



Chaska

2020

**Engineering
Guidelines**

Chaska Municipal Services Building

660 Victoria Drive, Chaska, MN 55318

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F O R W A R D

It is the goal and objective of the City that Chaska be the best small town in Minnesota. To accomplish this, it is necessary to provide quality development and assure uniform performance standards for the citizens of Chaska. To implement this objective, it is important that certain guidelines be adopted in order to standardize engineering requirements for Developers and their Consultant Engineers within the City of Chaska.

This manual outlines certain requirements, materials and standards that should be incorporated into the preparation of plans and specifications for sanitary sewer, storm sewer, water main and street construction within the City of Chaska.

This manual is NOT a specification in itself. Developers and their Engineers in charge of construction activity within the City are expected to prepare a complete and competent set of specifications for their work.

This manual is intended as a reference source of information, standards and data. Particular sections or information in this manual may be incorporated into project specifications by reference as deemed appropriate by the writer, provided this manual is made available to those to whom the reference is intended. Developers and their Engineers must comply with the requirements outlined in this manual.

City Engineer

Consultant Engineer

June 2016

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TABLE OF CONTENTS

Chapter 1.	Definition of Terms
Chapter 2.	General Engineering Requirements
Chapter 3.	Construction Plan Standards
Chapter 4.	Standard Plates
Chapter 5.	Standard Materials
Chapter 6.	Testing Requirements
Chapter 7.	Construction Requirements
Chapter 8.	Other Utility Information
Chapter 9.	Miscellaneous
Chapter 10.	Policy for Erosion and Siltation Control
Chapter 11.	Policy on Working Within the Public Right of Way
Chapter 12.	Policy on Building Permits and Occupancy Permits
Chapter 13.	Policy on Underground Electric Installation
Chapter 14.	Policy on Special Assessments
Chapter 15.	Wastewater Pumping Station Standards

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ENGINEERING GUIDELINES

CHAPTER 1 - Definition of Terms

Benchmark:	Shall mean a permanent or semi-permanent physical mark of known elevation. The elevation shall be tied to the U.S.G.S. Sea Level Datum.
Builder:	Shall mean the person applying for and receiving a building permit to perform the work requested in said permit.
Building Official:	Shall mean the duly appointed Building Official of the City of Chaska or his/her designated representative.
City:	Shall mean the City of Chaska, Carver County, Minnesota.
City Council or Council:	Shall mean the City Council of the City of Chaska.
City Engineer:	Shall mean the duly appointed City Engineer of the City of Chaska or his/her designated representatives.
Director of Planning and Development:	Shall mean the duly appointed Director of Planning and Development of the City of Chaska or his/her designated representatives.
Contract Documents:	Shall mean, unless the context provides otherwise, either a Developer's Agreement entered into between the City and the Developer; or, any Agreement existing between two or more persons, whether written or oral, setting forth the obligations of each party.
Contractor:	Shall mean, depending on the context, a person under contract with the City to perform labor or work for the City; or a person under contract with a Developer to install municipal improvements required by the subdivision regulations of the City.
Construction:	Is the total process of furnishing labor, material and equipment to arrange and combine the parts into a completed project in accordance with the approved plans and specifications.
Developer:	Shall mean the person who has, or proposes to, execute a developers agreement with the City of Chaska for the purpose of subdividing land within the City; and shall, where appropriate, include Developer, Developer's Engineer, Contractor Agents or Employees either individually or collectively.

Engineering Technician:	Shall mean duly appointed Engineering Technician of the City of Chaska or his/her designated representatives.
Person:	Shall mean an individual, corporation, partnership or any combination thereof.
Plans:	The approved drawings which include plan views, profiles, cross sections, working drawings, details, and supplemental drawings, or exact reproductions thereof, which show the location, character, dimensions, extent, limits and all else necessary to complete the work covered by the project.
Public Works Superintendent:	Shall mean the duly appointed Superintendent of Public Works for the City of Chaska or his/her designated representative.
Public Utilities Superintendent:	Shall mean the duly appointed Superintendent of Utilities for the City of Chaska or his/her designated representative.
Record Plans:	Shall mean the corrected or adjusted construction plans that accurately show the distances, elevations, dimensions, details and all other changes to reflect the actually completed work as constructed.
Specifications:	The body of written directives, provisions, and requirements made pertaining to the methods or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract; and outlining the obligations and responsibilities of the parties to the contract; and setting forth the method of payment and the duration of the work.
Standard Plates:	Shall mean those detail drawings or plates prepared for and approved by the City of Chaska. Such plates can be obtained at the Chaska Municipal Services Building.
Approved Plat:	Shall mean a final plat that has been accepted by the City Council and is recorded at the Carver County Court House.

End of Section

CHAPTER 2 - General Engineering Requirements:

As set forth in various sections of the City Ordinances, Developers of property within the City of Chaska are required to submit certain plans and specifications for review and approval by the City. These include such items as grading plans, drainage plans, topographic surveys, plats, street plans, utility plans and project specifications. These plans and specifications shall be prepared by competent professionals licensed to practice in the State of Minnesota.

The professional services required of the Developer might include an Architect, Land Surveyor, Planner and Engineer. The engineering services include not only preparation of plans and specifications, but also field staking, contract administration, and inspection in order to assure the City of a quality product and to assure that the completed project is in conformance with the approved plans and specifications.

Developers have a choice in determining how the required improvements will be constructed. The improvements can either be constructed and financed under Plan A at the Developer's cost, or the Developer can request that they be installed as a public improvement project under Plan B. The City Council has the right to accept or to reject any request for Plan B improvements.

A. If the Developer installs required public improvements within the development under Plan A, the following procedures shall be followed:

1. Developer shall submit plans, specifications, and copies of all design calculations to the City for review and approval. These plans are to be prepared by a registered professional Engineer as defined by the appropriate state statutes and shall be in accordance with City standards as outlined in the City Comprehensive Plan. Specific Sections of the Plan are:
 - a. Land use.
 - b. Housing.
 - c. Transportation.
 - d. Sanitary sewers.
 - e. Storm sewers.
 - f. Water supply and distribution.
 - g. Park and recreation.
 - h. Environmental protection.

The Environmental Protection Section of the Comprehensive Plan has been expanded with the addition of the Local Surface Water Management Plan (2015). A copy is on file in the City Engineers Office. Developers are advised to review this plan which provides

information on Regional Water Quality Treatment Ponds, objectives for specific Water Quality Districts, detailed wetland information and inventory maps.

All streets are to be designed to meet or exceed MnDOT standards for 30 MPH vertical and horizontal curve data.

2. A pre-construction meeting of all involved parties is required prior to any work taking place.
3. Developer shall submit a storm water pollution prevention plan (SWPPP) to the City, Carver County Planning Department, and Carver Soil and Water Conservation District for review and approval. No work is to begin until all erosion and sediment control facilities are in place.
4. Developer will provide competent engineering services for staking and contract administration for the construction of said improvements, unless other arrangements are made in advance with the City.
5. Developer shall be responsible for all site and material testing. Testing shall include but not be limited to all utility testing, soil borings, and street and concrete construction material testing. Copies of all test reports shall be given to City.
6