 2.125 inch OD outer casing with an inner 1½ inch ID plastic tube is driven continuously into the ground.
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RDA:	Rotary drilling with compressed air and roller or drag bit.
RDF:	Rotary drilling with drilling fluid and roller or drag bit
REC:	In split-spoon (see notes), direct push and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
SS:	Standard split-spoon sampler (steel; 1.5" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (approximate)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remolded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

(Calibrated Hammer Weight)

The standard penetration test consists of driving a split-spoon sampler with a drop hammer (calibrated weight varies to provide N_{60} values) and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM: D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

AMERICAN ENGINEERING TESTING, INC.

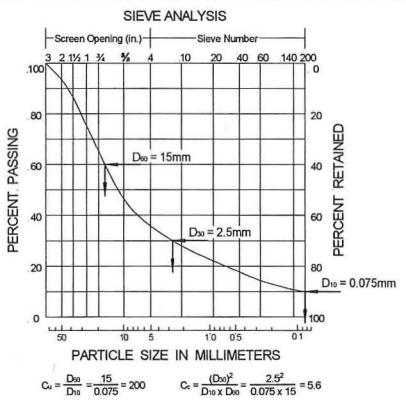
Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu≥4 and 1≤Cc≤3[E]	GW	Well graded gravel[F]
			Cu<4 and/or 1>Cc>3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu≥6 and 1≤Cc≤3[E]	SW	Well-graded sand[I]
			Cu<6 and 1>Cc>3[E]	SP	Poorly-graded sand[I]
		Sands with Fines more than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soil			Primarily organic matter, dark in color, and organic in odor	PT	Peat[R]

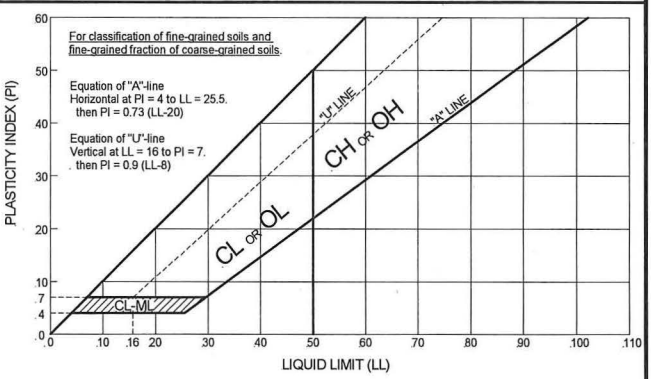
Notes

[A]Based on the material passing the 3-in (75-mm) sieve.
[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[D]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E]$Cu = D_{60}/D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to group name.
[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H]If fines are organic, add "with organic fines" to group name.
[I]If soil contains ≥15% gravel, add "with gravel" to group name.
[J]If Atterberg limits plot is hatched area, soils is a CL-ML silty clay.
[K]If soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.
[L]If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.
[M]If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N]PI≥4 and plots on or above "A" line.
[O]PI<4 or plots below "A" line.
[P]PI plots on or above "A" line.
[Q]PI plots below "A" line.
[R]Fiber Content description shown below.





Plasticity Chart

ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

Gravel Percentages

Term	Percent
A Little Gravel	3% - 14%
With Gravel	15% - 29%
Gravelly	30% - 50%

Consistency of Plastic Soils

Term	N-Value, BPF
Very Soft	less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

Relative Density of Non-Plastic Soils

Term	N-Value, BPF
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Greater than 50

Moisture/Frost Condition (MC Column)

D (Dry): Absense of moisture, dusty, dry to touch.
M (Moist): Damp, although free water not visible. Soil may still have a high water content (over "optimum").
W (Wet/ Waterbearing): Free water visible intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.
F (Frozen): Soil frozen

Layering Notes

Laminations: Layers less than ½" thick of differing material or color.
Lenses: Pockets or layers greater than ½" thick of differing material or color.

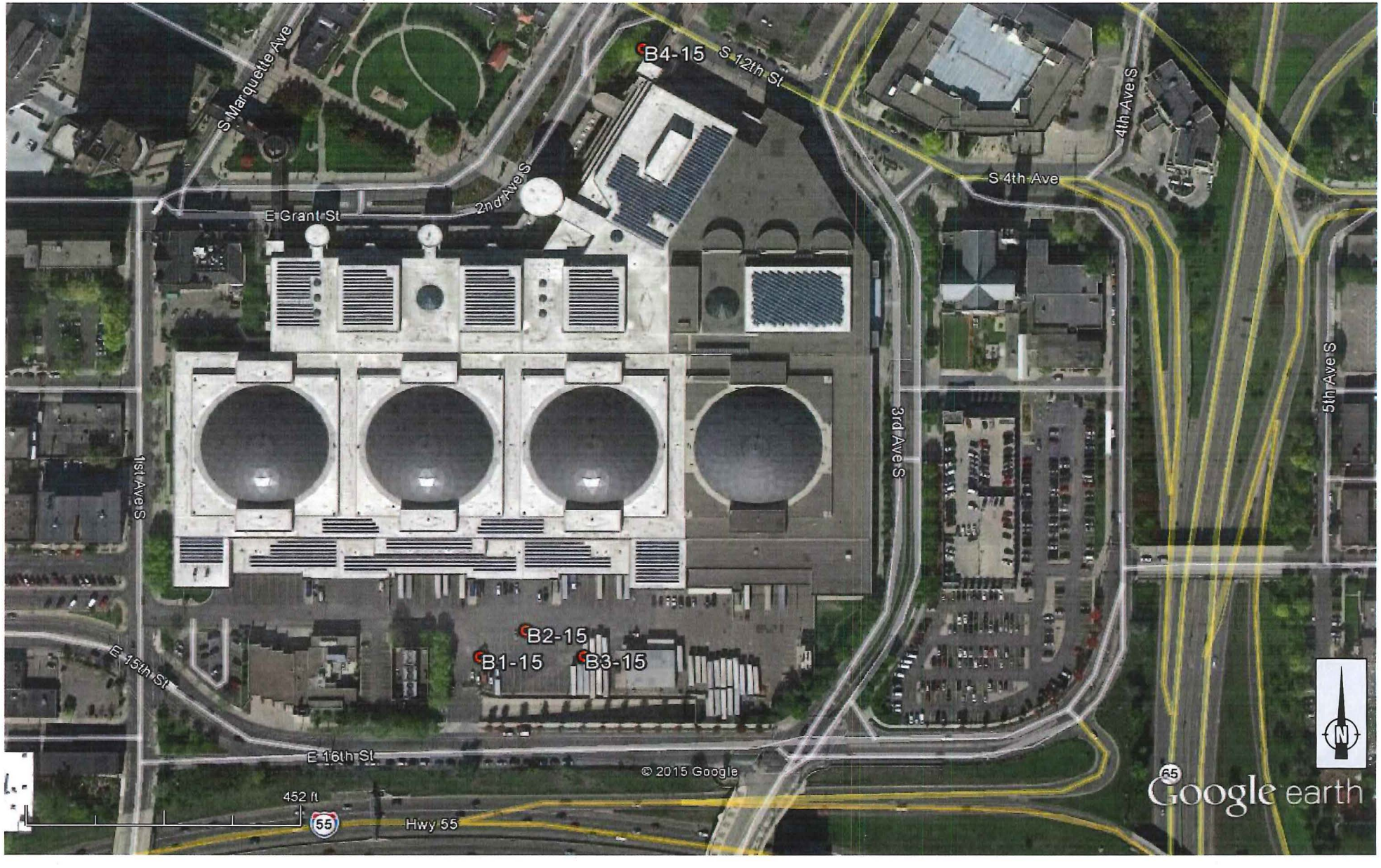
Fiber Content of Peat

Term	Fiber Content (Visual Estimate)
Fibric Peat:	Greater than 67%
Hemic Peat:	33 – 67%
Sapric Peat:	Less than 33%

Organic/Roots Description (if no lab tests)

Soils are described as *organic*, if soil is not peat and is judged to have sufficient organic fines content to influence the soil properties. *Slightly organic* used for borderline cases.

With roots: Judged to have sufficient quantity of roots to influence the soil properties.
Trace roots: Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.



AMERICAN ENGINEERING TESTING, INC.	**Project:** Minneapolis Convention Center Site Sustainability Improvements Minneapolis, Minnesota		**AET Proj. No.:** 01-06605
	Subject: Boring Locations		**Date:** 9/21/2015
	Scale: None	**Drawn By:** MPM	**Checked By:** MJLH	**Figure 1**

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B1-15 (p. 1 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Surface Elevation: **852.5** Hennepin Co. Coordinates: N **164375** E **528222**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	852.1	4¼" Bituminous pavement	FILL			SU						
	851.6	7" Crushed limestone, light brown										
1		FILL, mostly silty sand, brown		7	M	SS	12					
2	850.5	SAND WITH SILT, a little gravel, fine to medium grained, brown, moist, medium dense (SP-SM) (possible fill)	COARSE ALLUVIUM OR FILL									
3	849.0			11	M	SS	14					
4		SAND, fine to medium grained, brown, moist, loose (SP)	COARSE ALLUVIUM									
5				7	M	SS	16					
6												
7				8	M	SS	14					
8	844.5	SAND, a little gravel, fine to medium grained, light grayish brown, moist, medium dense to loose to medium dense (SP)										
9				11	M	SS	14					
10												
11				10	M	SS	14					
12												
13				11	M	SS	12					
14	838.5	SAND, a little gravel, medium to fine grained, light grayish brown, moist, loose (SP)										
15				6	M	SS	12					
16	836.5	SAND WITH GRAVEL, medium to fine grained, light grayish brown, moist, medium dense to loose to medium dense (SP)										
17				25	M	SS	14					
18												
19				10	M	SS	14					2
20												
21				30	M	SS	14					3
22	830.5	SANDY LEAN CLAY, a little gravel, brownish gray, a little brown, stiff, lenses and laminations of sand (CL)	TILL									
23				11	M	SS	14	20				
24	828.5											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-28'	**3.25" HSA**	**9/8/15**	**1:45**	**30.0**	**28.0**	**29.8**		**None**
		9/9/15	**8:15**	**30.0**	**28.0**	**29.8**		**None**
BORING COMPLETED: **9/8/15**								
DR: **DS** LG: **TPM** Rig: **33C**								

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: 01-06605 Log of Boring No. B1-15 (p. 2 of 2)

Project: Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN

Hennepin Co. Coordinates: N 164375 E 528222

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
		SANDY LEAN CLAY, a little gravel, gray, stiff to very stiff, lenses and laminations of silty sand (CL) *(continued)*	TILL *(continued)*	14	M	SS	18	26				
26												
27				17	M	SS	5	19				
28												
29	823.5			58	M	SS	18	21				
30	822.5	SAND WITH GRAVEL, medium grained, grayish brown, moist, very dense (SP)	COARSE ALLUVIUM									
		END OF BORING										

AET_CORP W-ELEV AND COORD 01-06605.GPJ AET+CPT+WELL.GDT 9/23/15

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B2-15 (p. 1 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Surface Elevation: **853.0** Hennepin Co. Coordinates: N **164422** E **528297**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	WC	DEN	LL	PL	%-#200
	852.6	5" Bituminous pavement	FILL			SU						
1	852.0	7" Crushed limestone, light brown										
2		FILL, mostly silty sand, a little gravel, pieces of bituminous, dark brown and brown		23	M	SS	14					
3				19	M	SS	14					
4												
5				6	M	SS	16					
6	847.0											
7		SAND WITH SILT, a little gravel, fine to medium grained, brown, moist, loose (SP-SM) (possible fill)	COARSE ALLUVIUM OR FILL	8	M	SS	14					
8	845.0											
9		SAND, a little gravel, medium to fine grained, light grayish brown, moist, loose to medium dense (SP)	COARSE ALLUVIUM	5	M	SS	16					
10												
11	841.5			16	M	SS	16					
12		SAND, fine to medium grained, light grayish brown, moist, medium dense (SP)										
13				26	M	SS	16					
14												
15				11	M	SS	16					
16	837.0											
17		SAND WITH GRAVEL, medium to fine grained, light brown, moist, medium dense (SP)		19	M	SS	16					
18												
19				19	M	SS	10					3
20	833.0											
21		SAND WITH SILT AND GRAVEL, medium to fine grained, light brown, a little brown, moist, dense (SP)		34	M	SS	16					5
22												
23	830.0			23	M	SS	16					
24	829.0	SANDY LEAN CLAY, a little gravel, brownish gray, very stiff, laminations of sand (CL)	TILL					25				

DEPTH:	DRILLING METHOD
0-28'	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/8/15	**10:00**	**30.0**	**28.0**	**30.0**		**None**

BORING COMPLETED: **9/8/15**

DR: **DS** LG: **TPM** Rig: **33C**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-ELEV AND COORD 01-06605.GPJ AET+CPT+WELL.GDT 9/23/15

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B2-15 (p. 2 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Hennepin Co. Coordinates: N **164422** E **528297**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
26		CLAYEY SAND, a little gravel, gray, stiff, lenses of sand (SC) *(continued)*	TILL *(continued)*	11	M	SS	18	17				
27				13	M	SS	18	19				
28	825.0											
	824.5	SANDY LEAN CLAY, a little gravel, gray, hard, laminations of sand (CL)						17				
29				40	M	SS	18					
30	823.0	SAND WITH GRAVEL, medium to fine grained, grayish brown, moist, dense (SP)										
		END OF BORING										

AET_CORP W-ELEV AND COORD 01-06605.GPJ AET+CPT+WELL.GDT 9/23/15

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B3-15 (p. 1 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Surface Elevation: **852.7** Hennepin Co. Coordinates: N **164376** E **528393**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	852.4	4¼" Bituminous pavement	FILL			SU						
1	851.7	8" Crushed limestone, light brown										
		FILL, mostly silty sand, dark brown		8	M	SS	14					
2	850.7											
3		FILL, mixture of lean clay and silty sand, brown		8	M	SS	16	20				
4	848.7											
5		SAND, a little gravel, medium to fine grained, brown, moist, loose (SP) (possible fill)	COARSE ALLUVIUM OR FILL	6	M	SS	14					
6												
7				7	M	SS	14					
8												
9				6	M	SS	14					
10	842.7											
11		SAND, a little gravel, fine to medium grained, brown, moist, medium, dense (SP)	COARSE ALLUVIUM	11	M	SS	16					
12												
13				14	M	SS	16					
14												
15				13	M	SS	14					
16	836.7											
17		SAND, a little gravel, medium to fine grained, light grayish brown, moist, loose (SP)		7	M	SS	12					2
18	834.7											
19		GRAVELLY SAND WITH SILT, medium to fine grained, brown, moist, medium dense (SP-SM)		25	M	SS	10					
20	832.7											
21		SAND WITH GRAVEL, medium to fine grained, grayish brown to brown, moist, medium dense (SP)		21	M	SS	12					3
22	830.7											
23		SILTY SAND, a little gravel, fine to medium grained, brown, moist, medium dense (SM)		21	M	SS	12					
24												

DEPTH:	DRILLING METHOD
0-28'	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/8/15	**11:45**	**30.0**	**28.0**	**30.0**		**None**

BORING COMPLETED: **9/8/15**

DR: **DS** LG: **TPM** Rig: **33C**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B3-15 (p. 2 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Hennepin Co. Coordinates: N **164376** E **528393**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
26		SILTY SAND, a little gravel, fine to medium grained, brown, moist, medium dense (SM) *(continued)*	COARSE ALLUVIUM *(continued)*	21	M	SS	14					
27	825.7	SANDY LEAN CLAY, a little gravel, gray, stiff (CL)	TILL	13	M	SS	18	20				
28	824.7	SANDY LEAN CLAY, a little gravel, gray and grayish brown mottled, hard, lenses and laminations of silty sand and sand (CL)										
29				46	M	SS	18	19				
30	822.7	**END OF BORING**										

AET_CORP W-ELEV AND COORD 01-06605.GPJ AET+CPT+WELL.GDT 9/23/15

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET No: **01-06605** Log of Boring No. **B4-15 (p. 1 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Surface Elevation: **854.9** Hennepin Co. Coordinates: N **165454** E **528486**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1		FILL, mostly silty sand, a little gravel and clayey sand, trace roots, brown, a little dark brown	FILL	13	M	SS	16					
2	852.9											
3		FILL, mostly silty sand, a little gravel, pieces of bituminous, brown		25	M	SS	16					
4	850.9											
5		FILL, mostly sand with silt, a little gravel and silty sand, trace roots, brown										
6				12	M	SS	14					
7												
8				4	M	SS	14					
9												
10												
11				2	M	SS	14					
12	842.9											
13		SAND, a little gravel, fine to medium grained, light grayish brown, moist, loose to medium dense (SP)	COARSE ALLUVIUM	5	M	SS	14					
14												
15												
16				13	M	SS	14					
17												
18												
19												
20												
21				24	M	SS	14					
22												
23												
24												

DEPTH:	DRILLING METHOD
0-49½'	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/9/15	**11:00**	**51.0**	**49.5**	**51.0**		**None**

BORING COMPLETED: **9/9/15**

DR: **DS** LG: **TPM** Rig: **33C**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

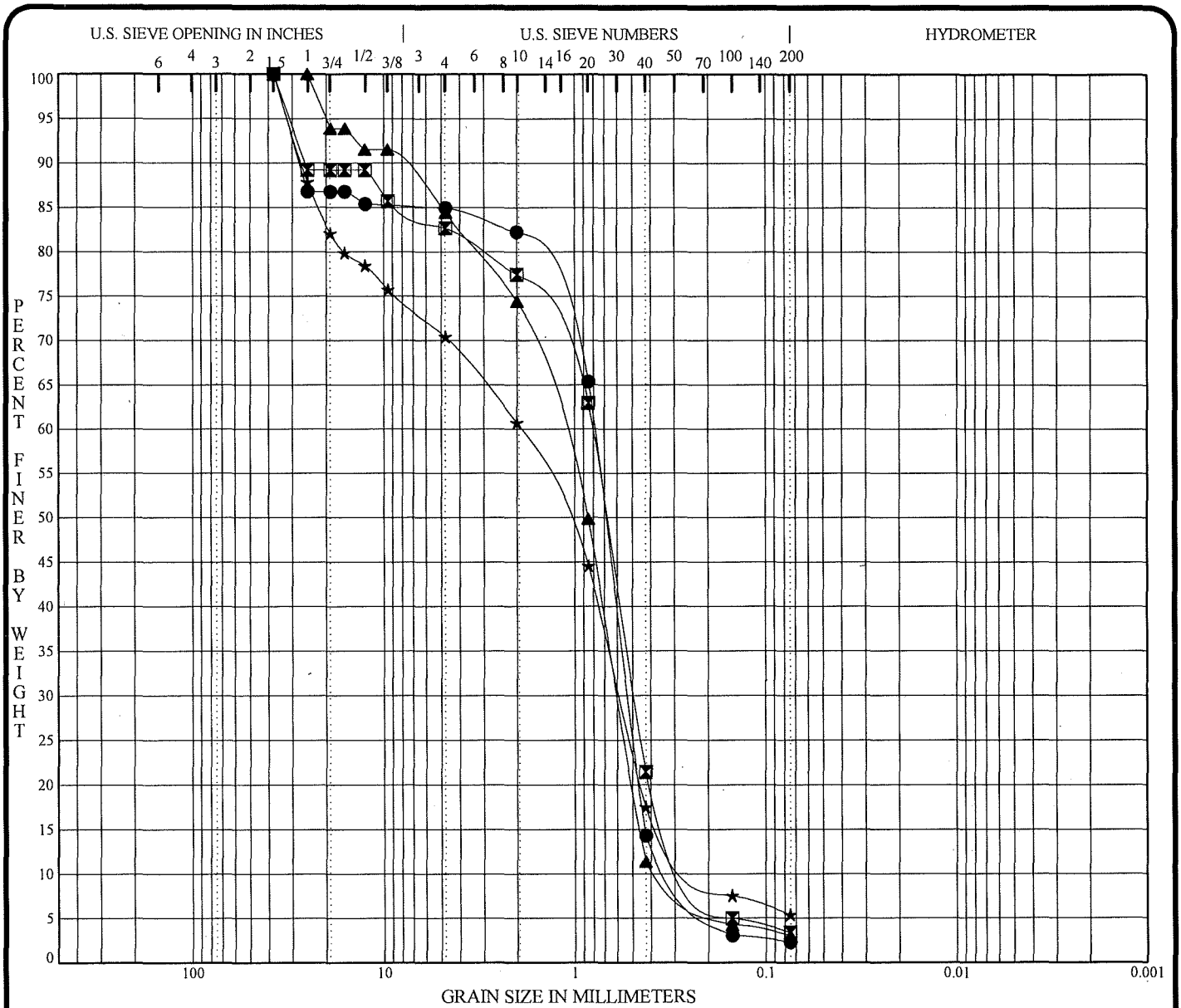
AET No: **01-06605** Log of Boring No. **B4-15 (p. 2 of 2)**

Project: **Minneapolis Convention Center Site Sustainability Improvements; Minneapolis, MN**

Hennepin Co. Coordinates: N **165454** E **528486**

DEPTH IN FEET	ELEV. FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
26		SAND, a little gravel, fine to medium grained, light grayish brown, moist, loose to medium dense (SP) *(continued)*	COARSE ALLUVIUM *(continued)*	25	M	SS	14					
27	827.9	SANDY LEAN CLAY, a little gravel, gray, very stiff, laminations of sand (CL)	TILL									
28												
29												
30												
31				17	M	SS	3	19				
32												
33	821.9	SANDY LEAN CLAY, a little gravel, gray, stiff, laminations of silty sand (CL)										
34												
35				14	M	SS	12	19				
36												
37												
38	816.9	CLAYEY SAND, a little gravel, grayish brown, very stiff, lenses and laminations of silty sand (SC)										
39												
40												
41				19	M	SS	14	11				
42	812.9	GRAVELLY SAND, possible cobbles, medium to fine grained, light brown, moist, dense (SP)	COARSE ALLUVIUM									
43				40	M	SS	14					
44	810.9	GRAVELLY SAND WITH SILT, fine to medium grained, brown, moist, very dense (SP-SM)										
45				70	M	SS	10					
46												
47												
48	806.9	SAND WITH SILT AND GRAVEL, fine to medium grained, brown, moist, very dense (SP-SM)										
49												
50				68	M	SS	10					
51	803.9	**END OF BORING**										

AET_CORP W-ELEV AND COORD 01-06605.GPJ AET+CPT+WELL.GDT 9/23/15



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B1-15**	**18.0'**	**SAND with GRAVEL (SP)**					**1.23**	**2.8**
⊠	**B1-15**	**20.0'**	**SAND with GRAVEL (SP)**					**1.44**	**3.9**
▲	**B2-15**	**18.0'**	**SAND with GRAVEL (SP)**					**0.84**	**3.5**
★	**B2-15**	**20.0'**	**SAND with SILT and GRAVEL (SP-SM)**					**0.92**	**9.9**

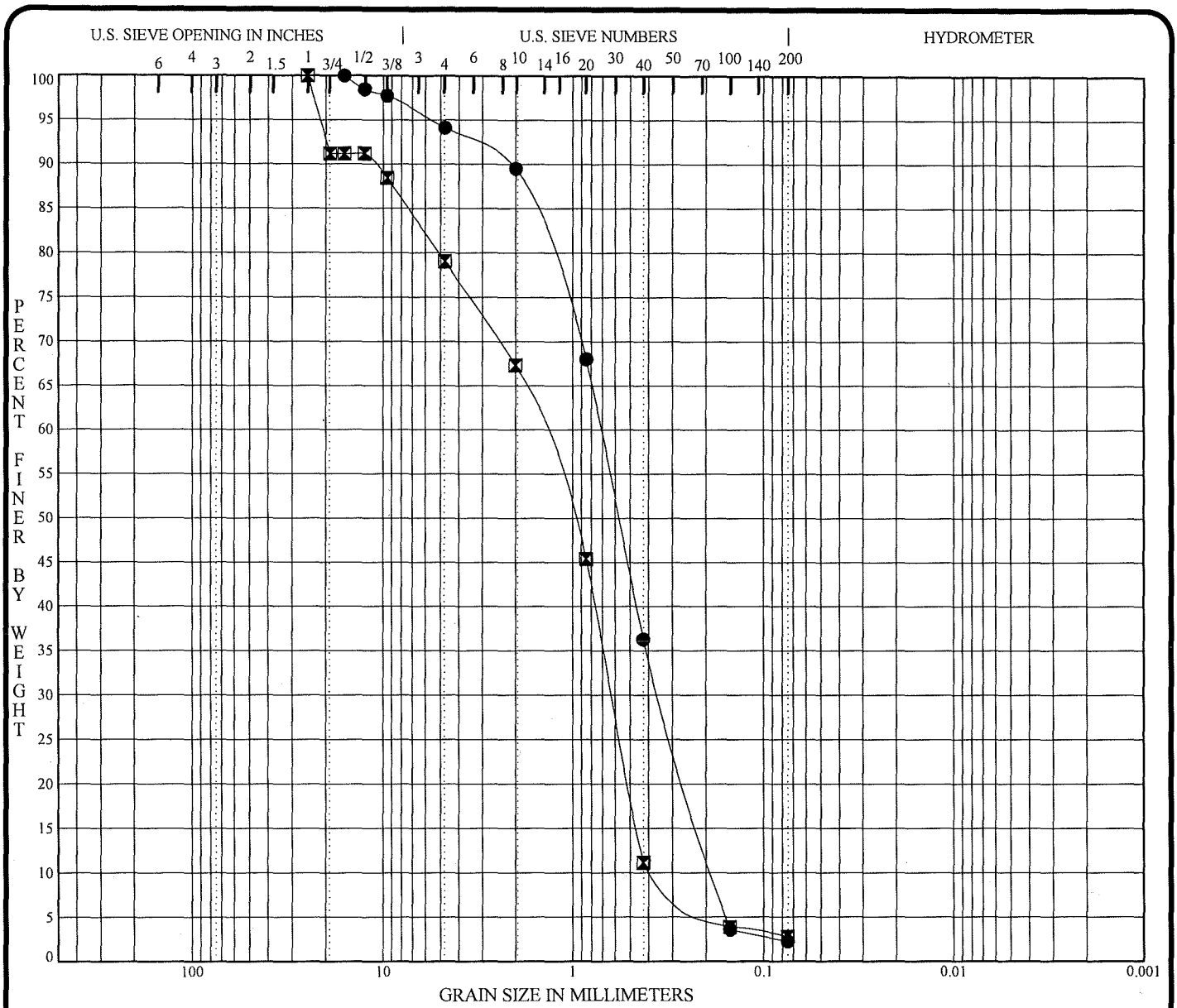
	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B1-15**	**18.0'**	**37.50**	**0.79**	**0.526**	**0.2856**	**15.1**	**82.6**	**2.3**	
⊠	**B1-15**	**20.0'**	**37.50**	**0.81**	**0.490**	**0.2061**	**17.3**	**79.3**	**3.4**	
▲	**B2-15**	**18.0'**	**25.00**	**1.21**	**0.595**	**0.3479**	**15.6**	**81.4**	**3.0**	
★	**B2-15**	**20.0'**	**37.50**	**1.93**	**0.585**	**0.1943**	**29.6**	**65.0**	**5.4**	

PROJECT **Minneapolis Convention Center Site**
Sustainability Improvements; Minneapolis, MN

AET JOB NO. **01-06605**
DATE **9/8/15**

AMERICAN ENGINEERING TESTING, INC.

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**B3-15**	**16.0'**	**SAND (SP)**					**0.92**	**3.9**
⊠	**B3-15**	**20.0'**	**SAND with GRAVEL (SP)**					**0.71**	**4.2**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B3-15**	**16.0'**	**16.00**	**0.71**	**0.348**	**0.1839**	**5.9**	**91.9**	**2.2**	
⊠	**B3-15**	**20.0'**	**25.00**	**1.50**	**0.623**	**0.3620**	**21.0**	**76.2**	**2.8**	

PROJECT **Minneapolis Convention Center Site**
Sustainability Improvements; Minneapolis, MN

AET JOB NO. **01-06605**
DATE **9/8/15**

AMERICAN ENGINEERING TESTING, INC.

GRADATION CURVES

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Appendix B
Geotechnical Report Limitations and Guidelines for Use
Report No. 01-06605

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by ASFE[1], of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 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.

B.2.2 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.

B.2.3 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. Typically 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.

B.2.4 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.

1 ASFE, 8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733: www.asfe.org

B.2.5 Most Geotechnical Findings Are Professional Opinions
Site exploration identified 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.

B.2.6 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.

B.2.7 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.

B.2.8 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 recognizes that separating logs from the report can elevate risk.

B.2.9 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 the 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.

B.2.10 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 report. 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.

B.2.11 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.

MINNEAPOLIS CONVENTION CENTER (MCC) RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

CONTACT INFORMATION

OWNER: CITY OF MINNEAPOLIS

OWNER REPRESENTATIVE: MINNEAPOLIS CONVENTION CENTER
LANE CARLSON, FACILITIES OPERATIONS MANAGER
612-335-6335
Lane.Carlson@minneapolismn.gov
1301 SECOND AVENUE S.
MINNEAPOLIS, MN 55403

ENGINEER: LHB, INC.
701 WASHINGTON AVE. N., SUITE 200,
MINNEAPOLIS, MN 55401

CIVIL ENGINEER: JIM TIGGELAAR, PE
612-752-6921
Jim.Tiggelaar@lhbcorp.com

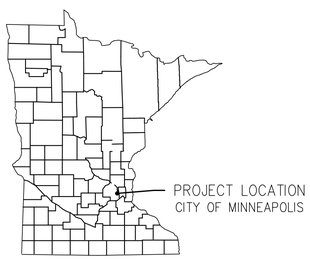
ELECTRICAL ENGINEER: MICHAEL BILBEN, PE
612-752-6973
Michael.Bilben@lhbcorp.com

MECHANICAL ENGINEER: ELIZABETH TOMLINSON, PE
612-752-6967
Elizabeth.Tomlinson@lhbcorp.com

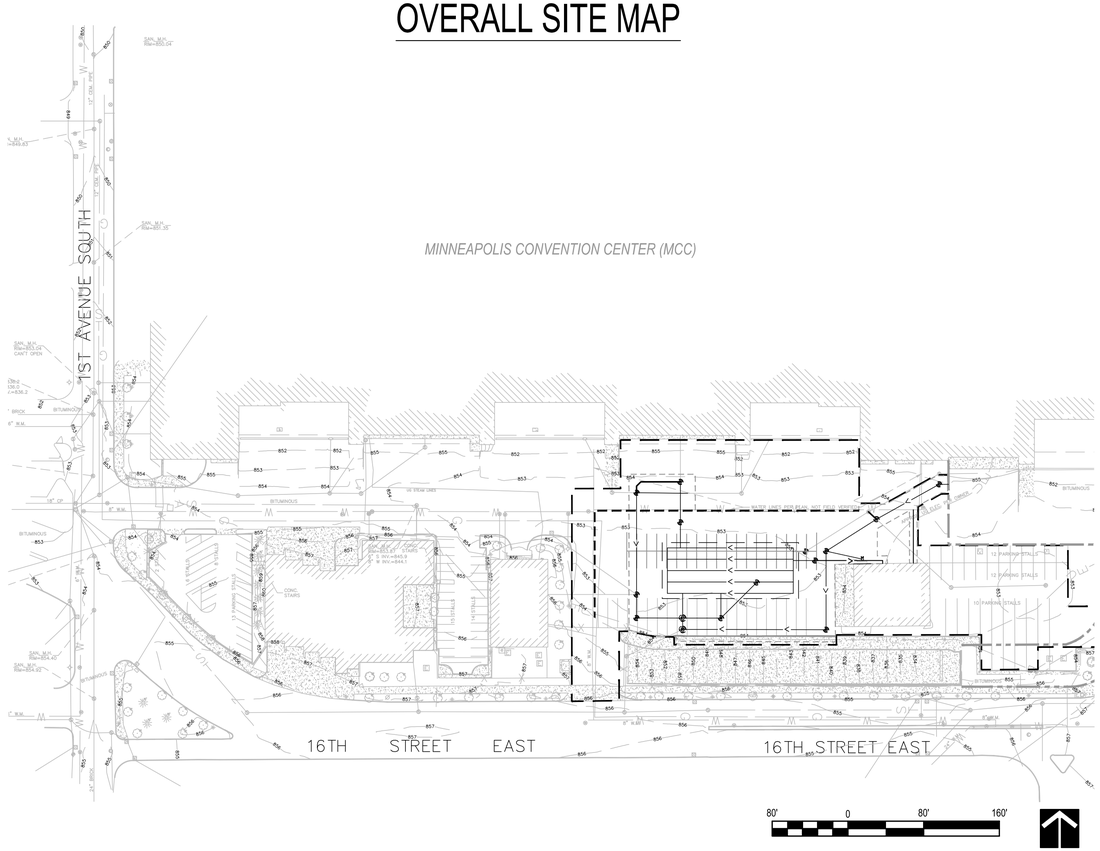
ARCHITECT: KARIN STUBER
612-766-2827
Karin.Stuber@lhbcorp.com

IRRIGATION DESIGNER: MLC IRRIGATION CONSULTANTS, JIM RUZICKA
952-447-2053
jim@mainlineconsulting.net
7620 JENNIFER LANE
PRIOR LAKE, MN 55372

GEOTECHNICAL ENGINEER: AMERICAN ENGINEERING TESTING, INC.,
MICHAEL McCARTHY, PE
651-659-1364
mmccarthy@amengtest.com
550 CLEVELAND AVE. N.
ST. PAUL, MN 55114



OVERALL SITE MAP



CALL BEFORE YOU DIG!!!!
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

UTILITY LOCATIONS ON PLANS WERE LOCATED EITHER BY SURVEY OR PROVIDED BY OTHERS AND SHOW THE APPROXIMATE LOCATION OF EXISTING UTILITIES. ALL UTILITIES MAY NOT BE INDICATED. CONTRACTOR IS RESPONSIBLE FOR LOCATING UTILITIES.

DRAWING INDEX

GENERAL

G0.00	COVER SHEET

SURVEY

1 OF 2	BOUNDARY & TOPOGRAPHICAL SURVEY
2 OF 2	BOUNDARY & TOPOGRAPHICAL SURVEY

CIVIL

C1.01	USE OF SITE
C1.02	DEMOLITION, PROTECTIONS, & EROSION CONTROL PLAN
C1.03	EROSION CONTROL DETAILS
C3.01	UTILITY PLAN - INITIAL
C3.02	UTILITY PLAN - FINAL
C4.01	SECTIONS AND DETAILS

MECHANICAL

P0.01	MECHANICAL COVER SHEET
P1.01	PLUMBING PLAN

ELECTRICAL

E0.01	ELECTRICAL SYMBOLS, ABBREVIATIONS AND NOTES
E1.01	ELECTRICAL SITE PLAN
E2.01	ELECTRICAL ENLARGED PLAN AND SCHEDULES

IRRIGATION (MLC)

IRR-1	IRRIGATION LAYOUT - WEST AREA
IRR-2	IRRIGATION LAYOUT - EAST AREA
IRR-3	IRRIGATION NOTES AND SCHEDULES
IRR-4	IRRIGATION DETAILS

PERFORMANCE DRIVEN DESIGN.
LHBcorp.com
701 Washington Ave. N, Ste 200 | Minneapolis, MN 55401 | 612.338.2029

CLIENT:
MINNEAPOLIS CONVENTION CENTER

1301 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55403

THIS SQUARE APPEARS 1/2" x 1/2" ON FULL SIZE SHEETS.

NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
COVER SHEET

FILE: ..\120383\600 Drawings\C\120383 G0.00 Cover Sheet.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: G0.00

GENERAL NOTES:

1. The bearing system used is assumed.

2. The location of the underground utilities shown hereon, if any, are approximate only. PURSUANT TO MSA 216D CONTACT GOPHER STATE ONE CALL AT (612) 454–0002 PRIOR TO ANY EXCAVATION.

3. Subject property is identified as being in "Zone X, Other Areas" on Flood Insurance Rate Map No., 27053C0357E, effective date September 2, 2004, AND is identified as being in "No Special Flood Hazard Areas" on Flood Insurance Rate Map No., 27053C0359E, effective date September 2, 2004.

4. This survey was made on the ground.

5. No current title work was furnished for the preparation of this survey. Legal description, recorded or unrecorded easements and encumbrances are subject to revision upon receipt of current title work.

6. Elevation datum is based on NAVD 88 data.
HSJBenchmark #1 is located Top of Nail (AS SHOWN ON SURVEY)
Elevation = 853.85

7. All storm sewer pipes are concrete unless otherwise noted.

8. Boundary and lot lines per Hennepin County Tax records and maps.

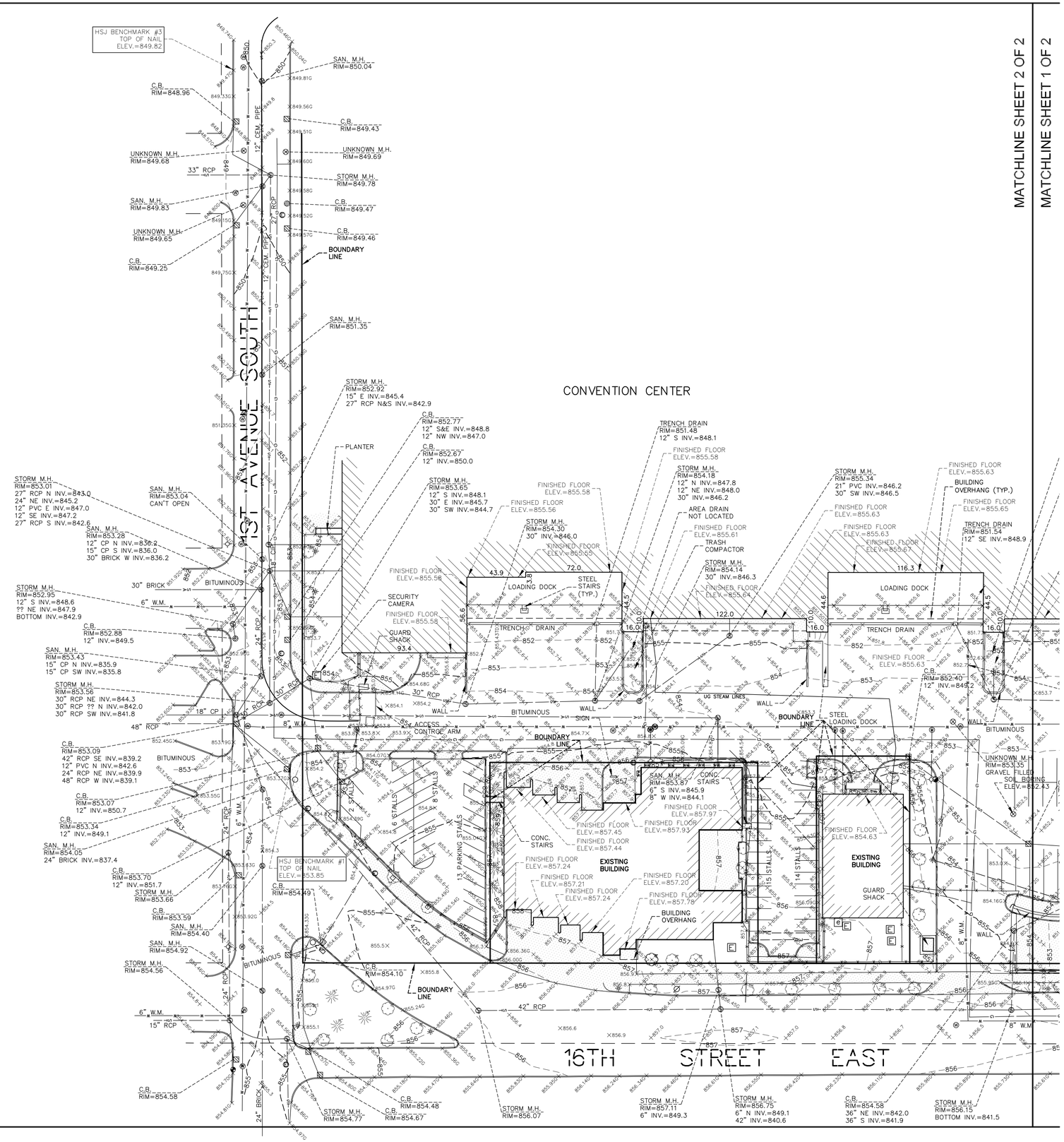
AREA UTILITY COMPANIES:

Gopher State One Call Locate Request Information Ticket Numbers: 152431882 & 152431933

Code	Name	Phone Number
ATTLCL01	AT&T LOCAL SVCS/TRANSMISSI–TCG – ATTLCL01	(903) 753–3145
ATT01	AT&T TRANSMISSION – ATT01	(903) 753–3145
MINGAS02	CENTER POINT ENERGY – MINGAS02	(612) 342–5200
CMINNE01	CITY OF MINNEAPOLIS – CMINNE01	(612) 673–5600
COMCST03	COMCAST – COMCST03	(612) 522–8141
MNSDOT01	DEPARTMENT OF TRANSPORTATION – MNSDOT01	(651) 366–5750
WLMTCM01	LEVEL 3 COMMUNICATIONS – WLMTCM01	(877) 366–8344
METSTM01	MINNEAPOLIS ENERGY CTR – METSTM01	(612) 349–6087
USSPNT01	SPRINT/LONG DISTANCE – USSPNT01	(800) 521–0579
LADATC02	WINDSTREAM COMMUNICATIONS – LADATC02	(800) 289–1901
XCEL07	XCEL ENERGY – XCEL07	(800) 848–7558
XOCOMM01	XO COMMUNICATIONS INC – XOCOMM01	(320) 241–4029
ZAYO01	ZAYO BANDWIDTH – ZAYO01	(888) 267–1063
CTLMN01	CENTURYLINK – CTLQL	(855) 742–6062

LEGEND

- Property Monument
- Concrete
- Concrete Curb
- Fence
- Overhead Electric
- Underground Electric
- Underground Telephone
- Water
- Gas
- Sanitary Sewer
- Storm Sewer
- Window Well
- Electric Meter
- Electric Box
- Electric Manhole
- Power Pole
- Hydrant
- Unknown Manhole
- Gate Valve
- Guard Post
- Catchbasin
- Catchbasin
- Deciduous Tree (Diameter in Inches)
- Coniferous Tree (Diameter in Inches)
- Light Pole
- Gas Meter
- Telephone Manhole
- Water Manhole
- Sanitary Manhole
- Storm Manhole
- 906 — Existing Contour
- X 851.27G — Existing Spot Elevation Gutter
- X 934.3 — Existing Spot Elevation
- X 934.3TD — Existing Spot Trench Drain



MATCHLINE SHEET 2 OF 2

MATCHLINE SHEET 1 OF 2

BOUNDARY & TOPOGRAPHICAL SURVEY

for:

LHB

SITE: MINNEAPOLIS CONVENTION CENTER
MINNEAPOLIS, MINNESOTA

CERTIFICATION:

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Registered Land Surveyor under the laws of the State of Minnesota.

Date: September 10, 2015

Thomas E. Hodorff
Minn. Reg. No. 23677

HARRY S. JOHNSON CO., INC.
LAND SURVEYORS CONSULTANTS
BLOOMINGTON, MINNESOTA
PHONE: 952-884-5341 FAX: 952-884-5344

Revision History
10–5–15 update utility info.

Sheet No.	Book	Page
1 OF 2	644	25
File No. 1-3-9194	W.O. Number 2015386	CAD Technician CT

CAD File: 2015386.DWG
Path: USB/JOBS/2015386/DWG/

MATCHLINE SHEET 1 OF 2

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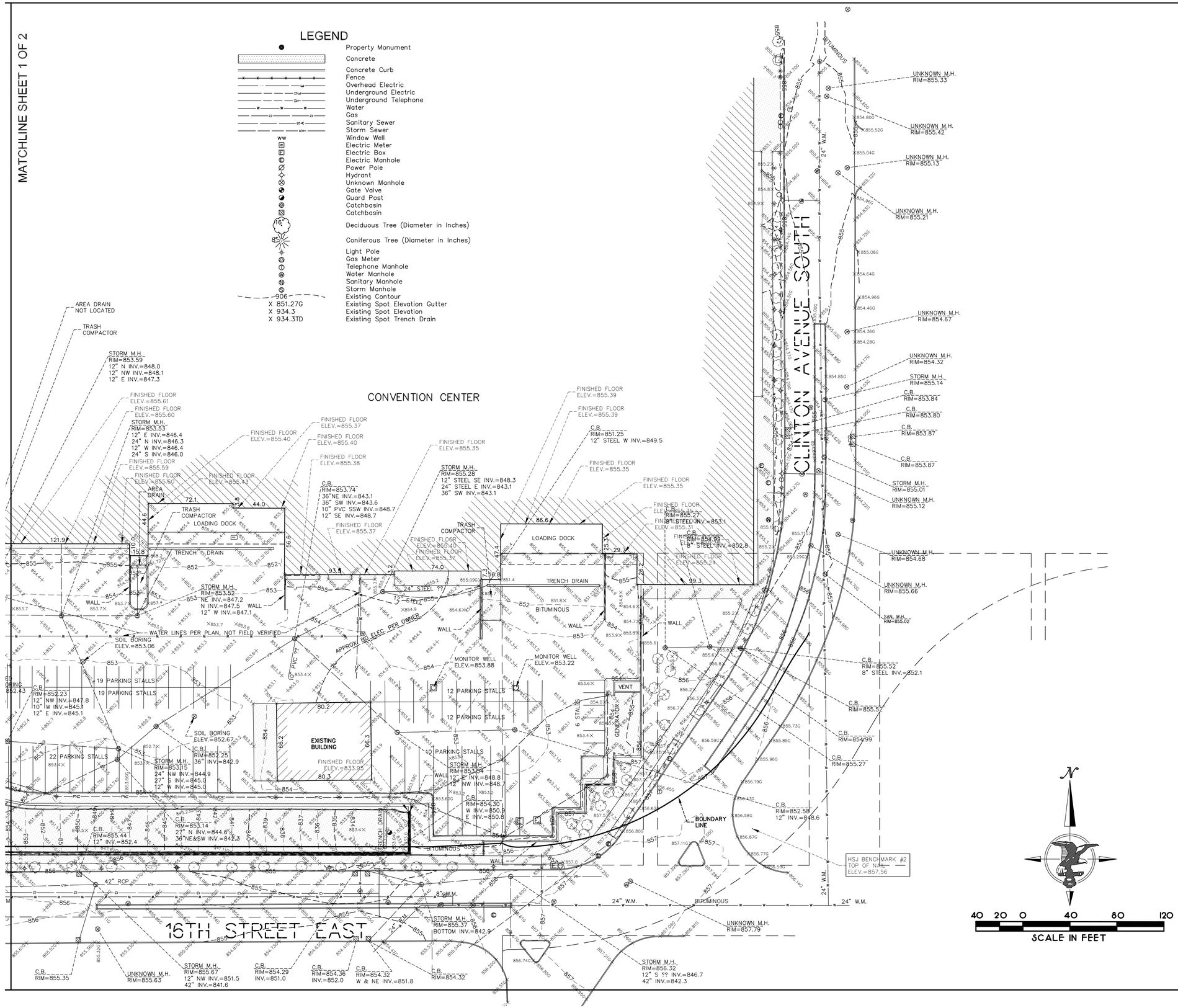

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BOUNDARY & TOPOGRAPHICAL SURVEY

for:

LHB

SITE: MINNEAPOLIS CONVENTION CENTER
MINNEAPOLIS, MINNESOTA

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10–5–15 update utility info.

Sheet No.	Book	Page
2 OF 2	644	25
File No.	W.O. Number	CAD Technician
1-3-9194	2015386	CT

HARRY S. JOHNSON CO., INC.
LAND SURVEYORS CONSULTANTS
BLOOMINGTON, MINNESOTA
PHONE: 952-884-5341 FAX: 952-884-5344

CAD File: 2015386.DWG
Path: USB/JOBS/2015386/DWG/

NOTES

1. THIS SHEET INDICATES GENERAL USE OF SITE REQUIREMENTS FOR THE UNDERGROUND STORAGE SYSTEM WORK.
2. THE PAVED AREAS ADJACENT TO THE LOADING DOCKS BETWEEN 1ST AVENUE S. AND CLINTON AVENUE S. ARE GENERALLY DEFINED AS THE "MARSHALLING YARD". THE CITY WILL REPAVE AND RESTRIPE THESE ARES CONCURRENT WITH OR AFTER THE RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT WORK. COORDINATE WORK WITH THE CITY (LARRY MATSUMOTO 612.919.1148; LARRY.MATSUMOTO@MINNEAPOLISMN.GOV) AND THE MINNEAPOLIS CONVENTION CENTER (MCC).
3. AREAS TO STOCKPILE SOILS ARE LIMITED AND MAY REQUIRE PHASING OF THE UNDERGROUND STORMWATER STORAGE SYSTEM. DEPENDING ON CONTRACTOR APPROACH TO CONSTRUCTION. SUBMIT A PHASING PLAN CLEARLY IDENTIFYING THE ANTICIPATED EXCAVATION LIMITS WITH CORRESPONDING DATES.

KEYED NOTES

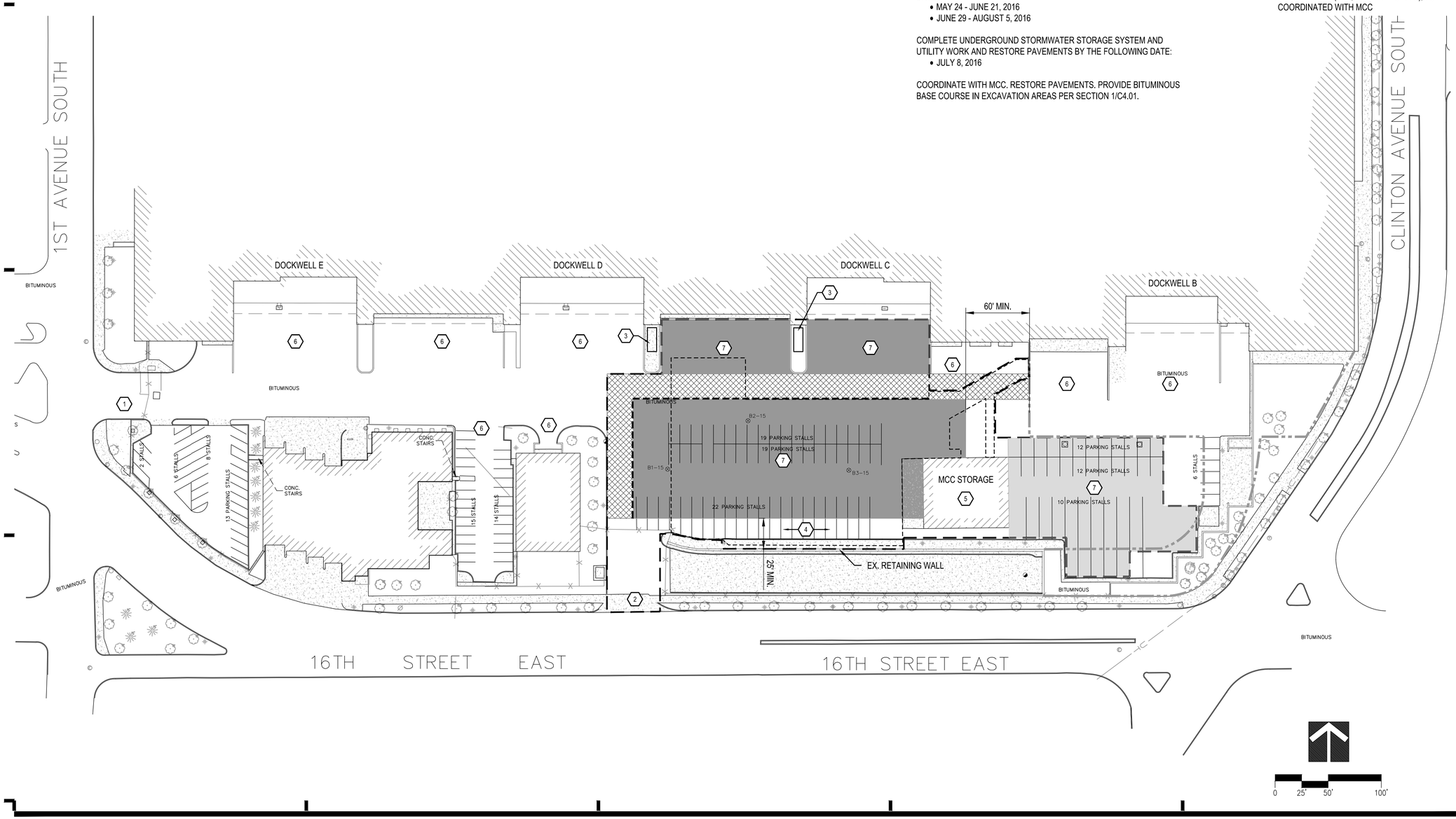
1. CONSTRUCTION ACCESS AND MCC ACCESS FOR TRUCKS ENTERING AND LEAVING SITE.
2. CONSTRUCTION ACCESS FOR TRUCKS ENTERING SITE. MCC ACCESS TO AND FROM UNDERGROUND LOADING DOCKS ONLY.
3. EXISTING TRASH COMPACTOR. COORDINATE WITH MCC FOR SERVICE SCHEDULE AND PROVIDE REQUIRED ACCESS.
4. VEHICULAR ACCESS TO MCC STORAGE BUILDING MAY BE DISCONTINUED DURING CONSTRUCTION. COORDINATE WITH MCC.
5. MATERIALS MAY BE STAGED IN MCC STORAGE BUILDING. COORDINATE WITH MCC. PROTECT BUILDING.
6. MAINTAIN FULL VEHICULAR ACCESS TO LOADING DOCK AND BUILDING ACCESSES AT ALL TIMES DURING CONSTRUCTION.
7. THIS AREA IS AVAILABLE FOR CONSTRUCTION ON THE FOLLOWING DATES:
   - MAY 24 - JUNE 21, 2016
   - JUNE 29 - AUGUST 5, 2016

   COMPLETE UNDERGROUND STORMWATER STORAGE SYSTEM AND UTILITY WORK AND RESTORE PAVEMENTS BY THE FOLLOWING DATE:
   - JULY 8, 2016

   COORDINATE WITH MCC. RESTORE PAVEMENTS. PROVIDE BITUMINOUS BASE COURSE IN EXCAVATION AREAS PER SECTION 1/C4.01.

LEGEND

- CONSTRUCTION LIMITS
- EXCAVATION LIMITS (APPROXIMATE)
- UNDERGROUND BUILDING AND RAMP LIMITS (APPROXIMATE - FOR REFERENCE)
- HEAVY EQUIPMENT AND MATERIALS STAGING AREA
- LIGHT EQUIPMENT AND MATERIALS STAGING AREA (E.G., NO SOILS STOCKPILING)
- PROVIDE TEMPORARY JERSEY BARRIERS FOR DIRECTING TRAFFIC. PLACE ROCK FILTER LOG AT OUTSIDE PERIMETER TO DIVERT RAINWATER AWAY FROM EXCAVATION
- MAINTAIN 22' (MIN) CLEAR VEHICULAR PASSAGE. MINIMIZE WORK THAT WILL DISRUPT THIS CLEAR VEHICLE PATH (E.G., PIPE TRENCHING), AS COORDINATED WITH MCC



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PERFORMANCE DRIVEN DESIGN.
LHBcorp.com
701 Washington Ave. N, Ste 200 | Minneapolis, MN 55401 | 612.338.2029

CLIENT:
MINNEAPOLIS CONVENTION CENTER

1301 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55403

THIS SQUARE APPEARS 1/2" x 1/2" ON FULL SIZE SHEETS.

NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

I HEREBY CERTIFY that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE: James William Tiggelaar

TYPED OR PRINTED NAME: JAMES W. TIGGELAAR

DATE: 12/04/2015 REG. NO.: 24755

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
USE OF SITE

FILE: ..\120383\600 Drawings\C\120383 C1.01 Use of Site.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: C1.01

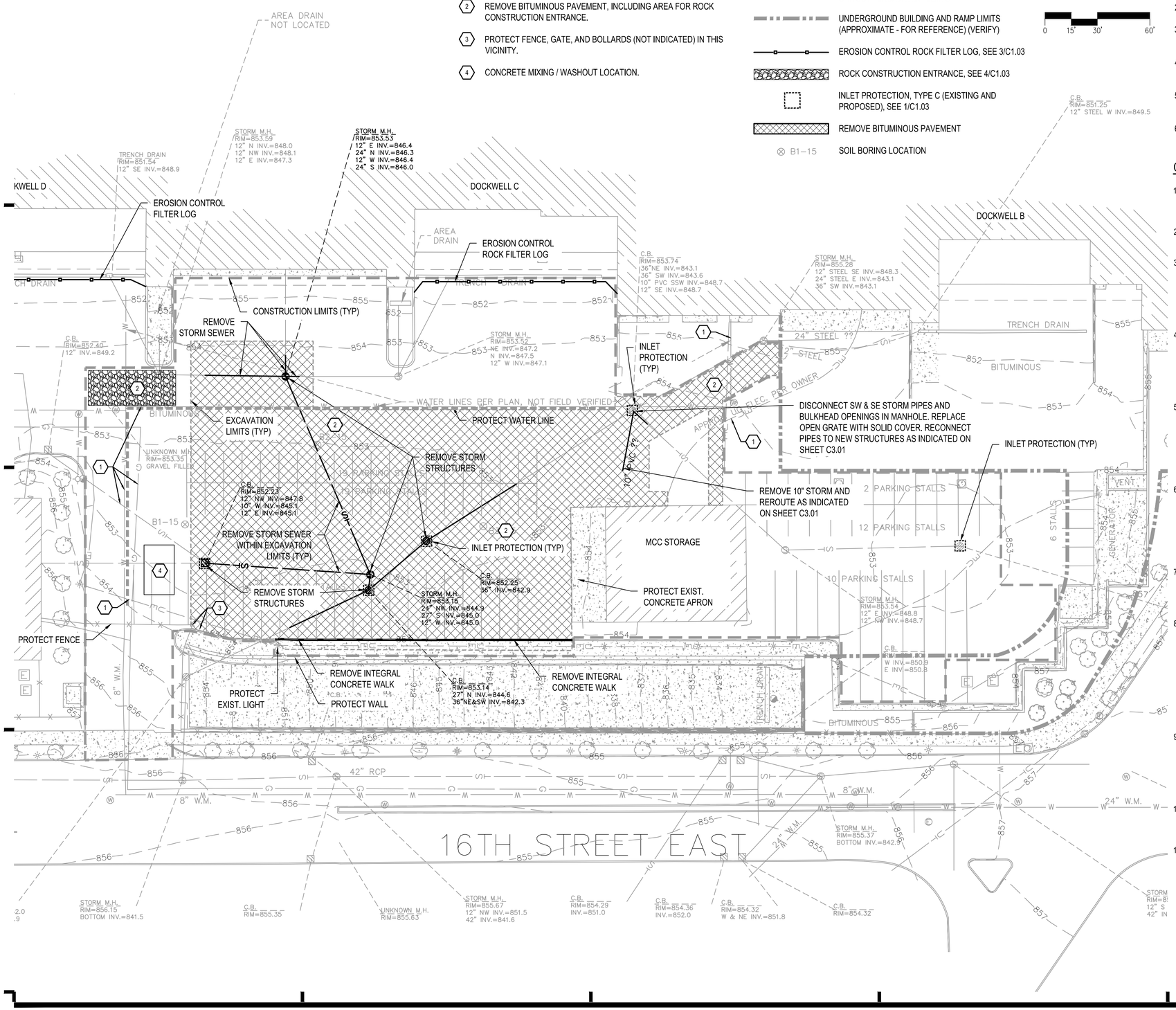
KEYED NOTES

1. PROTECT UTILITY (TYP) COORDINATE WORK WITH THE RESPECTIVE UTILITY.
2. REMOVE BITUMINOUS PAVEMENT, INCLUDING AREA FOR ROCK CONSTRUCTION ENTRANCE.
3. PROTECT FENCE, GATE, AND BOLLARDS (NOT INDICATED) IN THIS VICINITY.
4. CONCRETE MIXING / WASHOUT LOCATION.

LEGEND

- CONSTRUCTION LIMITS
- SAWCUT / EXCAVATION LIMITS
- UNDERGROUND BUILDING AND RAMP LIMITS (APPROXIMATE - FOR REFERENCE) (VERIFY)
- EROSION CONTROL ROCK FILTER LOG, SEE 3/C1.03
- ROCK CONSTRUCTION ENTRANCE, SEE 4/C1.03
- INLET PROTECTION, TYPE C (EXISTING AND PROPOSED), SEE 1/C1.03
- REMOVE BITUMINOUS PAVEMENT
- B1–15 SOIL BORING LOCATION

0 15' 30' 60'



NOTES

1. THIS SHEET INDICATES SITE DEMOLITION, PROTECTIONS, AND EROSION CONTROL.
2. REFERENCE SURVEY FOR EXISTING CONDITIONS INFORMATION.
3. PROVIDE TEMPORARY STORM SEWER BYPASS FOR THE ROOF DRAINAGE DURING CONSTRUCTION, SEE SHEETS C3.01 AND C3.02.
4. COVER SOIL STOCKPILES WITH TARPS WHEN RAIN IS FORECAST AND AT THE END OF EACH WORKDAY.
5. WHEN DEWATERING IS REQUIRED, DEWATER ACCORDING TO DETAIL 2/C1.03.
6. DIVERT SURFACE WATER AWAY FROM EXCAVATIONS USING TEMPORARY BERMS OR ROCK LOGS.

CITY OF MINNEAPOLIS EROSION CONTROL NOTES

1. CONTRACTOR MUST CALL A CONSTRUCTION START 48 HOURS PRIOR TO ANY LAND DISTURBANCES 612-673-3867. FAILURE TO DO SO MAY RESULT IN FINES, THE REVOCATION OF PERMIT AND A STOP WORK ORDER BEING ISSUED.
2. INSTALL PERIMETER EROSION CONTROL AT THE LOCATIONS SHOWN ON THE PLANS PRIOR TO THE COMMENCEMENT OF ANY LAND DISTURBANCE OR CONSTRUCTION ACTIVITIES.
3. BEFORE BEGINNING CONSTRUCTION, INSTALL A TEMPORARY ROCK CONSTRUCTION ENTRANCE AT EACH POINT WHERE VEHICLES EXIT THE CONSTRUCTION SITE. USE 2 INCH OR GREATER DIAMETER ROCK IN A LAYER AT LEAST 6 INCHES THICK ACROSS THE ENTIRE WIDTH OF THE ENTRANCE. EXTEND THE ROCK ENTRANCE AT LEAST 50 FEET INTO THE CONSTRUCTION ZONE USING A GEO-TEXTILE FABRIC BENEATH THE AGGREGATE TO PREVENT MIGRATION OF SOIL INTO THE ROCK FROM BELOW.
4. REMOVE ALL SOILS AND SEDIMENTS TRACKED OR OTHERWISE DEPOSITED ONTO PUBLIC AND PRIVATE PAVEMENT AREAS. REMOVAL SHALL BE ON A DAILY BASIS WHEN TRACKING OCCURS AND MAY BE ORDERED BY MINNEAPOLIS INSPECTORS AT ANY TIME IF CONDITIONS WARRANT. SWEEPING SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE CONSTRUCTION AND DONE IN A MANNER TO PREVENT DUST BEING BLOWN TO ADJACENT PROPERTIES.
5. INSTALL INLET PROTECTION AT ALL PUBLIC AND PRIVATE CATCH BASIN INLETS, WHICH RECEIVE RUNOFF FROM THE DISTURBED AREAS. CONTRACTOR SHALL CLEAN, REMOVE SEDIMENT OR REPLACE STORM DRAIN INLET PROTECTION DEVICES ON A ROUTINE BASIS SUCH THAT THE DEVICES ARE FULLY FUNCTIONAL FOR THE NEXT RAIN EVENT. SEDIMENT DEPOSITED IN AND/OR PLUGGING DRAINAGE SYSTEMS IS THE RESPONSIBILITY OF THE CONTRACTOR. HAY BALES OR FILTER FABRIC WRAPPED GRATES ARE NOT ALLOWED FOR INLET PROTECTION.
6. LOCATE SOIL OR DIRT STOCKPILES NO LESS THAN 25 FEET FROM ANY PUBLIC OR PRIVATE ROADWAY OR DRAINAGE CHANNEL. IF REMAINING FOR MORE THAN SEVEN DAYS, STABILIZE THE STOCKPILES BY MULCHING, VEGETATIVE COVER, TARPS, OR OTHER MEANS. CONTROL EROSION FROM ALL STOCKPILES BY PLACING SILT BARRIERS AROUND THE PILES. TEMPORARY STOCKPILES LOCATED ON PAVED SURFACES MUST BE NO LESS THAN TWO FEET FROM THE DRAINAGE/GUTTER LINE AND SHALL BE COVERED IF LEFT MORE THAN 24 HOURS.
7. MAINTAIN ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES IN PLACE UNTIL THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED. INSPECT TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES ON A DAILY BASIS AND REPLACE DETERIORATED, DAMAGED, OR ROTTED EROSION CONTROL DEVICES IMMEDIATELY.
8. TEMPORARILY OR PERMANENTLY STABILIZE ALL CONSTRUCTION AREAS WHICH HAVE UNDERGONE FINAL GRADING, AND ALL AREAS IN WHICH GRADING OR SITE BUILDING CONSTRUCTION OPERATIONS ARE NOT ACTIVELY UNDERWAY AGAINST EROSION DUE TO RAIN, WIND AND RUNNING WATER WITHIN 7-14 DAYS. USE SEED AND MULCH, EROSION CONTROL MATTING, AND/OR SODDING AND STAKING IN GREEN SPACE AREAS. REMOVE ALL TEMPORARY SYNTHETIC, STRUCTURAL, NON-BIODEGRADABLE EROSION AND SEDIMENT CONTROL DEVICES AFTER THE SITE HAS UNDERGONE FINAL STABILIZATION WITH PERMANENT VEGETATION ESTABLISHMENT. FINAL STABILIZATION FOR PURPOSES OF THIS REMOVAL IS 70% ESTABLISHED COVER OVER DENUDED AREA.
9. READY MIXED CONCRETE AND CONCRETE BATCH/MIX PLANTS ARE PROHIBITED WITHIN THE PUBLIC RIGHT OF WAY. ALL CONCRETE RELATED PRODUCTION, CLEANING AND MIXING ACTIVITIES SHALL BE DONE IN THE DESIGNATED CONCRETE MIXING/WASHOUT LOCATIONS AS SHOWN IN THE EROSION CONTROL PLAN. UNDER NO CIRCUMSTANCE MAY WASHOUT WATER DRAIN ONTO THE PUBLIC RIGHT OF WAY OR INTO ANY PUBLIC OR PRIVATE STORM DRAIN CONVEYANCE.
10. CHANGES TO APPROVED EROSION CONTROL PLAN MUST BE APPROVED BY THE EROSION CONTROL INSPECTOR PRIOR TO IMPLEMENTATION. CONTRACTOR TO PROVIDE INSTALLATION AND DETAILS FOR ALL PROPOSED ALTERNATE TYPE DEVICES.
11. IF DEWATERING OR PUMPING OF WATER IS NECESSARY, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY NECESSARY PERMITS AND/OR APPROVALS PRIOR TO DISCHARGE OF ANY WATER FROM THE SITE. IF THE DISCHARGE FROM THE DEWATERING OR PUMPING PROCESS IS TURBID OR CONTAINS SEDIMENT LADEN WATER, IT MUST BE TREATED THROUGH THE USE OF SEDIMENT TRAPS, VEGETATIVE FILTER STRIPS, OR OTHER SEDIMENT REDUCING MEASURES SUCH THAT THE DISCHARGE IS NOT VISIBLY DIFFERENT FROM THE RECEIVING ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AT THE DISCHARGE POINT TO PREVENT SCOUR EROSION. THE CONTRACTOR SHALL PROVIDE A DEWATERING/PUMPING PLAN TO THE EROSION CONTROL INSPECTOR PRIOR TO INITIATING DEWATERING ACTIVITIES.

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NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

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SIGNATURE: James William Tiggelaar

TYPED OR PRINTED NAME: JAMES W. TIGGELAAR

DATE: 12/04/2015 REG. NO.: 24755

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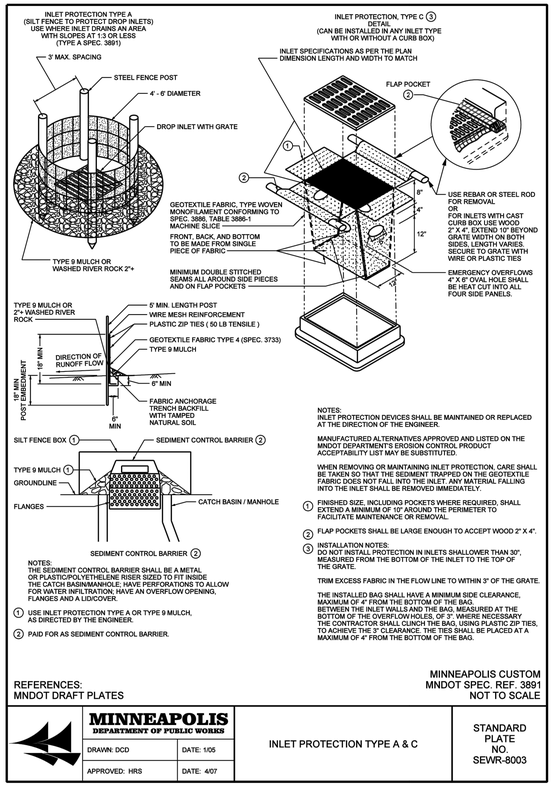
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
DEMOLITION, PROTECTIONS, AND EROSION CONTROL PLAN

FILE: ..\120383\600 Drawings\C\120383 C1.02 Demo & Eros Control.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: C1.02



NOTES:
THE SEDIMENT CONTROL BARRIER SHALL BE A METAL OR PLASTIC/POLYETHELENE RISER SIZED TO FIT INSIDE THE CATCH BASIN/MANHOLE; HAVE PERFORATIONS TO ALLOW FOR WATER INFILTRATION; HAVE AN OVERFLOW OPENING, FLANGES AND A LID/COVER.

① USE INLET PROTECTION TYPE A OR TYPE 9 MULCH, AS DIRECTED BY THE ENGINEER.

② PAID FOR AS SEDIMENT CONTROL BARRIER.

NOTES:
INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER.

MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE MNDOT DEPARTMENT'S EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.

WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

① FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

② FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" X 4".

③ INSTALLATION NOTES:
DO NOT INSTALL PROTECTION IN INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

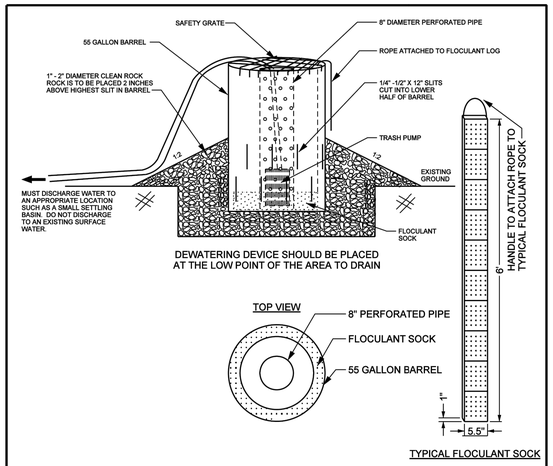
THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG. BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CLINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

REFERENCES:
MNDOT DRAFT PLATES

MINNEAPOLIS CUSTOM
MNDOT SPEC. REF. 3891
NOT TO SCALE

MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS		INLET PROTECTION TYPE A & C	STANDARD PLATE NO. SEWR-8003
DRAWN: DCD	DATE: 1/05		
APPROVED: HRS	DATE: 4/07		

1 INLET PROTECTION
NOT TO SCALE

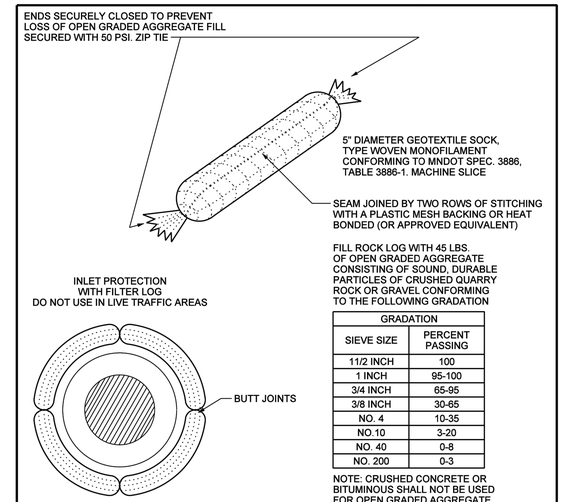


REFERENCES:
MINNESOTA URBAN SMALL SITES
BMP MANUAL pp.3-121 TO 3-129
MNDOT EROSION CONTROL HANDBOOK

MINNEAPOLIS CUSTOM
MNDOT SPEC. REF. 3898
NOT TO SCALE

MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS		DEWATERING -- TRASH PUMP	STANDARD PLATE NO. SEWR-8006
DRAWN: DCD	DATE: 1/05		
APPROVED: HRS	DATE: 4/07		

2 DEWATERING
NOT TO SCALE



GRADATION	
SIEVE SIZE	PERCENT PASSING
11/2 INCH	100
1 INCH	95-100
3/4 INCH	65-95
3/8 INCH	30-65
NO. 4	10-35
NO.10	3-20
NO. 40	0-8
NO. 200	0-3

NOTE: CRUSHED CONCRETE OR BITUMINOUS SHALL NOT BE USED FOR OPEN GRADED AGGREGATE.

PAYMENT SHALL INCLUDE ALL MATERIALS, FILLING OF LOG,PLACEMENT, MAINTENANCE, & REMOVAL. 80% OF BID PRICE SHALL BE PAID UPON PROPER PLACEMENT WITH THE FINAL 20% PAID UPON REMOVAL.

FILTER LOGS MNDOT SPEC. 3897

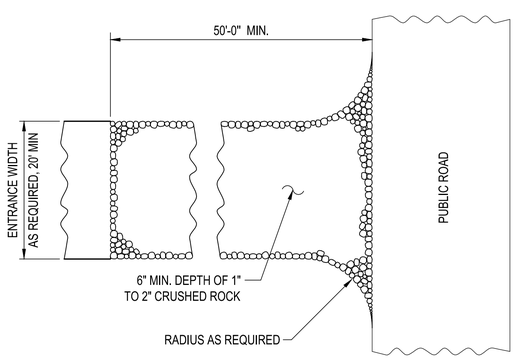
STRAW BIOROLL	GRAIN AND SEED FREE OF WEEDS, 6-9 MONTH POLYPROPYLENE NETTING
WOOD FIBER BIOROLL	EXCELSIOR FIBER LOG, 6-9 MONTH POLYPROPYLENE NETTING
COMPOST LOG	30-40% WEED FREE COMPOST (3890, GRADE 2), 8" DIAMETER GEOTECHNICAL CYLINDRICAL BAG
ROCK LOG	4"-6" DIAMETER, SEE SIEVE SIZE CHART ABOVE

FIBER LOG MNDOT SPEC. 3895
12" DIAMETER COCONUT FIBER (COIR),
OUTER COIR NETTING REQUIRED, MINIMUM 5 YEAR LIFE

MINNEAPOLIS CUSTOM
MNDOT SPEC. REF. 3897
NOT TO SCALE

MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS		SEDIMENT CONTROL -- FILTER LOG	STANDARD PLATE NO. SEWR-8008
DRAWN: DCD	DATE: 4/07		
APPROVED: HRS	DATE: 4/07		

3 ROCK FILTER LOG
NOT TO SCALE



CONSTRUCTION ENTRANCE SPECIFICATIONS

* STONE SIZE: USE 1"-2" CRUSHED ROCK OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
* THICKNESS: NOT LESS THAN 6-INCHES.
* FILTER CLOTH: SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
* MAINTENANCE: THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY.
* WASHING: WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
* PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN EVENT.

4 ROCK CONSTRUCTION ENTRANCE
NOT TO SCALE

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NO	DATE	REVISION

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DATE: 12/04/2015 REG. NO.: 24755

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
EROSION CONTROL DETAILS

FILE: ..\120383\600 Drawings\C\120383 C1.03 Eros Details.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO:

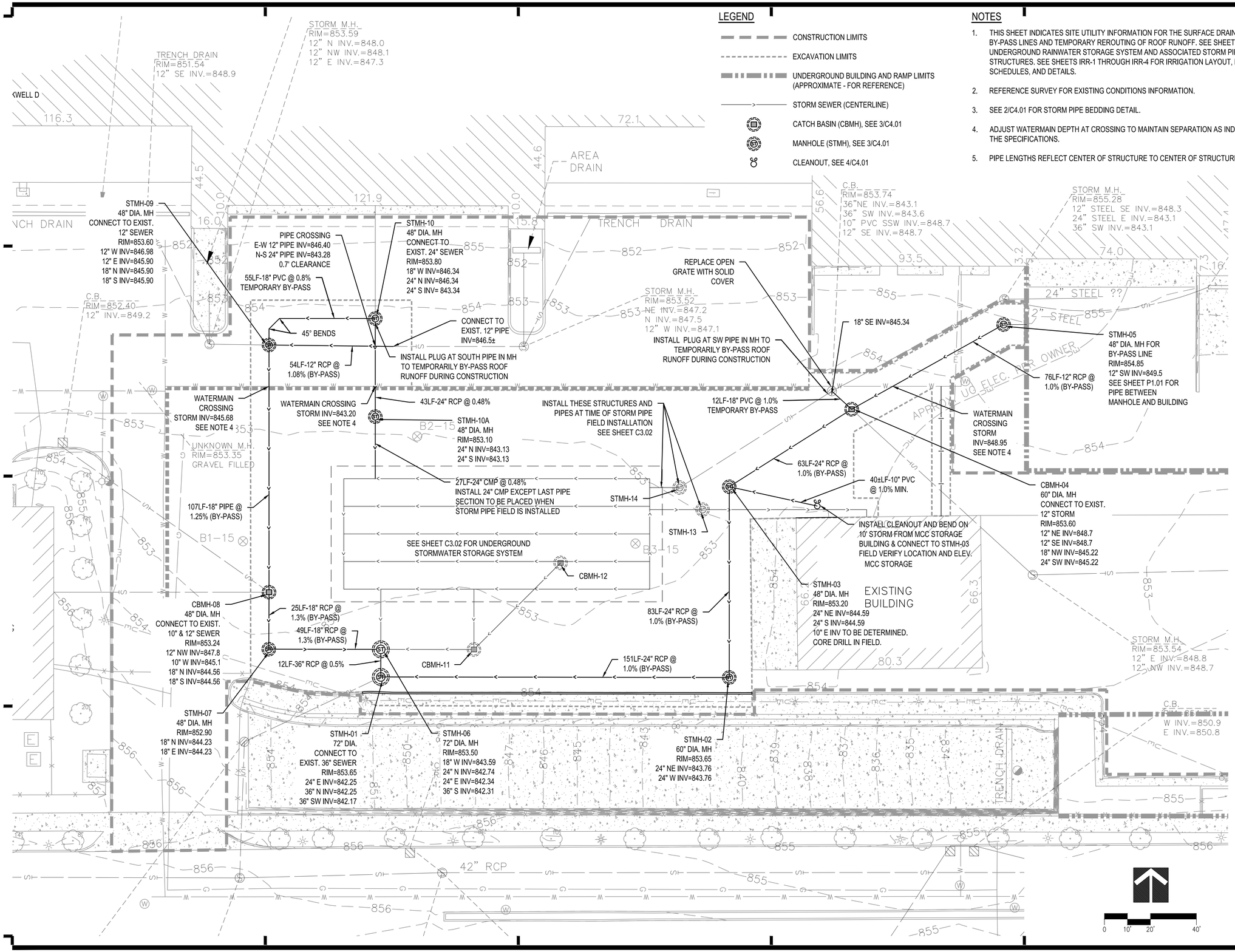
C1.03

LEGEND

- CONSTRUCTION LIMITS
- EXCAVATION LIMITS
- UNDERGROUND BUILDING AND RAMP LIMITS (APPROXIMATE - FOR REFERENCE)
- STORM SEWER (CENTERLINE)
- CATCH BASIN (CBMH), SEE 3/C4.01
- MANHOLE (STMH), SEE 3/C4.01
- CLEANOUT, SEE 4/C4.01

NOTES

1. THIS SHEET INDICATES SITE UTILITY INFORMATION FOR THE SURFACE DRAINAGE BY-PASS LINES AND TEMPORARY REROUTING OF ROOF RUNOFF. SEE SHEET C3.02 FOR UNDERGROUND RAINWATER STORAGE SYSTEM AND ASSOCIATED STORM PIPING AND STRUCTURES. SEE SHEETS IRR-1 THROUGH IRR-4 FOR IRRIGATION LAYOUT, NOTES, SCHEDULES, AND DETAILS.
2. REFERENCE SURVEY FOR EXISTING CONDITIONS INFORMATION.
3. SEE 2/C4.01 FOR STORM PIPE BEDDING DETAIL.
4. ADJUST WATERMAIN DEPTH AT CROSSING TO MAINTAIN SEPARATION AS INDICATED IN THE SPECIFICATIONS.
5. PIPE LENGTHS REFLECT CENTER OF STRUCTURE TO CENTER OF STRUCTURE DISTANCE.



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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
UTILITY PLAN - INITIAL

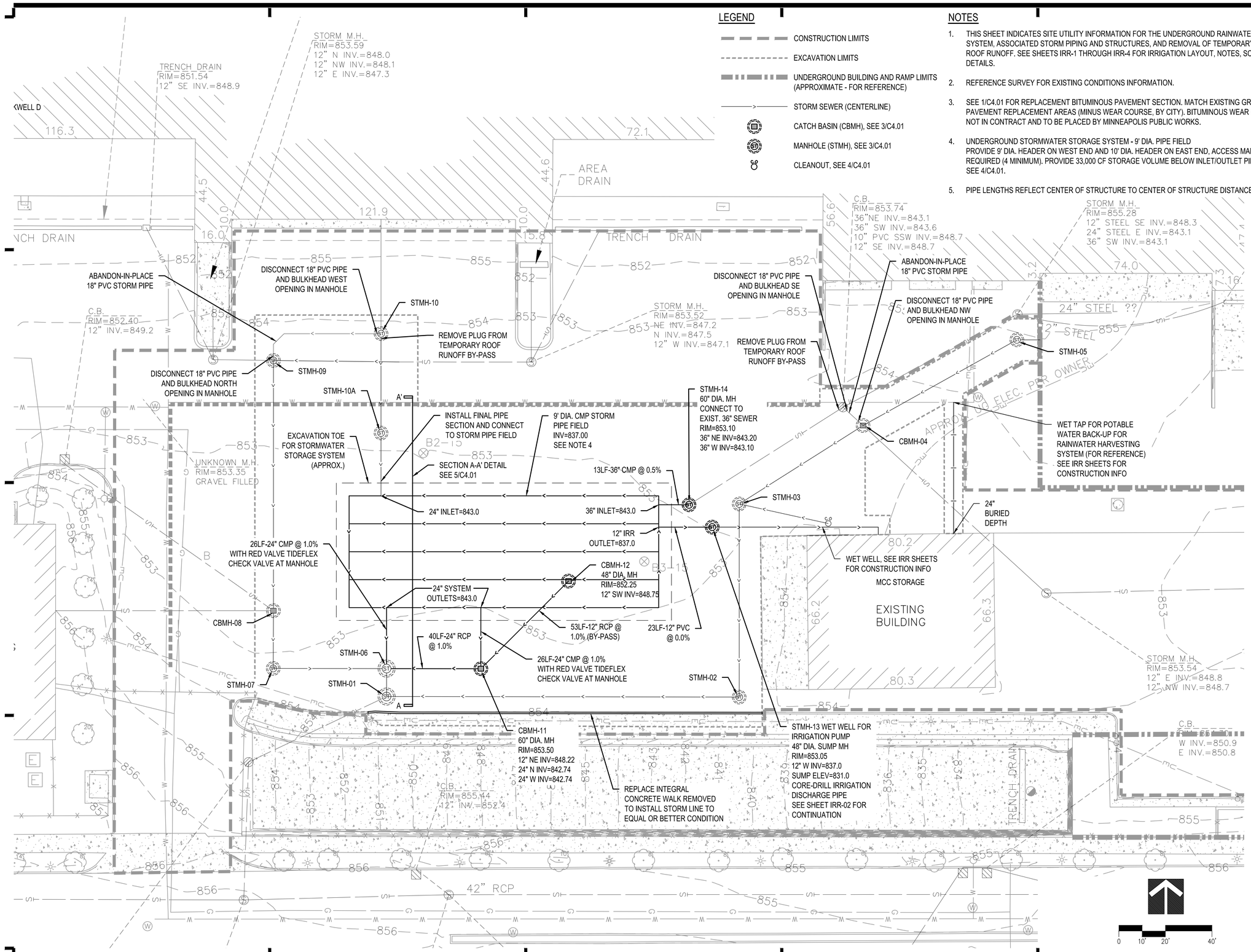
FILE: ..\120383\600 Drawings\C\120383 C3.01 Utility Plan.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: C3.01

LEGEND

- CONSTRUCTION LIMITS
- EXCAVATION LIMITS
- UNDERGROUND BUILDING AND RAMP LIMITS (APPROXIMATE - FOR REFERENCE)
- STORM SEWER (CENTERLINE)
- CATCH BASIN (CBMH), SEE 3/C4.01
- MANHOLE (STMH), SEE 3/C4.01
- CLEANOUT, SEE 4/C4.01

NOTES

1. THIS SHEET INDICATES SITE UTILITY INFORMATION FOR THE UNDERGROUND RAINWATER STORAGE SYSTEM, ASSOCIATED STORM PIPING AND STRUCTURES, AND REMOVAL OF TEMPORARY BY-PASS FOR ROOF RUNOFF. SEE SHEETS IRR-1 THROUGH IRR-4 FOR IRRIGATION LAYOUT, NOTES, SCHEDULES, AND DETAILS.
2. REFERENCE SURVEY FOR EXISTING CONDITIONS INFORMATION.
3. SEE 1/C4.01 FOR REPLACEMENT BITUMINOUS PAVEMENT SECTION. MATCH EXISTING GRADES FOR ALL PAVEMENT REPLACEMENT AREAS (MINUS WEAR COURSE, BY CITY). BITUMINOUS WEAR COURSE LAYER NOT IN CONTRACT AND TO BE PLACED BY MINNEAPOLIS PUBLIC WORKS.
4. UNDERGROUND STORMWATER STORAGE SYSTEM - 9' DIA. PIPE FIELD
   PROVIDE 9' DIA. HEADER ON WEST END AND 10' DIA. HEADER ON EAST END, ACCESS MANHOLES AS REQUIRED (4 MINIMUM). PROVIDE 33,000 CF STORAGE VOLUME BELOW INLET/OUTLET PIPE INVERT, SEE 4/C4.01.
5. PIPE LENGTHS REFLECT CENTER OF STRUCTURE TO CENTER OF STRUCTURE DISTANCE.



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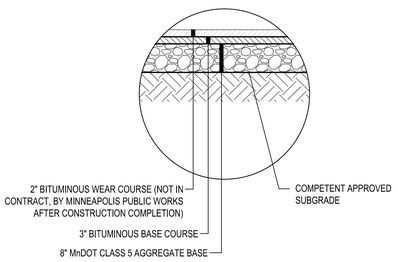
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
UTILITY PLAN - FINAL

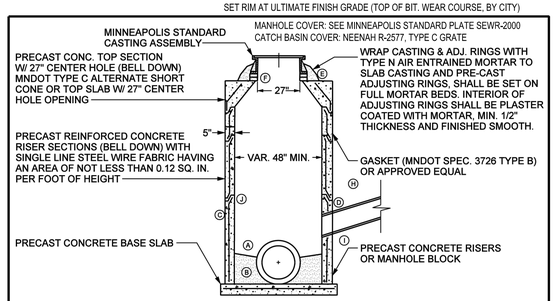
FILE: ..\120383\600 Drawings\C\120383 C3.01 Utility Plan.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: C3.02



1 MINIMUM REPLACEMENT PAVEMENT SECTION
NOT TO SCALE

2 NOT USED
NOT TO SCALE

SET RIM AT ULTIMATE FINISH GRADE (TOP OF BIT. WEAR COURSE, BY CITY)



FOLLOW MNDOT 2451.3-C - FOUNDATION PREPARATION AND COMPACTION REQUIREMENTS OF MNDOT 2105.3 F1 - SPECIFIED DENSITY METHOD (100% COMPACTION REQUIREMENTS OF STANDARD PROCTOR)

MNDOT DESIGN F, MODIFIED
CONTINUOUS INSIDE DIAMETER
USE MINNEAPOLIS SHORT CONE SECTION (MNDOT TYPE C ALTERNATE) OR TOP SLAB ONLY

(A) BOTTOM TO BE SHAPED 2/3 OF PIPE DIAMETER WITH POURED CONCRETE TO PROVIDE EFFICIENT FLOW.

(B) WHEN THE INVERT OF THE INLET PIPE IS BELOW THE SPRING LINE OF THE MAIN, THEN PROVIDE CONCRETE "POWER FLOWS" FOR POSITIVE DOWN STREAM FLOW THROUGH MANHOLE.

(C) PRE-CAST CONCRETE MANHOLE SECTIONS.

(D) FILL AROUND INLET PIPE AND LIFTING HOLES WITH CEMENT MORTAR, TYPE N AIR ENTRAINED, FINISH SMOOTH AS NECESSARY. ALL PIPES CONNECTING TO MH'S SHALL BE TRIMMED FLUSH TO THE INTERIOR WALL OF THE MH STRUCTURE.

(E) MANHOLE CASTING SHALL BE SET ON A FULL MORTAR BED, TYPE N AIR ENTRAINED

(F) THE NUMBER OF CONCRETE ADJUSTING RINGS SHALL BE LIMITED TO PROVIDE A MAXIMUM THICKNESS OF 8" INCLUDING MORTAR, TYPE N AIR ENTRAINED WITH A MINIMUM OF 1 - 2" ADJUSTING RING.
ALL ADJUSTING RINGS TO BE NEATLY SEALED WITH CONCRETE GROUT, TYPE N AIR ENTRAINED, ON THE INTERIOR OF THE STRUCTURE.
MINIMUM OF 2" OF ADJUSTING RINGS & MORTAR TYPE N AIR ENTRAINED REQUIRED.
ALL WOOD AND NON-CONCRETE ADJUSTING DEVICES SHALL BE REMOVED.

(G) CONCRETE MANHOLE BLOCK MAY BE USED WITH THE APPROVAL OF CITY ENGINEER.
INTERIOR & EXTERIOR OF BLOCK WORK SHALL BE MORTAR PLASTERED, TYPE N AIR ENTRAINED, TO A SMOOTH FINISH, MIN. 1/2" THICKNESS.

(H) SUITABLE BACKFILL UNIFORMLY DISTRIBUTED IN 8" OR LESS LAYERS AND COMPACTED BEFORE SUCCESSIVE LAYERS ARE ADDED. MNDOT 2451.3 D - BACKFILLING EXCAVATIONS, COMPACTION IN ACCORDANCE WITH MNDOT 2105.3 F1 - SPECIFIED DENSITY METHOD.

(J) FILL ANNULAR SPACE ON BELL END OF 1ST RISER SECTION WITH BRICK AND MORTAR, TYPE N AIR ENTRAINED, IF REQUIRED.

(I) WATER STOP REQUIRED ON PVC, DIP, VCP, HDPE, HOBAS, PPP.

MINNEAPOLIS SHORT CONE SECTION SHALL BE USED UNLESS OTHERWISE SPECIFIED IN THE PLANS AND PLASTER COATED WITH TYPE N AIR ENTRAINED MORTAR (TO A SMOOTH FINISH).

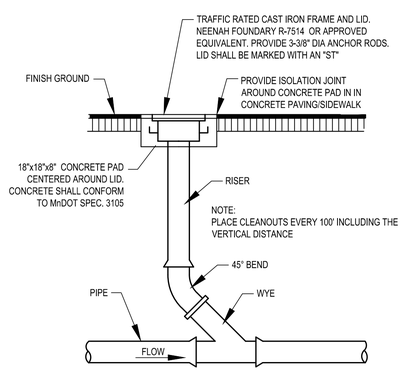
ALL PRE-CAST MH RISER SECTIONS SHALL BE CONFIGURED TO PLACE THE BELL END DOWN.

MINNEAPOLIS CUSTOM
MNDOT SPEC. REF. 2506
MODIFIED MNDOT 4000J, 4005L
NOT TO SCALE

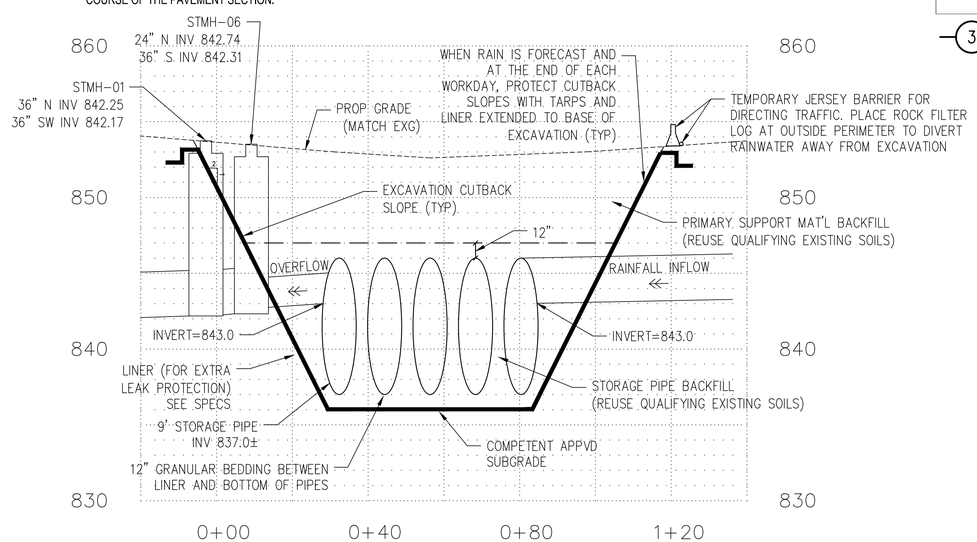
MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS		TYPICAL MANHOLE CONSTRUCTION	STANDARD PLATE NO. SEWR-1000-R1
DRAWN: DCD	DATE: 12/09		
APPROVED: HRS	DATE: 12/09		

3 STORM MANHOLE
NOT TO SCALE

NOTE:
PROVIDE LINER BELOW STORMWATER STORAGE SYSTEM PIPING AS INDICATED EXTENDING UP TO THE TOP OF THE EXCAVATION CUTBACK SLOPE. PROVIDE WATERTIGHT BOOTS AROUND MANHOLES AND PIPE PENETRATIONS BELOW ELEVATION 843.0. ABOVE ELEVATION 843.0, THE LINER MAY BE NEATLY TRIMMED AROUND PENETRATIONS (E.G., WATERTIGHT BOOTS ARE NOT REQUIRED). PROVIDE GEOTEXTILE FILTER FABRIC BELOW LINER EXTENDING UP TO ELEVATION 843.0 (MINIMUM 12 INCH OVERLAPS). ASSUME RESPONSIBILITY FOR TEMPORARILY STABILIZING THE LINER DURING THE WORK OF THE UNDERGROUND STORAGE SYSTEM, INCLUDING DESIGN AND USE OF AN ANCHOR TRENCH OR STAPLES. IF ANCHOR TRENCHES ARE USED, DO NOT EXTEND ABOVE THE ELEVATION OF THE AGGREGATE BASE COURSE OF THE PAVEMENT SECTION.



4 CLEANOUT
NOT TO SCALE



5 SECTION A–A'
SCALE: 1"=20' (H), 1"=5' (V)

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
SECTIONS AND DETAILS

FILE: ..\120383\600 Drawings\C\120383 C4.01 Sections & Details.dwg
DRAWN BY: MRH
CHECKED BY: JWT
PROJ. NO: 120383
DRAWING NO: C4.01

EQUIPMENT ABBREVIATIONS

ACC	AIR COOLED CONDENSER	FUR	FURNACE
ACCU	AIR COOLING CONDENSING UNIT	GEN	GENERATOR
ACP	AIR COMPRESSOR	HUM	HUMIDIFIER
AF	AIR FILTER	HC	HEATING COIL
AFMS	AIR FLOW MEASURING STATION	HRU	HEAT RECOVERY UNIT
AHU	AIR HANDLING UNIT	HTR	HEATER
AS	AIR SEPARATOR	HX	HEAT EXCHANGE
B	BOILER	HPU	HEAT PUMP UNIT
CC	COOLING COIL	MAU	MAKE-UP AIR UNIT
CF	CABINET FAN	OBD	OPPOSED BLADE DAMPER
CF	CHEMICAL FEEDER	P	PUMP
CFP	CHEMICAL FEED PUMP	PRV	POWER ROOF VENTILATOR
CH	CHILLER	RF	RETURN FAN
CP	CONDENSATE PUMP	RHC	REHEAT COIL
CRAC	COMPUTER ROOM AIR CONDITIONER	RMB	RADIANT MIXING BLOCK
CRU	CONDENSATE RETURN UNIT	RTU	ROOF TOP UNIT
CSG	CLEAN STEAM GENERATOR	SAT	SOUND ATTENUATOR
CT	COOLING TOWER	SEP	SEWAGE EJECTOR PUMP
CUH	CABINET UNIT HEATER	SF	SUPPLY FAN
CWP	CONDENSER WATER PUMP	SP	SUMP PUMP
DBP	DOMESTIC WATER BOOSTER PUMP	UH	UNIT HEATER
EAV	EXHAUST AIR VALVE	US	UTILITY SET
EF	EXHAUST FAN	UV	UNIT VENTILATOR
ERU	ENERGY RECOVERY UNIT	VAV	VARIABLE AIR VOLUME BOX
ET	EXPANSION TANK	WF	WATER FILTER
FCU	FAN COIL UNIT	WFMS	WATER FLOW MEASURING STATION
FP	FIRE PUMP	WH	WATER HEATER
		WHD	WALL HYDRANT

FIXTURE ABBREVIATIONS

BT	BATH TUB	LV	LAVATORY
CO	CLEAN OUT	MB	MOP BASIN
DF	DRINKING FOUNTAIN	OB	WASHING MACHINE OUTLET BOX
DISP	GARBAGE DISPOSAL	SH	SHOWER
DW	DISHWASHER CONNECTION	SK	SINK
EC	ELECTRIC WATER COOLER	SS	SERVICE SINK
ES	EMERGENCY SHOWER	TD	TRENCH DRAIN
EW	EYE WASH	UR	URINAL
FD	FLOOR DRAIN	WB	WASH BASIN
HB	HOSE BIB	WC	WATER CLOSET
HY	HYDRANT	WCO	WALL CLEAN OUT
LT	LAUNDRY TUB	WHD	WALL HYDRANT

PLUMBING AND PIPING SYMBOLS

A	AIR
AV	ACID VENT
AW	ACID WASTE
AWBS	ACID WASTE, BELOW SLAB
BBD	BOILER BLOW DOWN
BFW	BOILER FEED WATER
CHW	DOMESTIC CIRCULATING HOT WATER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CLPS	CLEAN LOW PRESSURE STEAM
CMPS	CLEAN MEDIUM PRESSURE STEAM
CO2	CARBON DIOXIDE
COND	CONDENSATE RETURN
CW	DOMESTIC COLD WATER
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
D	INDIRECT DRAIN
DI	DEIONIZED WATER
DW	DISTILLED WATER
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FP	FIRE PROTECTION MAIN
FPD	FIRE PROTECTION DRY SYSTEM
FPPA	FIRE PROTECTION PRE-ACTION SYSTEM
FPW	FIRE PROTECTION WET SYSTEM
GAS	GAS
GR	GLYCOL RETURN
GS	GLYCOL SUPPLY
HPC	HIGH PRESSURE STEAM CONDENSATE
HPS	HIGH PRESSURE STEAM
HPWR	HEAT PUMP WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HRR	HEAT RECOVERY WATER RETURN
HRS	HEAT RECOVERY WATER SUPPLY
HW	DOMESTIC HOT WATER
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
LPC	LOW PRESSURE STEAM CONDENSATE
LPG	LIQUID PETROLEUM GAS
LPS	LOW PRESSURE STEAM
MED AIR	MEDICAL AIR
MED VAC	MEDICAL VACUUM
MPC	MEDIUM PRESSURE STEAM CONDENSATE
MPS	MEDIUM PRESSURE STEAM
N2	NITROGEN
N2O	NITROUS OXIDE
NG	NATURAL GAS
NP	NON-POTABLE WATER
O2	OXYGEN
OVFL	OVERFLOW STORM DRAIN
PC	PUMPED CONDENSATE
RD	REFRIGERANT DISCHARGE (HOT GAS)
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
SD	STORM DRAIN
SDBS	STORM DRAIN, BELOW SLAB
SW	SOFTENED WATER
TWR	TEMPERED WATER RETURN
TWS	TEMPERED WATER SUPPLY
V	VENT
W	WASTE/SANITARY
WAGD	WASTE ANESTHETIC GAS DISPOSAL
WBS	WASTE/SANITARY, BELOW SLAB
WC	WASTE CONDENSATE (COLD COND.)

	CHECK VALVE
OR	SHUT-OFF VALVE
	THROTTLING VALVE
	CIRCUIT BALANCING VALVE
	TWO-WAY CONTROL VALVE
	THREE-WAY CONTROL VALVE
	PRESSURE REDUCING VALVE
	STRAINER
	TRIPLE DUTY VALVE
	UNION
	PRESSURE GAUGE
	STEAM TRAP
	THERMOMETER
	FLOW DIRECTION ARROW
FC	FLOW CONTROL VALVE
FM	WATER FLOW MEASURING STATION
M	METER
	PUMP
	DROP IN PIPE
	RISE IN PIPE
	PIPE CONNECTION
	EXPANSION JOINT
	RPZ BACK FLOW PREVENTER
A	AUTO AIR VENT
	MANUAL AIR VENT
	RELIEF VALVE
	FIN-TUBE RADIATION ELEMENT
3" FD	FLOOR DRAIN (SIZE AS INDICATED)
	HOSE BIB OR WALL HYDRANT
	PIPING, HEAT TRACED
	PIPING PITCH, DOWN

GENERAL SYMBOLS

#	REVISION NUMBER, SHOWN ON PLAN
	TIE IN POINT
#	KEYED NOTE
X	NO. OF DETAIL
Y.Z	NUMBER OF SHEET WHERE DETAIL APPEARS.

CONTROL SYMBOLS

T	THERMOSTAT
T_{RA}	THERMOSTAT REVERSE ACTING
T_S	THERMOSTAT WITH LOCKING SECURITY COVER
H	HUMIDISTAT
T	TEMPERATURE SENSOR
H	HUMIDITY SENSOR
S XXX	SENSOR (OTHER) (REFER TO GEN ABBREV FOR SENSOR TYPE)

GENERAL ABBREVIATIONS

Ø	DIAMETER	FA	FRESH AIR	OXY	OXYGEN
A	AIR	FD	FLOOD DRAIN	OA	OUTSIDE AIR
AC	AIR CONDITIONING	FLEX	FLEXIBLE	OAD	OUTSIDE AIR DAMPER
AD	ACCESS DOOR	FLG	FLANGE	OAT	OUTSIDE AIR TEMPERATURE
AFF	ABOVE FINISHED FLOOR	FOB	FLAT ON BOTTOM	OC	ON CENTER
AG	ABOVE GROUND	FOF	FUEL OIL FILL	OF	OVERFLOW
ALT	ALTERNATE	FOV	FUEL OIL VENT	ORD	OVERFLOW ROOF DRAIN
ALUM	ALUMINUM	FOR	FUEL OIL RETURN	PD	PRESSURE DROP
AP	ACCESS PANEL	FOS	FUEL OIL SUPPLY	PG	PROPYLENE GLYCOL
APD	AIR PRESSURE DROP	FOT	FLAT ON TOP	PIV	POST INDICATOR VALVE
APPROX	APPROXIMATE	FPM	FEET PER MINUTE	PLBG	PLUMBING
ARCH	ARCHITECT/ARCHITECTURAL	FRP	FIBERGLASS REINFORCED PIPE	PR	PAIR
AV	ACID VENT	FT	FOOT (FEET)	PREL	PRELIMINARY
AW	ACID WASTE	FTG	FOOTING	PRESS	PRESSURE
AUTO	AUTOMATIC	FTR	FIN TUBE RADIATION	PRS	PRESSURE REDUCING STATION
BLDG	BUILDING	GA	GAUGE	PRV	PRESSURE REDUCING VALVE
BOD	BOTTOM OF DUCT	GAL	GALLON	PSI	POUNDS PER SQUARE INCH
BOT	BOTTOM	GALV	GALVANIZED	PSIG	POUNDS PER SQUARE INCH GAUGE
BSMT	BASEMENT	GC	GENERAL CONTRACTOR	PW	POTABLE WATER
BTU	BRITISH THERMAL UNITS	GPH	GALLONS PER HOUR	PWR	POWER
BTUH	BRITISH THERMAL UNITS PER HOUR	GR	GRADE	RA	RETURN AIR
CAP	CAPACITY	GPM	GALLONS PER MINUTE	RAD	RETURN AIR DAMPER
CAV	CONSTANT AIR VOLUME	HD	HEAD	RAT	RETURN AIR TEMPERATURE
CB	CATCH BASIN	HHW	HEATING HOT WATER	RCP	RADIANT CEILING PANEL
CFCV	CONSTANT FLOW CONTROL VALVE	HORZ	HORIZONTAL	RD	ROOF DRAIN
CFM	CUBIC FEET PER MINUTE	HP	HORSE POWER	REC	RECESSED
CHW	DOMESTIC CIRCULATING HOT WATER	HP	HIGH PRESSURE	RECT	RECTANGULAR
CI	CAST IRON	HPC	HIGH PRESSURE CONDENSATE	RED	REDUCER
CLG	CEILING	HTG	HEATING	REFR	REFRIGERATION
CLG	COOLING	HVAC	HEATING, VENTILATION, AIR CONDITIONING	RH	RELATIVE HUMIDITY
CO	CARBON MONOXIDE	HW	DOMESTIC HOT WATER	REQD	REQUIRED
CO	CLEAN OUT	IN	INCH/INCHES	RLA	RELIEF AIR
CO2	CARBON DIOXIDE	INL	INLET	RLD	RELIEF AIR DAMPER
COL	COLUMN	INSUL	INSULATION	RM	ROOM
COMB	COMBINATION	INT	INTERIOR	RND	ROUND
CONC	CONCRETE	INV	INVERT	RPM	REVOLUTIONS PER MINUTE
COND	CONDENSATE	INWG	INCHES WATER GAUGE	RPZ	REDUCED PRESSURE ZONE
CONN	CONNECT	IPLV	INTEGRATED PART LOAD VALUE	SA	SUPPLY AIR
CONST	CONSTRUCT	KBTU	ONE THOUSAND BTU PER HOUR	SAN	SANITARY
CONT	CONTINUE, CONTINUATION	LAB	LABORATORY	SCHED	SCHEDULE
CONTR	CONTRACTOR	LB	POUND	SECT	SECTION
COORD	COORDINATE	LB/HR	POUNDS PER HOUR	SF	SQUARE FEET
CTR	CENTER	LAT	LEAVING AIR TEMPERATURE	SD	SMOKE DAMPER
CUFT	CUBIC FEET	LF	LINEAL FEET	SHT	SHEET
CV	CHECK VALVE	LOC	LOCATION	SIM	SIMILAR
CW	DOMESTIC COLD WATER	LP	LOW PRESSURE	SLV	SLEEVE
°	DEGREE	LPG	LIQUIFIED PETROLEUM GAS	SP	STATIC PRESSURE
DA	DISCHARGE AIR	LVR	LOUVER	SPEC	SPECIFICATION
DAT	DISCHARGE AIR TEMPERATURE	LWT	LEAVING WATER TEMPERATURE	SPS	STATIC PRESSURE STATION
DB	DRY BULB	M/A	MIXED AIR	SQ	SQUARE
DI	DEIONIZED WATER	MAD	MIXED AIR DAMPER	SRV	SAFETY RELIEF VALVE
DIA	DIAMETER	MAN	MANUAL	SS	STAINLESS STEEL
DIAG	DIAGONAL	MAT	MIXED AIR TEMPERATURE	STD	STANDARD
DIM	DIMENSION	MATL	MATERIAL	STM	STEAM
DISCH	DISCHARGE	MAV	MANUAL AIR VENT	STRUCT	STRUCTURAL
DIR	DEIONIZED WATER RETURN	MAX	MAXIMUM	SUCT	SUCTION
DIS	DEIONIZED WATER SUPPLT	MBD	MOTORIZED BYPASS DAMPER	SUSP	SUSPENDED
DIV	DIVISION	MBH	ONE THOUSAND BTU PER HOUR	TCP	TEMPERATURE CONTROL PANEL
DN	DOWN	MCF	ONE THOUSAND CUBIC FEET	TEFC	TOTALLY ENCLOSED FAN COOLED
DW	DISTILLED WATER	MD	MOTORIZED DAMPER	TEMP	TEMPERATURE
DWG	DRAWING	MECH	MECHANICAL	TSP	TOTAL STATIC PRESSURE
EA	EACH	MFR	MANUFACTURER	TYP	TYPICAL
EAT	ENTERING AIR TEMPERATURE	MH	MANHOLE	UG	UNDERGROUND
EL	ELBOW	MIN	MINIMUM	VAC	VACUUM
ELEC	ELECTRICAL	MISC	MISCELLANEOUS	V	VENT
ELEV	ELEVATION	MMBH	ONE MILLION BTU PER HOUR	VEL	VELOCITY
EQ	EQUAL	MTR	MOTOR	VENT	VENTILATION
EQUIP	EQUIPMENT	MUA	MAKE-UP AIR	VERT	VERTICAL
ESP	EXTERNAL STATIC PRESSURE	NC	NOISE CRITERIA	VFD	VARIABLE FREQUENCY DRIVE
EWT	ENTERING WATER TEMPERATURE	NC	NORMALLY CLOSED	VOL	VOLUME
EXH	EXHAUST AIR	NIC	NOT IN CONTRACT	VTR	VENT THROUGH ROOF
EX	EXISTING	NO	NUMBER	W	WASTE
EXP	EXPANSION	NO	NORMALLY OPEN	WB	WET BULB
EXT	EXTERIOR	NOM	NOMINAL	WC	WATER COLUMN
F or °F	DEGREES FAHRENHEIT	NPLV	NOMINAL PART LOAD VALUE	WCO	WALL CLEAN OUT
		NTS	NOT TO SCALE	WPD	WATER PRESSURE DROP

AIRSIDE SYMBOLS

	HORIZONTAL FIRE DAMPER	12x10	RECTANGULAR DUCT (WIDTHxHEIGHT IN INCHES)
	VERTICAL FIRE DAMPER	12Ø	ROUND SPIRAL DUCT (DIAMETER IN INCHES)
F/S	FIRE/SMOKE DAMPER	12/10	OVAL SPIRAL DUCT (WIDTH/HEIGHT IN INCHES)
S	SMOKE DAMPER		SUPPLY DUCT TOWARD VIEWER
	MANUAL/VOLUME DAMPER		SUPPLY DUCT AWAY FROM VIEWER
M	MOTORIZED DAMPER		RETURN DUCT TOWARD VIEWER
BDD	BACK DRAFT DAMPER		RETURN DUCT AWAY FROM VIEWER
	VARIABLE AIR VOLUME VALVE		EXHAUST DUCT TOWARD VIEWER
	VARIABLE AIR VOLUME VALVE WITH REHEAT COIL		EXHAUST DUCT AWAY FROM VIEWER
	SOUND ATTENUATOR	R	CHANGE IN DUCT ELEVATION - RISE INDICATED BY "R"
	SUPPLY AIR OUTLET	D	CHANGE IN DUCT ELEVATION - DROP INDICATED BY "D"
	RETURN AIR INLET	AD	SIDE ACCESS DOOR (VERTICAL)
	EXHAUST AIR INLET	AD	TOP ACCESS DOOR (HORIZONTAL)
	RECTANGLE TO ROUND TRANSITION	AD	BOTTOM ACCESS DOOR (HORIZONTAL)
	STRAIGHT TAP	FC	FLEXIBLE CONNECTION
			DUCT LINING
	45° ENTRY TAP		SIDEWALL DIFFUSER
			SIDEWALL GRILLE
	HIGH EFFICIENCY TAP, RECTANGLE TO ROUND		TRANSFER GRILLES
		UC, H	UNDERCUT DOOR (H=CLEARANCE)

AIR INLET AND OUTLET TAG
XXX-X
(CFM-DIFFUSER TYPE)

GENERAL MECHANICAL NOTES

1. REFER TO "DIVISION 1 - GENERAL REQUIREMENTS" IN THE PROJECT MANUAL FOR WORK THAT IS THE RESPONSIBILTY OF ALL CONTRACTORS.
2. IT IS THE RESPONSIBILITY OF THE MECHANICAL CONTRACTORS TO COORDINATE THE WORK OF THEIR TRADE WITH ALL OTHER TRADES PRIOR TO PROCEEDING WITH THEIR WORK. ANY WORK REQUIRING REMOVAL AND REINSTALLATION DUE TO LACK OF COORDINATION SHALL BE THE RESPONSIBILTY OF THE CONTRACTORS.
3. PRIOR TO PERFORMING WORK REQUIRED, INSPECT ALL EXISTING CONDITIONS AND INSTALLED WORK OF OTHER TRADES AND VERIFY THAT ALL CONDITIONS AND ALL SUCH WORK IS COMPLETE TO THE POINT WHERE MECHANICAL WORK CAN PROPERLY COMMENCE.
4. PERFORM CUTTING, FITTING, AND PATCHING OF MECHANICAL EQUIPMENT AND MATERIALS REQUIRED TO REMOVE EXISTING WORK AND TO INSTALL EQUIPMENT AND MATERIALS IN EXISTING STRUCTURES.
5. PROTECT NEW WORK AND EXISTING WORK TO REMAIN.
6. THE CONTRACTOR IS REQUIRED TO FIELD VERIFY LOCATIONS OF EXISTING WORK TO REMAIN.
7. ALL EQUIPMENT SHALL BE INSTALLED TRUE, LEVEL, AND IN THE LOCATION SHOWN ON THE DRAWINGS.
8. ALL EQUIPMENT SHALL BE INSTALLED IN A MANNER THAT PROVIDES ADEQUATE MAINTENANCE ACCESS.
9. PROTECT EQUIPMENT AND MATERIALS FROM THE WEATHER AND CONSTRUCTION DUST DURING CONSTRUCTION AND LEAVE ALL EQUIPMENT AND DUCT INTERIORS CLEAN.

MECHANICAL SHEET INDEX

P0.01	MECHANICAL COVER SHEET
P1.01	PLUMBING PLAN

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CLIENT:
MINNEAPOLIS CONVENTION CENTER

1301 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55403

THIS SQUARE APPEARS 1/2" x 1/2" ON FULL SIZE SHEETS.

NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

I HEREBY CERTIFY that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE: E. Tomlinson

TYPED OR PRINTED NAME: ELIZABETH K. TOMLINSON

DATE: 12/04/2015 REG. NO.: 46427

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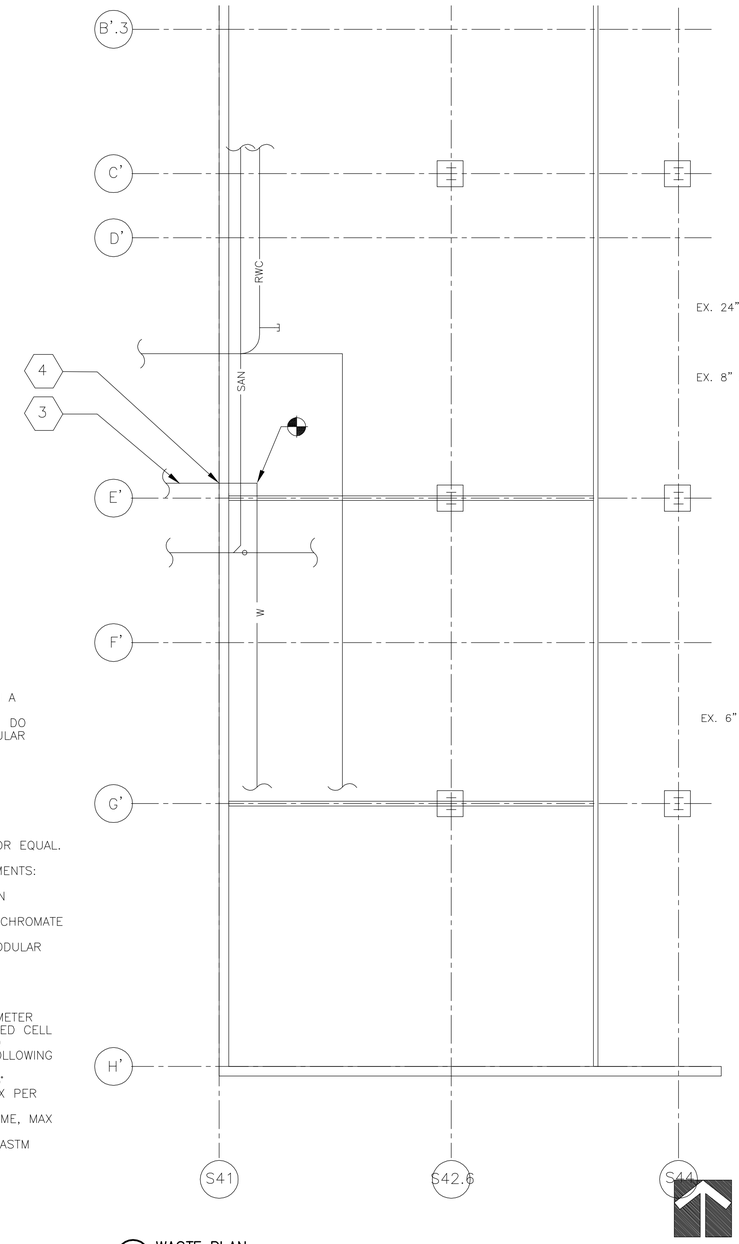
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
MECHANICAL COVER SHEET

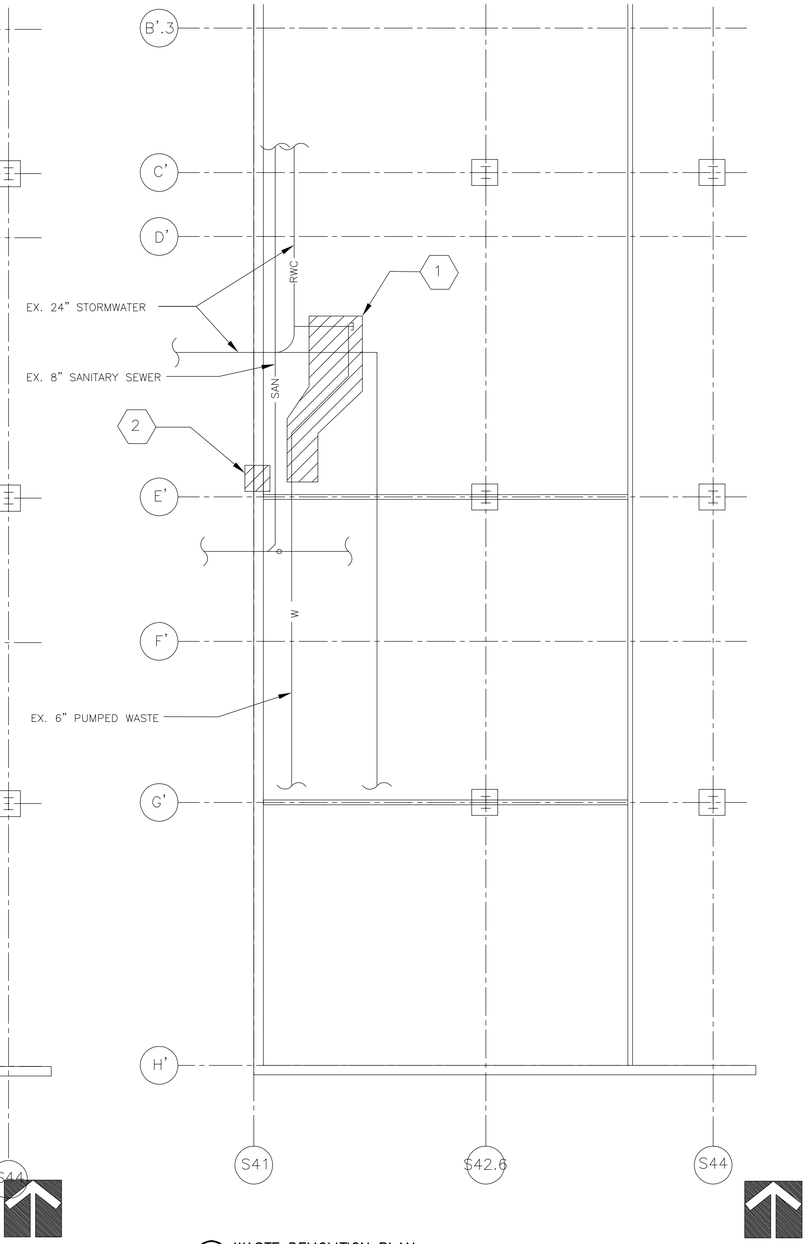
FILE: ..\120383\600 Drawings\M\Mechanical Task 2.3\P0-01 - MECHANICAL CO
DRAWN BY: AJA
CHECKED BY: EKT
PROJ. NO: 120383
DRAWING NO: P0.01

KEYED NOTES

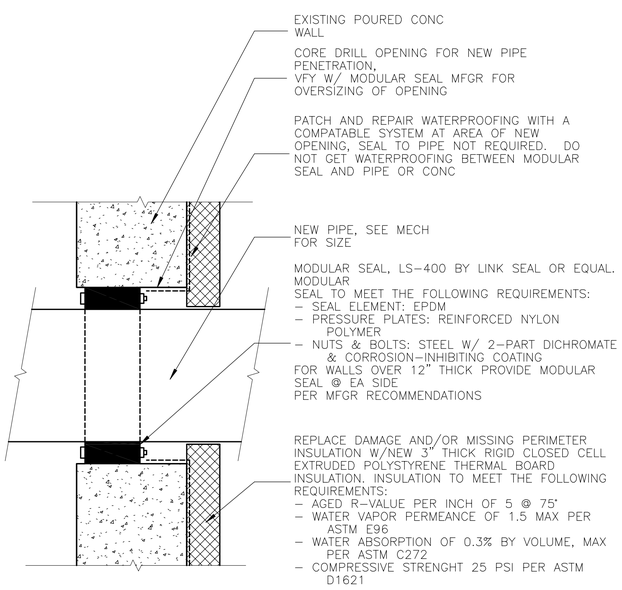
1. DEMOLISH EXISTING 6" PUMPED WASTE LINE BACK TO 24" STORMWATER MAIN AND CAP.
2. CONTRACTOR TO PENETRATE EXTERNAL WALL TO ACCOMODATE NEW PIPE ROUTE.
3. INSTALL NEW 6" PUMPED WASTE LINE AT APPROXIMATELY 17' AFF, CONTRACTOR TO COORDINATE EXACT CONNECTION ELEVATION WITH CIVIL PLANS.
4. WALL OPENING TO BE REPAIRED WEATHERTIGHT AND WATERPROOF AS PER PIPE PENETRATION DETAIL.



2 WASTE PLAN
1/8" = 1' 0"



1 WASTE DEMOLITION PLAN
1/8" = 1' 0"



3 PIPE PENETRATION DETAIL
NO SCALE

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NO	DATE	REVISION

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SIGNATURE: E. Tomlinson

TYPED OR PRINTED NAME: ELIZABETH K. TOMLINSON

DATE: 12/04/2015 REG. NO.: 46427

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
PLUMBING PLAN

FILE: ...\120383\600 Drawings\M\Mechanical Task 2,3\P1.01.dwg
DRAWN BY: AJA
CHECKED BY: EKT
PROJ. NO: 120383
DRAWING NO: P1.01

ELECTRICAL SYMBOL LEGEND

HT AFF	SYMBOL	DESCRIPTION
AS NOTED	A B	SURFACE INCANDESCENT LIGHT (TYPE DENOTED)
AS NOTED	C D	SURFACE H.I.D. LIGHT (TYPE DENOTED)
AS NOTED	F	WALL MOUNTED FLOODLIGHT (TYPE DENOTED)
	R	RECESSED LIGHT (TYPE DENOTED)
PER SCHED	AA	POLE MOUNTED LIGHT (TYPE DENOTED)
PER SCHED	BB	POLE MOUNTED FLOODLIGHT (TYPE DENOTED)
	G	SURFACE FLUORESCENT LIGHT (TYPE DENOTED)
P1	P2	SUSPENDED OR PENDANT LIGHT (TYPE DENOTED)
	H	RECESSED FLUORESCENT LIGHT (TYPE DENOTED)
	ST1	FLUORESCENT STRIP LIGHT (TYPE DENOTED)
AS NOTED	ST1 ST2 T1	TRACK AND TRACK LIGHT (TYPES DENOTED)
96"	EM	EMERGENCY BATTERY LIGHT (TYPE DENOTED)
12**	E	EXIT SIGN (TYPE DENOTED)
AS NOTED	I	LIGHT FIXTURE ON (EM) LIFE SAFETY BRANCH
AS NOTED	I	LIGHT FIXTURE ON (EM) CRITICAL BRANCH
AS NOTED	I	LIGHT FIXTURE ON OPTIONAL STANDBY CIRCUIT
AS NOTED	I	LIGHT FIXTURE WITH EMERGENCY BALLAST
		LIGHT ON CORD REEL (TYPE DENOTED)
AS NOTED	CH3	LIGHTING CHANNEL WIRE (TYPE DENOTED)
48"		SINGLE POLE SW.
48"	2	2 POLE SINGLE THROW SW.
48"	3	3-WAY SW.
48"	4	4-WAY SW.
48"	K	KEYED SW.
48"	PILOT	SW. W/PILOT
48"		SEPARATE PILOT LIGHT
48"	D	DIMMER SWITCH
48"	OS	OCCUPANCY SENSOR SWITCH
48"	MC	MOMENTARY CONTACT SWITCH
48"	T	TIMER SWITCH
48"	LV	LOW VOLTAGE SWITCH
48"	SP	FAN SPEED CONTROL
48"	M	MOTOR HP RATED SWITCH WITH OVERLOADS
48"		PUSH BUTTON
18"		SINGLE RECEPT.
18"		DUPLEX RECEPT.
18"		SPLIT DUPLEX RECEPT.
18"		ISOLATED GROUND RECEPTACLE (DUPLEX SHOWN)
18"		RECEPTACLE ON EMERGENCY CIRCUIT (DUPLEX SHOWN)
18"		DOUBLE DUPLEX RECEPT.
18"		DOUBLE DUPLEX RECEPTACLE ON EMERGENCY CIRCUIT
18"		240 VOLT RECEPT.
		FLOOR RECEPT. (DUPLEX SHOWN)
AS NOTED		RECEPT ON DROP CORD (DUPLEX SHOWN)
		RECEPT ON CORD REEL (DUPLEX SHOWN)
		EQUIPMENT PLUG

HT AFF	SYMBOL	DESCRIPTION
18"	A B	MULTIOUTLET ASSEMBLY (TYPE DENOTED)
18"	A B	MULTIOUTLET ASSEMBLY (TYPE DENOTED)
84"	A	CLOCK (TYPE DENOTED)
		POWER POLE (OPEN OFFICE STYLE)
		SURGERY SERVICE COLUMN
		STATIC GROUND RECEPTACLE (TYPE DENOTED)
		LIGHTNING PROTECTION AIR TERMINAL
		LIGHTNING PROTECTION CONDUCTOR SPLICE
		GROUND ROD (PLAN VIEW)
		GROUND CONNECTION TO STEEL OR STRUCTURE
		GROUND CONNECTION - EXOTHERMIC WELD
	P	UTILITY SERVICE POWER POLE (SITE)
AS NOTED	1	SPECIAL RECEPT. OR CONN. (SEE SCHEDULE)
	2	SPECIAL CONNECTION (SEE SCHEDULE)
AS NOTED	J	JUNCTION BOX
	PB	PULL BOX
72***		CIRCUIT BREAKER PANEL
72***		POWER OR DISTRIBUTION PANEL
72***		SPECIAL CABINET
	T1	TRANSFORMER (TYPE DENOTED)
	25 KVA	GENERATOR (KVA DENOTED)
	SF-1	MOTOR (SEE SCHEDULE)
		DAMPER MOTOR
72***		MAG. MOTOR STARTER OR CONTACTOR
72***		COMB. MOTOR STARTER (NON-FUSED)
72***		COMB. MOTOR STARTER (FUSED)
	VFD	VARIABLE FREQUENCY DRIVE
72***		SAFETY DISC. SW. (NON-FUSED)
72***		SAFETY DISC. SW. (FUSED)
AS NOTED		BUS DUCT WITH PLUG ON DISCONNECT (FUSED)
72***	R	RELAY
72***		ENCLOSED CIRCUIT BREAKER
48****		MUSHROOM SWITCH
	PS	PRESSURE SWITCH
	FS	FLOAT SWITCH
	OS IR	OCCUPANCY SENSOR - TYPE DENOTED
	LS A	LIGHT LEVEL SENSOR - TYPE DENOTED
AS NOTED		PHOTOCELL
48**	TS	TIME CONTROL SWITCH (TIME SWITCH)
48*	H	HUMIDISTAT
48*	T	THERMOSTAT
PER SCHED	H1	BASEBOARD HEATER (TYPE DENOTED)
PER SCHED	H2	WALL HEATER (TYPE DENOTED)
PER SCHED	D1	HAND OR HAIR DRYER (TYPE DENOTED)
	SO	SOLENOID VALVE
		DASHED SYMBOL INDICATES EXISTING
		HATCHED SYMBOL INDICATES REMOVED

HT AFF	SYMBOL	DESCRIPTION
		CONDUIT CONCEALED IN WALL OR OVERHEAD
		CONDUIT CONCEALED BELOW FLOOR
		CONDUIT EXPOSED
	SR	SURFACE RACEWAY
		CONDUIT TRANSITION UP
		CONDUIT TRANSITION DOWN
		CONDUIT STUBBED OUT
	LV	LOW VOLTAGE POWER WIRING
	EX	EXISTING CONDUIT
	UE	UNDERGROUND ELECTRICAL
	UMVE	UNDERGROUND MEDIUM VOLTAGE ELECTRICAL
	UT	UNDERGROUND TELEPHONE
	UCOM	UNDERGROUND COMMUNICATIONS
	UTV	UNDERGROUND CABLE TELEVISION (CATV OR CCTV)
	UFIBR	UNDERGROUND FIBER OPTIC
	OHE	OVERHEAD ELECTRIC
	OHT	OVERHEAD TELEPHONE
		BRANCH CIRCUIT HOME RUN
		FLEXIBLE CONDUIT OR FIXTURE WHIP
		UNDERFLOOR RACEWAY SYSTEM
		CABLE TRAY (TYPE DENOTED)
	E	CONDUIT SLEEVE (SIZE DENOTED)
18"		TELEPHONE OUTLET (TYPE DENOTED)
48****	W	WALL TELEPHONE OUTLET (TYPE DENOTED)
18"		INFORMATION OUTLET (TYPE DENOTED)
48****	IC	INTERCOM OUTLET LOCATION
18"		TELEVISION OUTLET
18"		MULTIPLE SERVICE OUTLET (TYPE DENOTED)
	M	OUTLET IN FLOOR (MICROPHONE SHOWN)
		MULTIPLE SERVICE FLOOR OUTLET (TYPE DENOTED)
18"	D	DICTATION OUTLET LOCATION
48****	W	WALL DICTATION OUTLET LOCATION
18"	G	EQUIPOTENTIAL GROUND OUTLET
AS NOTED	NFV-4x2	X-RAY FILM VIEWER (SEE SPECIFICATIONS)
84"		BELL
84"		BUZZER
		CHIME
48****	D	DOOR SIGNAL - APT. UNIT
84"	S	SPEAKER (WALL OR CEILING MT.)
84"	S S	HORN TYPE SPEAKER
	S	SURFACE MT SPEAKER SUSPENDED FROM CEILING
48"	V	VOLUME CONTROL
18"	M	MICROPHONE OUTLET
18"	P	PROJECTOR CONTROL OUTLET
		ANTENNA
		WEATHERHEAD
	1	KEYED NOTE (SEE SCHEDULE)

HT AFF	SYMBOL	DESCRIPTION
90***		FIRE ALARM HORN
90***	110cd	FIRE ALARM HORN W/STROBE (CANDELAS)
90***		FIRE ALARM BELL
90***	110cd	FIRE ALARM BELL W/STROBE (CANDELAS)
90***	F	FIRE ALARM CHIME
90***	F 110cd	FIRE ALARM CHIME W/STROBE (CANDELAS)
90***	110cd	FIRE ALARM STROBE (CANDELAS)
90***	S 110cd	FIRE ALARM SPEAKER W/STROBE (CANDELAS)
72***	F.A. ANNUN	FIRE ALARM REMOTE ANNUNCIATOR
8*****	P P	SMOKE DETECTOR (TYPE DENOTED)
8*****	R/F155 R/F155	HEAT DETECTOR (TYPE & TEMPERATURE DENOTED)
		LINEAR HEAT DETECTOR
	P	DUCT SMOKE DETECTOR (TYPE DENOTED)
48*	P	REMOTE TEST/STATUS STATION
8*****	UV/IR UV/IR	FLAME DETECTOR (TYPE DENOTED)
8*****	CO CO	GAS DETECTOR (TYPE DENOTED)
48****	P	F.A. PULLSTATION
	Z	F.A. ZONE ADDRESSABLE MODULE
	I	F.A. INDIVIDUAL ADDRESSABLE MODULE
	H	F.A. DOOR HOLDER
		F.A. DOOR CLOSER
	FR	FIRE ALARM RELAY
		SPRINKLER FLOW SWITCH
		SPRINKLER VALVE TAMPER SWITCH
		SPRINKLER LEVEL SWITCH
		SPRINKLER PRESSURE SWITCH
		SPRINKLER TEMPERATURE SWITCH
	ELR	END OF LINE RESISTOR
	S	ELECTRIC STRIKE
	M	MAGNETIC LOCK
	C	COMBINATION LOCK
	D	DOOR CONTACTS
48****	R	CARD READER
48****		KEYPAD
144**	MD PIR	MOTION DETECTOR (TYPE DENOTED)
48*		NURSE CALL EMERG. STATION
48*		NURSE CALL CODE BLUE EMERG. STATION
48****		NURSE CALL DUTY STATION
48****		NURSE CALL STAFF STATION
48*		NURSE CALL SINGLE PATIENT STATION
48*	S	NURSE CALL DUAL PATIENT STATION
12**	S N	NURSE CALL DOME LIGHT (LAMPS INDICATED)
48****	NCM	NURSE CALL MASTER STATION
48****	NCC	NURSE CALL EQUIPMENT CABINET
72***	NC ANNUN	NURSE CALL ANNUNCIATOR PANEL
AS NOTED		CCTV CAMERA
AS NOTED		CCTV CAMERA WITH PAN/TILT DRIVE

THIS IS A MASTER ELECTRICAL SYMBOL LIST. NOT ALL SYMBOLS APPEAR IN THE DRAWING.

ALL DISTANCES ARE TO CENTER OF DEVICE OR EQUIPMENT UNLESS OTHERWISE NOTED. DEVICES INDICATED AT 48" MAY NOT BE INSTALLED WITH ANY OPERABLE PART HIGHER THAN 48". DEVICES MAY BE INSTALLED IN CONCRETE MASONRY UNITS WITH THE TOP OF THE DEVICE AT 48".

* DISTANCE ABOVE TOP OF DOOR FRAME ** DISTANCE TO TOP OF EQUIPMENT OR DEVICE *** DISTANCE TO HIGHEST OPERABLE PART OF EQUIPMENT **** DISTANCE BELOW CEILING ***** DISTANCE TO BOTTOM OF DEVICE

ELECT ABBREVIATIONS LIST

1P	1 POLE (2P, 3P, 4P, ETC.)	KWH	KILOWATT HOUR
A	AMPERE	LV	LOW VOLTAGE
AC	ALTERNATING CURRENT	MAX	MAXIMUM
AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR
AFG	ABOVE FINISHED GRADE	MCB	MAIN CIRCUIT BREAKER
AHU	AIR HANDLING UNIT	MCC	MOTOR CONTROL CENTER
AIC	AMPERE INTERRUPTING CAPACITY	MDP	MAIN DISTRIBUTION PANEL
AL	ALUMINUM	MFS	MAIN FUSED DISCONNECT SWITCH
AMP	AMPERE	MIN	MINIMUM
ANNUN	ANNUNCIATOR	MISC	MISCELLANEOUS
APPROX	APPROXIMATELY	MLO	MAIN LUGS ONLY
ATS	AUTOMATIC TRANSFER SWITCH	MSBD	MAIN SWITCHBOARD
AUTO	AUTOMATIC	MTR	MOTOR
AUX	AUXILIARY	NF	NON-FUSED
AWG	AMERICAN WIRE GAUGE	NIC	NOT IN CONTRACT
BLDG	BUILDING	N.A.	NORMALLY OPEN
BMS	BUILDING MANAGEMENT SYSTEM	NPF	NORMAL POWER FACTOR
C	CONDUIT	NTS	NOT TO SCALE
CAB	CABINET	N.C.	NORMALLY CLOSED
CAM	CAMERA	NEC	NATIONAL ELECTRICAL CODE
CB	CIRCUIT BREAKER	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
CKT	CIRCUIT		
CLG	CEILING	NF	NON-FUSED
COL	COLUMN	NIC	NOT IN CONTRACT
CONT	CONTINUATION OR CONTINUOUS	N.O.	NORMALLY OPEN
CONTR	CONTRACTOR	NTS	NOT TO SCALE
CU	COPPER	No.	NUMBER
DISC	DISCONNECT	OL	OVERLOADS
DIST	DISTRIBUTION	P	POLE
DN	DOWN	PB	PULL BOX OR PUSHBUTTON
DS	SAFETY DISCONNECT SWITCH	PF	POWER FACTOR
DWG	DRAWING	PH	PHASE
EC	ELECTRICAL CONTRACTOR	PNL	PANEL
EF	EXHAUST FAN	PR	PAIR
ELEC	ELECTRIC, ELECTRICAL	PVC	POLYVINYL CHLORIDE (CONDUIT)
EM	EMERGENCY	PWR	POWER
EMS	ENERGY MANAGEMENT SYSTEM	QUAN	QUANTITY
EMT	ELECTRICAL METALLIC TUBING	REQD	REQUIRED
ENCL	ENCLOSURE	RMC	RIGID METALLIC CONDUIT
EQUIP	EQUIPMENT	SC	SURFACE CONDUIT
EXIST	EXISTING	SP	SPARE
FLA	FULL LOAD AMPERES	SS	STAINLESS STEEL
FLEX	FLEXIBLE	SSW	SELECTOR SWITCH
FU	FUSE	S/S	STOP/START PUSHBUTTONS
GA	GAUGE	STD	STANDARD
GALV	GALVANIZED	SURF	SURFACE MOUNTED
GC	GENERAL CONTRACTOR	SW	SWITCH
GEN	GENERATOR	SWBD	SWITCHBOARD
GFI	GROUND FAULT CIRCUIT INTERRUPTER	SYS	SYSTEM
		TYP	TYPICAL
GND	GROUND	UE	UNDERGROUND ELECTRICAL
GRSC	GALVANIZED RIGID STEEL CONDUIT	UG	UNDERGROUND
		V	VOLT
HOA	HAND-OFF-AUTOMATIC SWITCH	VA	VOLT-AMPERES
HP	HORSEPOWER	VERT	VERTICAL
HT	HEIGHT	Y	WYE
HTG	HEATING	W	WATT
HTR	HEATER	W/	WITH
Hz	HERTZ	W/O	WITHOUT
IC	INTERRUPTING CAPACITY	WP	WEATHERPROOF
IMC	INTERMEDIATE METAL CONDUIT	XFMR	TRANSFORMER
J-BOX	JUNCTION BOX		
KCM	THOUSAND CIRCULAR MILS	∠	ANGLE
KO	KNOCK-OUT	@	AT
KV	KILOVOLT	'	FEET
KVA	KILOVOLT-AMPERE	"	INCHES
KVAR	KILOVOLT-AMPERE REACTIVE	#	NUMBER
KW	KILOWATT		

GENERAL ELECTRICAL NOTES

GENERAL NOTES

A. REFER TO "DIVISION 1 - GENERAL REQUIREMENTS" IN THE PROJECT MANUAL FOR WORK THAT IS THE RESPONSIBILITY OF ALL CONTRACTORS.

B. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON EACH DRAWING.

C. VERIFY LOCATIONS AND ROUGH-IN REQUIREMENTS OF ALL EQUIPMENT PRIOR TO ROUGH-IN. SEE ALSO ELECTRICAL EQUIPMENT SCHEDULE FOR EC ADDITIONAL REQUIREMENTS.

D. ALL CONDUCTORS SHALL BE IN RACEWAY OR WIREWAY.

E. ALL LOW VOLTAGE CABLES OR CONDUCTORS OPERATING AT LESS THAN 50 VOLTS SHALL BE IN METAL RACEWAY UNLESS NOTED OTHERWISE.

F. CIRCUIT NUMBERS AT DEVICES CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE FOR CIRCUIT BREAKER SIZES). BRANCH CIRCUITS SHALL BE SIZED PER THE ELECTRICAL EQUIPMENT SCHEDULE, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

G. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO COORDINATE THE WORK OF THEIR TRADE WITH ALL OTHER TRADES PRIOR TO PROCEEDING WITH THEIR WORK. ANY WORK REQUIRING REMOVAL AND REINSTALLATION DUE TO LACK OF COORDINATION SHALL BE THE RESPONSIBILITY OF THE CONTRACTORS.

H. PRIOR TO PERFORMING WORK REQUIRED, INSPECT ALL EXISTING CONDITIONS AND INSTALLED WORK OF OTHER TRADES AND VERIFY THAT ALL CONDITIONS AND ALL SUCH WORK IS COMPLETE TO THE POINT WHERE ELECTRICAL WORK CAN PROPERLY COMMENCE.

I. PERFORM CUTTING, FITTING, AND PATCHING OF ELECTRICAL EQUIPMENT AND MATERIALS REQUIRED TO REMOVE EXISTING WORK AND TO INSTALL EQUIPMENT AND MATERIALS IN EXISTING STRUCTURES.

J. PROTECT NEW WORK AND EXISTING WORK TO REMAIN.

K. THE CONTRACTOR IS REQUIRED TO FIELD VERIFY LOCATIONS OF EXISTING WORK TO REMAIN.

L. ALL EQUIPMENT SHALL BE INSTALLED TRUE, LEVEL, AND IN THE LOCATION SHOWN ON THE DRAWINGS.

M. ALL EQUIPMENT SHALL BE INSTALLED IN A MANNER THAT PROVIDES ADEQUATE MAINTENANCE ACCESS AND N.E.C.-REQUIRED CLEARANCE.

N. PROTECT EQUIPMENT AND MATERIALS FROM THE WEATHER AND CONSTRUCTION DUST DURING CONSTRUCTION AND LEAVE ALL ELECTRICAL EQUIPMENT CLEAN.

DEMOLITION NOTES

A. DISCONNECT, REMOVE, AND PROPERLY DISPOSE OF ALL ELECTRICAL DISCONNECTS, BOXES, CONDUIT, CONDUCTORS, AND FITTINGS ASSOCIATED WITH EQUIPMENT INDICATED TO BE DEMOLISHED.

B. PROVIDE CLOSURES FOR ANY CONDUIT OPENINGS IN PANELBOARDS AND OTHER ELECTRICAL EQUIPMENT WHERE CONDUIT IS REMOVED AS PART OF DEMOLITION.

C. MODIFY PANELBOARD CIRCUIT DIRECTORIES TO INDICATE ELECTRICAL CIRCUIT CHANGES RESULTING FROM EQUIPMENT DEMOLITION. LABEL UNUSED CIRCUIT BREAKERS AS "SPARE".

D. FURNISH AND INSTALL CONDUIT AND WIRE AS NECESSARY FOR CONTINUITY OF CIRCUIT(S) TO ANY EXISTING DEVICES TO REMAIN. COORDINATE AND VERIFY REQUIREMENTS WITH NEW WORK IN AREA.

E. FURNISH AND INSTALL CONDUIT AND WIRE AS NECESSARY FOR CONTINUITY OF ANY FEEDERS OR BRANCH CIRCUITS ORIGINATING OUTSIDE THE DEMOLITION AREA THAT SERVES ANY ELECTRICAL EQUIPMENT OR DEVICES TO REMAIN AFTER DEMOLITION. MODIFY OR REPLACE AS REQUIRED.

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NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

I HEREBY CERTIFY that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE: Michael Bilben

TYPED OR PRINTED NAME: MICHAEL S. BILBEN

DATE: 12/04/2015 REG. NO.: 51324

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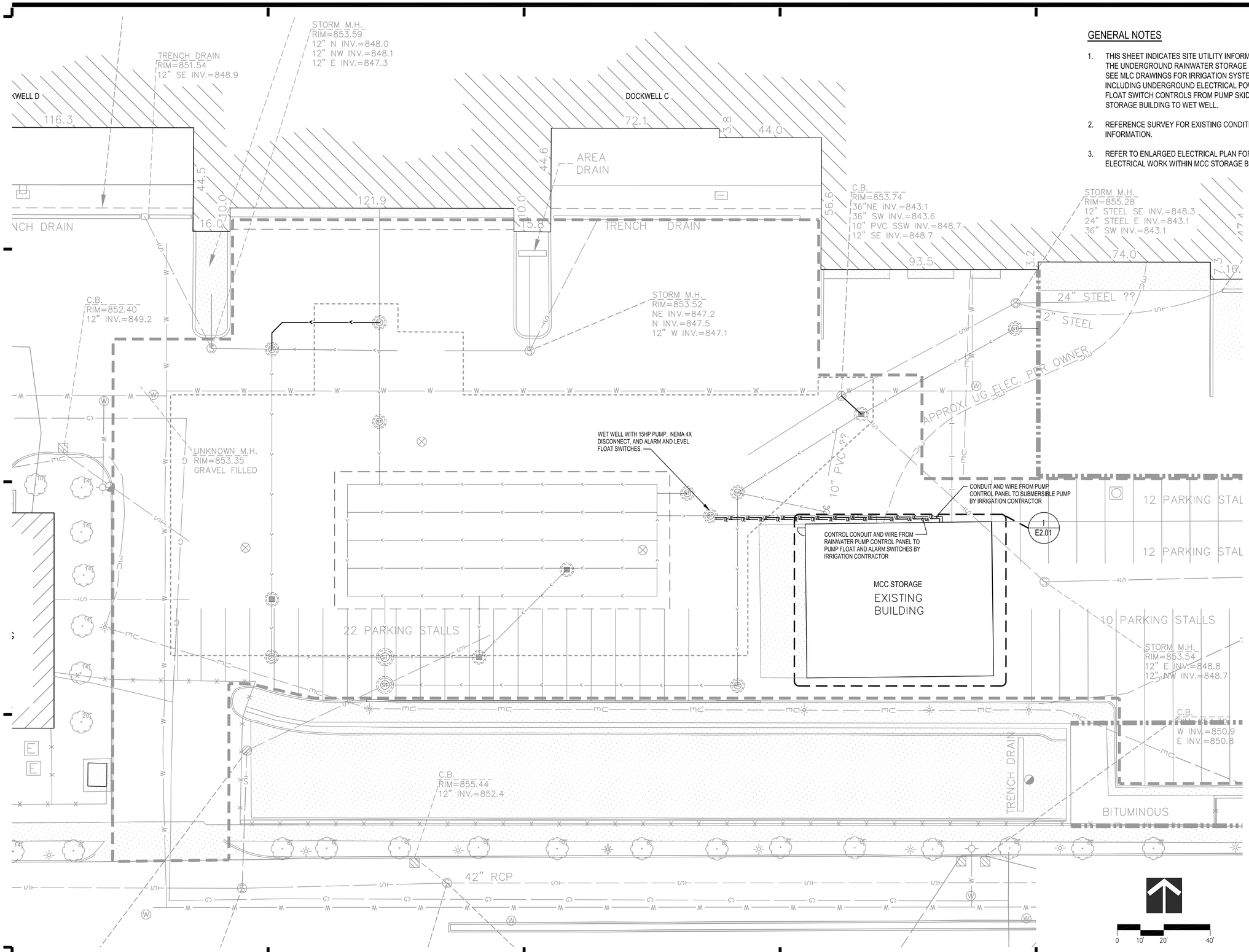
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
ELECTRICAL SYMBOLS, ABBREVIATIONS AND NOTES

FILE: ..\120383\600 Drawings\E\120383 E0.01 Electrical Symbols.dwg
DRAWN BY: MSB
CHECKED BY: MSB
PROJ. NO: 120383
DRAWING NO: E0.01



GENERAL NOTES

1. THIS SHEET INDICATES SITE UTILITY INFORMATION FOR THE UNDERGROUND RAINWATER STORAGE SYSTEM. SEE MLC DRAWINGS FOR IRRIGATION SYSTEM, INCLUDING UNDERGROUND ELECTRICAL POWER AND FLOAT SWITCH CONTROLS FROM PUMP SKID IN STORAGE BUILDING TO WET WELL.
2. REFERENCE SURVEY FOR EXISTING CONDITIONS INFORMATION.
3. REFER TO ENLARGED ELECTRICAL PLAN FOR ELECTRICAL WORK WITHIN MCC STORAGE BUILDING.

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TYPED OR PRINTED NAME: MICHAEL S. BILBEN

DATE: 12/04/2015 REG. NO.: 51324

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
ELECTRICAL SITE PLAN

FILE: ..\120383\600 Drawings\E\120383 E1.01 Electrical Site Plan.dwg
DRAWN BY: MSB
CHECKED BY: MSB
PROJ. NO: 120383
DRAWING NO:

E1.01

ELECTRICAL EQUIPMENT SCHEDULE

NO.	DESCRIPTION	ROOM	LOAD HP	LOAD A	LOAD W	VOLT	PHASE	CONDUIT & WIRE SIZE	STARTER COMPONENT	CONTROL DEVICE COMPONENT	DISCONNECT COMPONENT	NOTES
RWP	RAINWATER PUMP/CONTROL PANEL		15			208 V	3	1"C-3#8, #10 GND	CONTROL PANEL	FLOAT SWITCH	CONTRL PNL DISC	1

NOTES:
1. COORDINATE CONNECTIONS AT RAINWATER SKID WITH IRRIGATION CONTRACTOR

PANELBOARD: EXISTING P1

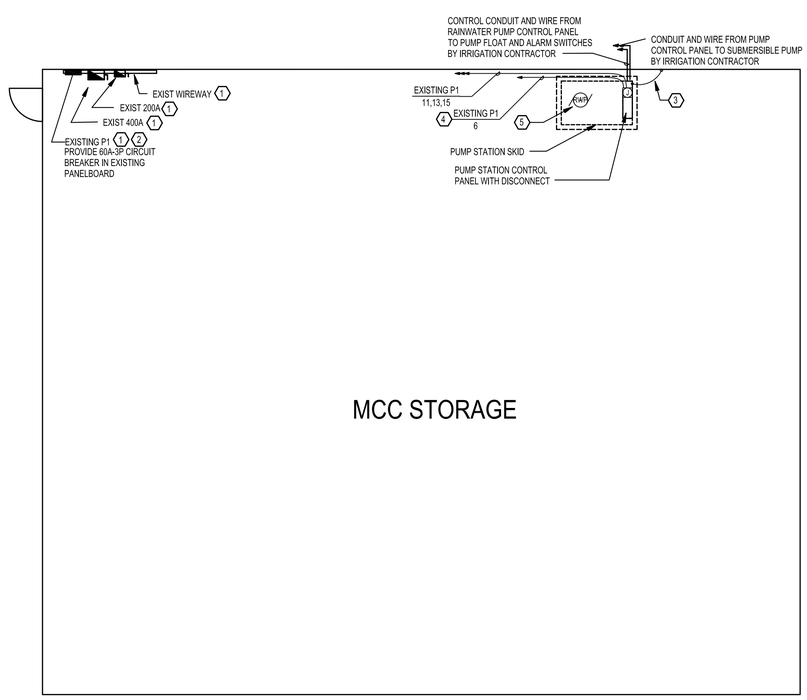
LOCATION:
MOUNTING: SURFACE NEMA 1
MAIN DEVICE: 200 A MAIN CB
BUS AMPS: 200 AMPS
VOLTAGE: 208Y/120 V. 3 ø 4 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL: EXISTING SIEMENS LOADCENTER

LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		PHASE C kVA		CKT	P	BKR	LOAD DESCRIPTION
EXIST DOOR OPENERS	20 A	1	1	0.0	0.0					2	1	20 A	EXIST RECEPTACLES
EXIST FRONT LITES	20 A	1	3			0.0	0.0			4	1	20 A	EXIST RECEPTACLES
EXIST REAR LITES	20 A	1	5					0.0	0.8	6	1	20 A	RAINWATER CONTROLLER
EXIST TRAILER (SPARE?)	50 A	2	7	0.0	0.0					8	2	50 A	EXIST TRAILER (SPARE?)
			9			0.0	0.0			10			
RAIN WATER PUMP/CONTROL PANEL 15 HP	60 A	3	11					4.9		12			
			13	4.9						14			
			15			4.9				16			
			17							18			
			19							20			
			21							22			
			23							24			
			25							26			
			27							28			
			29							30			
			31	0.0						32			
EXISTING	30 A	3	33			0.0				34			
			35					0.0		36			
			37	0.0	0.0					38			
EXISTING	30 A	3	39			0.0	0.0			40	3	40 A	EXIST WELDING OUTLET
			41					0.0	0.0	42			
	TOTAL LOAD:			5 kVA		5 kVA		6 kVA					
	TOTAL AMPS:			41 A		41 A		47 A					

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED
Other	800 VA	100.00%	800 VA
MTR	14770 VA	125.00%	18463 VA

PANEL TOTALS	
CONNECTED LOAD:	15570 VA
ESTIMATED DEMAND:	19263 VA
CONNECTED CURRENT:	43 A
EST. DEMAND CURRENT:	53 A

NOTES:



1 ELECTRICAL POWER PLAN – MCC STORAGE BUILDING
1/8" = 1'-0"

GENERAL SHEET NOTES

A. CIRCUIT NUMBERS AT DEVICES AND EQUIPMENT CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE). BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE ON THE ELECTRICAL EQUIPMENT SCHEDULE.

B. REFER ALSO TO RAINWATER PUMPING SYSTEM DRAWINGS. COORDINATE CONNECTION TO RAINWATER PUMP CONTROL PANEL WITH IRRIGATION CONTRACTOR.

KEYED SHEET NOTES

1. EXISTING EQUIPMENT TO REMAIN.
2. PROVIDE CIRCUIT BREAKER LOCKING ACCESSORY TO ALLOW LOCKOUT-TAG-OUT OF RAINWATER PUMP CONTROL PANEL 60A-3P CIRCUIT BREAKER.
3. PROVIDE #2 AWG BARE COPPER CONDUCTOR. BOND ONE END TO RAINWATER SKID. PROVIDE EXOTHERMIC WELD AND BOND OTHER END TO BUILDING STRUCTURE.
4. PROVIDE 1/2"C, 2 #12, #12G. CONNECT FROM CONTROLLER 120V TO EXISTING SPARE 20A-1P CIRCUIT BREAKER IN EXISTING PANELBOARD.
5. PUMP LOCATED IN WET WELL. SEE SHEET E1.01 FOR WET WELL LOCATION.

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NO	DATE	REVISION

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SIGNATURE: Michael Bilben
TYPED OR PRINTED NAME: MICHAEL S. BILBEN
DATE: 12/04/2015 REG. NO.: 51324

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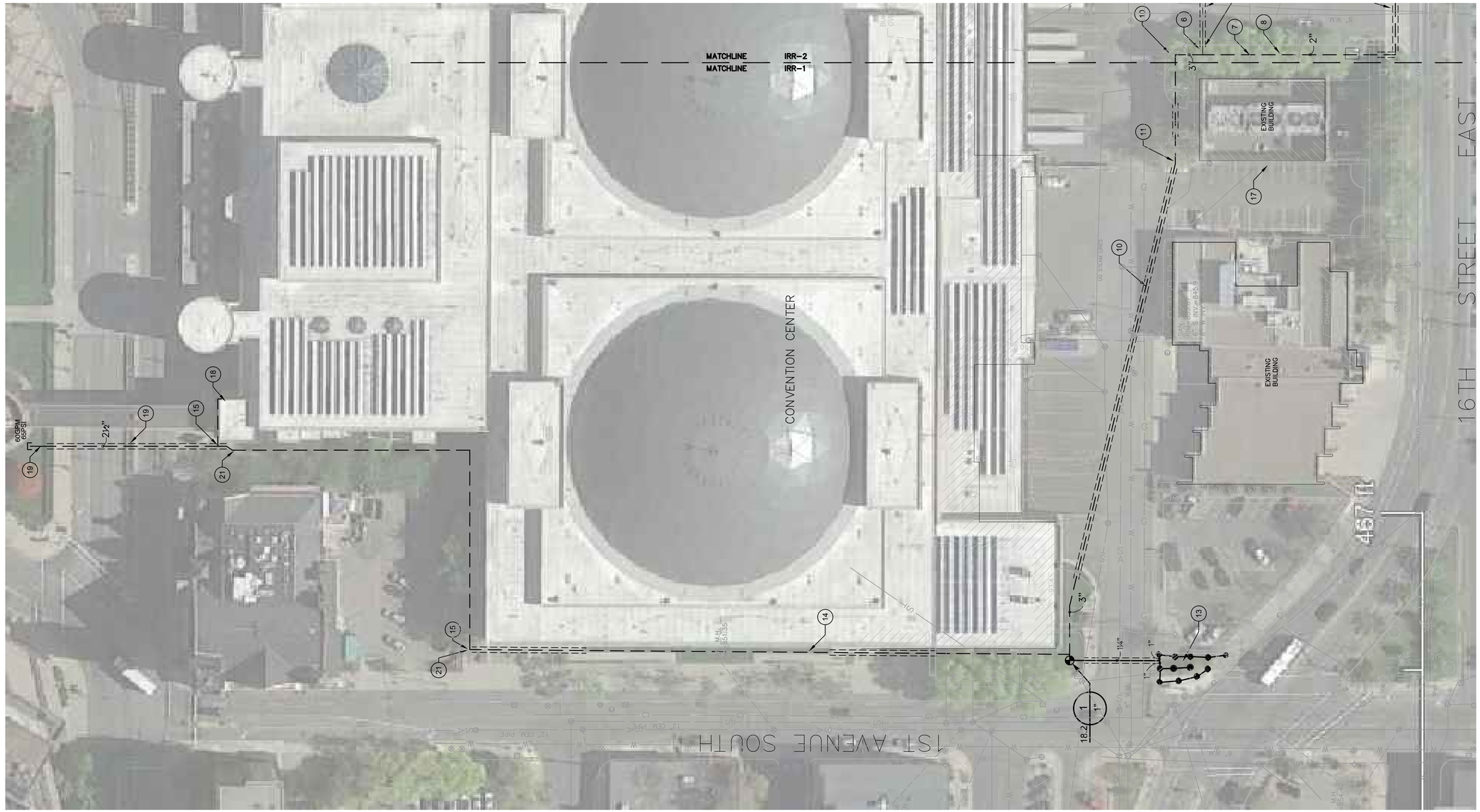
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
ELECTRICAL ENLARGED PLAN AND SCHEDULES

FILE: ..\120383\600 Drawings\E\120383 E2.01 Electrical Plans Shedules.dwg
DRAWN BY: MSB
CHECKED BY: MSB
PROJ. NO: 120383
DRAWING NO: **E2.01**

NOTES

REFER TO SHEETS IRR-3 AND IRR-4 FOR IRRIGATION NOTES, SCHEDULES, AND DETAILS.



0 20' 40' 80'

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MLC
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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
IRRIGATION LAYOUT WEST AREA

FILE: ..\120383\600 Drawings\C\120383 IRR1 Irrigation Plans.dwg
DRAWN BY:
CHECKED BY:
PROJ. NO: 120383
DRAWING NO:

IRR-1

NOTES

REFER TO SHEETS IRR-3 AND IRR-4 FOR IRRIGATION NOTES, SCHEDULES, AND DETAILS.

0 20' 40' 80'

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1	12-04-2015	BID

NO	DATE	REVISION

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PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
IRRIGATION LAYOUT EAST AREA

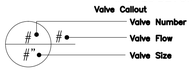
FILE: ..\120383\600 Drawings\C\120383 IRR1 Irrigation Plans.dwg
DRAWN BY:
CHECKED BY:
PROJ. NO: 120383
DRAWING NO: **IRR-2**

IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
12 12 12 12 12 12 (Q T H TT TQ F)	TORO 570Z-4P-PRX-COM 12 SERIES TURF SPRAY, 4" POP-UP WITH BUILT IN-RISER PRESSURE REGULATOR, AND X-FLOW WATER SHUT-OFF DEVICE. ALSO INCLUDES THE ZERO FLUSH WIPER SEAL. 1/2" FEMALE-THREADED INLET. WITH CHECK VALVE.
15 15 15 15 15 15 (Q T H TT TQ F)	TORO 570Z-4P-PRX-COM 15 SERIES TURF SPRAY, 4" POP-UP WITH BUILT IN-RISER PRESSURE REGULATOR, AND X-FLOW WATER SHUT-OFF DEVICE. ALSO INCLUDES THE ZERO FLUSH WIPER SEAL. 1/2" FEMALE-THREADED INLET. WITH CHECK VALVE.
8 10 12 15 (8 10 12 15)	TORO 570Z-4P-PRX-COM ADJ TURF SPRAY, 4" POP-UP WITH BUILT IN-RISER PRESSURE REGULATOR, AND X-FLOW WATER SHUT-OFF DEVICE. ALSO INCLUDES THE ZERO FLUSH WIPER SEAL. 1/2" FEMALE-THREADED INLET. WITH CHECK VALVE.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION
	TORO 220-26-0 BRASS 1", 1-1/4", 1-1/2", 2", 2-1/2", AND 3" ELECTRIC REMOTE CONTROL VALVE. WITH SPIKE GUARD SOLENOID. 1"-2" HAVE IN-LINE GLOBE BODY STYLE, AND 2-1/2" - 3" ARE ANGLE VALVE BODY STYLES.
	MATCO-NORCA 521T 1/2"-4" BRASS SWING CHECK VALVE, IPS. WITH BRASS SEAT. SAME SIZE AS MAINLINE PIPE.
BF	FEBCO 860 MASTER SERIES 10" REDUCED PRESSURE BACKFLOW PREVENTER
X X	CAP FOR FUTURE USE CAP AT THE MAINLINE OR LATERAL LINE FOR FUTURE USE. THE PRESSURE AND FLOW PROVIDED TO THAT LOCATION ARE INDICATED NEXT TO THE CAP SYMBOL. THIS WILL BE
M	WATER METER 3" MUNICIPAL WATER SOURCE
P.O.C.	PUMP STATION RAINWATER STORAGE SYSTEM WITH PUMP STATION
	IRRIGATION LATERAL LINE: POLYETHYLENE AND PVC CLASS 160 POLYETHYLENE SDR-7 UP TO 1-1/4, THEN PVC CLASS 160 SDR 26 FOR 1-1/2" AND LARGER.
	IRRIGATION MAINLINE: PVC CLASS 200 SDR 21
	IRRIGATION MAINLINE: HDPE PE4710 DR 11 (200PSI) HIGH-DENSITY POLYETHYLENE IRRIGATION PIPE, HEAT FUSION INSTALLATION AS PER MANUFACTURER`S RECOMMENDATION.
	IRRIGATION MAINLINE: DUCTILE IRON PIPE DUCTILE IRON PIPE ANSI/AWWA C150 CLASS 350.
	PIPE SLEEVE: PVC CLASS 200 SDR 21 TYPICAL PIPE SLEEVE FOR IRRIGATION PIPE. PIPE SLEEVE SIZE SHALL BE A MINIMUM OF TWO SIZES LARGER THAN PIPE CONTAINED. EXTEND SLEEVES 18 INCHES BEYOND EDGES OF PAVING OR CONSTRUCTION.

Valve Callout



CRITICAL ANALYSIS

Generated:	2015-11-21 09:03
P.O.C. NUMBER: 02	
Water Source Information:	Rainwater Storage System with Pump Station
FLOW AVAILABLE	
Custom Max Flow:	140.00 gpm
Flow Available:	140.00 gpm
PRESSURE AVAILABLE	
Static Pressure at POC:	90.00 psi
Pressure Available:	90.00 psi
DESIGN ANALYSIS	
Maximum Multi-valve Flow:	120.00 gpm
Flow Available at POC:	140.00 gpm
Residual Flow Available:	20.00 gpm
Pressure Req. at Critical Station:	50.00 psi
Loss for Fittings:	2.75 psi
Loss for Main Line:	27.55 psi
Loss for POC to Valve Elevation:	0.00 psi
Loss for Backflow:	0.00 psi
Critical Station Pressure at POC:	80.30 psi
Pressure Available:	90.00 psi
Residual Pressure Available:	9.70 psi

REFERENCE NOTES SCHEDULE

SYMBOL	DESCRIPTION
1	NEW WET TAP FOR POTABLE WATER BACK UP. CONTRACTOR RESPONSIBLE FOR BACKFILL, COMPACTION & PAVEMENT IN THE AREA DISTURBED. COORDINATE WITH OWNER`S REPRESENTATIVE.
2	3" WATER METER, 3" RP BACKFLOW DEVICE AND 3" SWING CHECK FEED TO IRRIGATION MAIN LINE.
3	PUMP STATION VALVES & CONTROLS FOR RAIN WATER STORAGE SYSTEM.
4	3" FLUSH LINE FROM FILTER TO DOWNSTREAM LEG OF STORAGE SYTEM.
5	WET WELL FROM RAIN WATER STORAGE SYSTEM. SUBMERSIBLE PUMP & LEVEL SENSORS LOCATED IN THIS WET WELL.
6	3" IRRIGATION MAIN LINE FROM PUMP STATION TO TIE INTO EXISTING IRRIGATION SYTEM.
7	NEW 2" MAIN LINE & 2 WIRE PATH AND CONNECT TO EXISTING 2" MAIN AND 2 WIRE PATH
8	CONNECT EXISTING BUILDING #9 ZONES (8) TO NEW MAIN LINE AND WIRE PATH WITH DECODERS - FIELD VERIFY QUANTITIES.
9	CONNECT TO EXISTING 2" MAIN AND WIRE PATH AT THIS APPROXIMATE LOCATION.
10	NEW 3" MAIN LINE AND 2 WIRE PATH
11	CONTRACTOR TO PROVIDE OPEN TRENCH PRICING FOR NEW MAIN LINE ACROSS PARKING AND ADD ALTERNATE FOR DIRECTIONAL DRILLING - TYPICAL IN BACK OF BUILDING.
13	NEW ZONE FOR TURF IN THIS AREA CONNECT TO NEW IRRIGATION MAIN LINE AND 2 WIRE PATH.
14	CONTRACTOR WILL NEED TO DRILL THRU CONCRETE PLATFORMS TO BRING NEW 3" MAINLINE AND WIRE PATH TO AREA 1 AND 3.
15	CONNECT MAINLINE AND TWO WIRE PATH TO AREA 1 ZONES
17	HDPE MAIN LINE & WIRE CONDUIT EXISTING ALONG THIS SIDE OF BUILDING IF REQUIRED.
18	CONNECT EXISTING IRRIGATION SYSTEM TO NEW MAIN LINE ABANDON EXISTING WATER SOURCE AT THIS LOCATION. RETURN EXISTING CONTROLLER AND FLOW SENSOR TO OWNER.
19	PLACE VALVE BOX WITH - MAIN LINE STUB, SHUT OFF & BLOW OUT POINT, TWO-WIRE PATH FOR FUTURE EXPANSION AT THESE LOCATIONS.
20	AT THIS LOCATION UTILIZE DIRECTIONAL DRILLING OR BORING TO REDUCE IMPACT TO TRAFFIC INTO THIS AREA.
21	EXISTING 2 1/2" MAIN LINE AND TWO-WIRE PATH BETWEEN THESE TWO POINTS.

GENERAL NOTES

1. DO NOT DISRUPT MINNEAPOLIS CONVENTION CENTER (MCC) TRAFFIC FLOWS OR OPERATIONS. COORDINATE WORK WITH MCC.

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MLC IRRIGATION CONSULTANTS
Water, solved.

CLIENT:
MINNEAPOLIS CONVENTION CENTER

1301 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55403

THIS SQUARE APPEARS 1/2" x 1/2" ON FULL SIZE SHEETS.

NO	DATE	ISSUED FOR
1	12-04-2015	BID

NO	DATE	REVISION

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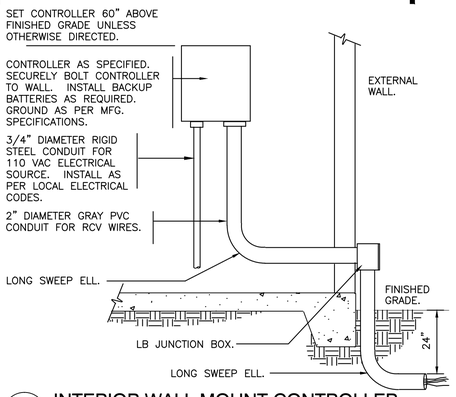
PROJECT NAME:
RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

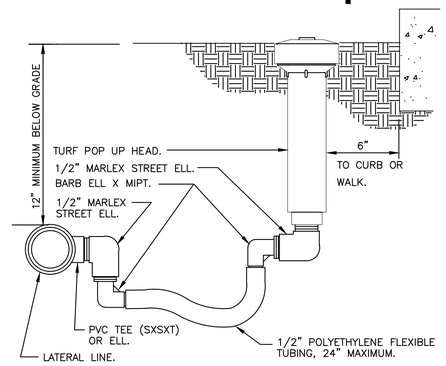
DRAWING TITLE:
IRRIGATION NOTES AND SCHEDULES

FILE: ..\120383\600 Drawings\C\120383 IRR1 Irrigation Plans.dwg
DRAWN BY:
CHECKED BY:
PROJ. NO: 120383
DRAWING NO: IRR-3



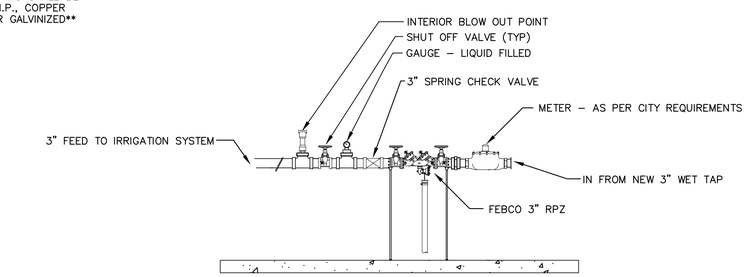
1 INTERIOR WALL MOUNT CONTROLLER

1" = 12" 328409.13-08



2 TURF SPRAY FLEX ASSEMBLY

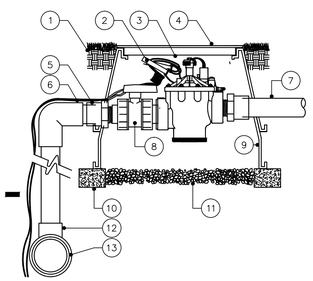
3" = 1'-0" 328403.13-02



GENERAL NOTES:
1. VERIFY LOCATION AND DETAILS OF CONNECTION WITH OWNER
2. VERIFY WATER QUALITY WITH OWNER, PRIOR TO INSTALLATION.

3 INTERIOR CONNECTION WITH RPZ & METER DETAIL

1/2" = 1'-0" 328409.73-95



1. FINISHED GRADE
2. TORO ANGLE REMOTE CONTROL VALVE WITH FLOW CONTROL. MODEL NO. P252-26-X0 SEE SPECS. & LEGEND
3. CONTROL WIRES WITH 12" MIN. SERVICE COIL AND WATERPROOF WIRE SPLICE CONNECTORS
4. VALVE BOX & COVER
5. PVC MAIN LINE LENGTH AS REQUIRED
6. PVC ELBOW
7. PVC LATERAL LINE SEE SPECS. FOR DEPTH
8. PVC BALL VALVE ON MAIN LINE SIDE OF VALVE
9. VALVE BOX EXTENSION
10. CONTINUOUS BRICK SUPPORTS
11. GRAVEL (1 CU. FT.)
12. PVC TEE OR ELBOW (TYP.)
13. PVC MAIN LINE (TYP.) SEE SPECS. FOR DEPTH

NOTES:
SEE PLANS, LEGEND AND SPECIFICATIONS FOR ADDITIONAL INSTALLATION NOTES.

4 TORO P252 ELECTRIC VALVE W/ SHUT OFF

1 1/2" = 1'-0" 328406.13-16

PUMP STATION SPECIFICATIONS:
NAME: *MINNEAPOLIS CONVENTION CENTER*
STATION MODEL: SHSTV-1-(?K)-15-208-3-140-90
STATION TOTAL PERFORMANCE: 140 GPM @ 90 PSI
MAXIMUM LIFT = 14'-0"
PUMP HORSEPOWER:
PUMP NO.1: 15 HP (3600RPM)

MIN SUGGESTED CIRCUIT BREAKER: 60 AMP
POWER REQUIREMENTS: 208V, 60HZ, 3PHZ, 41 FLA

DESCRIPTION OF OPERATION:

PUMP WILL START VIA PRESSURE DROP SENSED IN WATER MAINLINE AND REGULATE A CONSTANT PRESSURE AT VARIABLE FLOW RATE. PUMP WILL RETIRE BASED UPON AN ADJUSTABLE MINIMUM WATER DEMAND (FLOW) AND SUSTAINED REGULATE PRESSURE.

WATER WILL BE DRAWN OUT OF TANK. ONCE USER ADJUSTABLE LEVEL SET POINT IS SATISFIED THE AUTOMATIC VALVE(S) WILL SWITCH TO CITY WATER AND THE PUMP WILL SHUT DOWN. VALVE(S) WILL ALSO BE ENGAGED WHENEVER PUMP IS DISABLED VIA ALARM OR IN THE OFF POSITION. A MANUAL OVER RIDE BUTTON WILL ALSO BE LOCATED ON THE OPERATOR INTERFACE. VALVE(S) WILL SWITCH BACK TO TANK WATER WHEN LEVEL RISES ABOVE USER ADJUSTABLE SET POINT. AUTOMATIC SWITCH TO CITY WATER UPON A POWER FAILURE IS AN AVAILABLE OPTION, SEE QUOTE FOR INCLUSION.

PUMP SYSTEM WILL TOTALIZE ALL WATER PUMPED AND ALL CITY MAKE UP WATER USED.

AUTOMATIC DISCHARGE FILTRATION SHALL BE FLUSHED UPON (3) INPUTS. DIFFERENTIAL PRESSURE, TOTAL GALLONS PUMPED, AND TIMED INTERVAL WHICHEVER OCCURS FIRST. FILTER SHALL ALSO HAVE ALARM AFTER (3) FLUSH CYCLES AND PRESSURE DIFFERENTIAL IS NOT RESTORED TO CLEAN SCREEN.

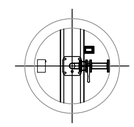
OWNER RESPONSIBLE FOR CITY WATER METER, BACK FLOW PREVENTER AND ANY OTHER REGULATING DEVICES THAT MAY BE REQUIRED. OWNER RESPONSIBLE FOR VERIFYING CITY WATER CAPACITY MUST SUPPLY A MIN 140 GPM @ 90 PSI TO RAINWATER CONTROL SKID, AND NOT EXCEED 125PSI.

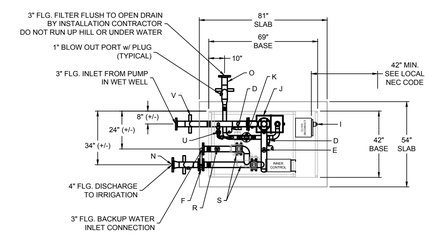
SYSTEM SHALL HAVE THE FOLLOWING ALARMS AT MINIMUM
-HIGH DISCHARGE PRESSURE
-LOW DISCHARGE PRESSURE
-VFD FAULT
-LOW LOW LEVEL SHUT DOWN (HARD FAULT)
-LOW LEVEL ALARM (SOFT FAULT)
-FILTER ALARM
-PIPE FILL ALARM (SYSTEM CAN NOT PRESSURIZE)
-LOSS OF PHASE OR PHASE REVERSAL
-HIGH VOLTAGE
-LOW VOLTAGE
-CONTROL POWER ALARM

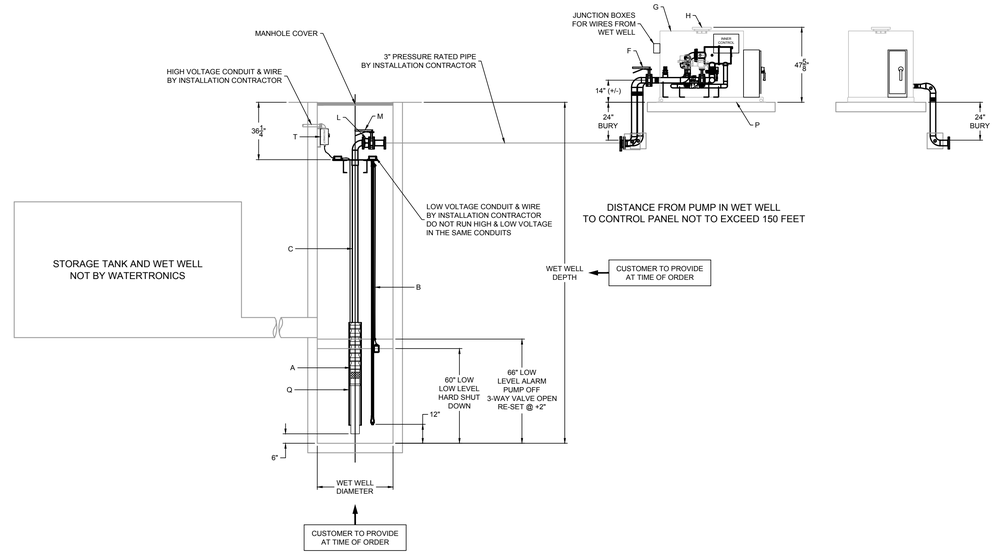
CONTROL PANEL TO INCLUDE:
-COLOR TOUCHSCREEN OPERATOR INTERFACE
-FILTER CONTROLS AND DISPLAY
-FLOW SENSOR DISPLAY AND TOTALIZERS
-PSI DISPLAY AND SET POINTS
-AUTO RE-ENABLING OF PUMP BASED UPON WATER AVAILABILITY
-PUMP RUNNING STATUS & RUN-TIME HRS
-LEVEL CONTROLS AND DISPLAY IN "INCHES" & "GALLONS"
-USER ABILITY TO ADJUST ALL SYSTEM PARAMETERS
-VFD PRESSURE REGULATION FOR ENERGY EFFICIENCY
-BRANCH CIRCUIT PROTECTION
-U.L. 508 LISTED CONTROL PANEL ASSEMBLY
-PROGRAMABLE PLC "programable logic controller"
-NON-FUSABLE MAIN DISCONNECT
-HOA (hand, off, auto) SWITCH FOR PUMP
-SERIAL MODBUS PLC CAPABILITY

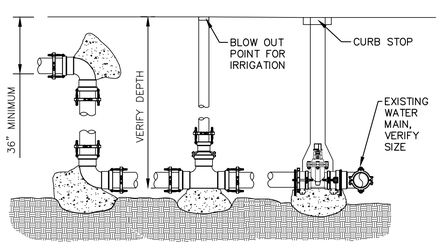
NOTES:
1. CONCEPT ONLY DRAWING NOT TO SCALE.
2. DO NOT RULER OR MEASURE IN A-CAD SPACE.
3. DO NOT RULER DRAWING!
4. ALL WIRE AND CONDUIT FROM REMOTE COMPONENTS TO CONTROL PANEL NOT SUPPLIED BY WATERTRONICS.
5. INSTALLATION OF PUMP EQUIPMENT SHALL BE BY EXPERIENCED AUTOMATIC PUMP/CONTROLS CONTRACTOR.

STATION COMPONENTS:
A 15 HP PUMP AND MOTOR
B LEVEL TRANSDUCER ASSEMBLY w/ BACK UP FLOAT
C PUMP DISCHARGE PIPE
D PRESSURE TRANSDUCER W/ GAUGE
E PUMP FLOW SENSOR
F DISCHARGE ISOLATION VALVE
G PAINTED ENCLOSURE (SANDSTONE)
H STATION FAN HOOD MOUNTED
I PUMP STATION CONTROL PANEL w/ DISCONNECT
J AUTOMATIC FILTER w/ 300 MICRON SCREEN
K FILTER FLUSH VALVE
L CHECK VALVE
M PUMP ISOLATION VALVE
N 4" FLG. DISCHARGE DROP PIPE
O 3" FLG. FILTER FLUSH DROP PIPE
P PAINTED STEEL BASE (SANDSTONE)
Q FLOW INDUCER SLEEVE FOR MOTOR COOLING
R BACKUP WATER FLOW SENSOR
S BACKUP WATER VALVE w/ ELECTRIC ACTUATOR
T NEMA 4X REMOTE DISCONNECT
U PRESSURE RELIEF VALVE
V 3" FLG. INLET DROP PIPE









5 POINT OF CONNECTION

3/4" = 1'-0" 32 8409.73-69

6 MINNEAPOLIS CONVENTION CENTER - RAIN WATER PUMP

1/4" = 1'-0" 32 8409.53-47

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RAINWATER STORAGE AND IRRIGATION SYSTEM RETROFIT

DRAWING TITLE:
IRRIGATION DETAILS

FILE: ..\120383\600 Drawings\C\120383 IRR1 Irrigation Plans.dwg
DRAWN BY:
CHECKED BY:
PROJ. NO: 120383
DRAWING NO: IRR-4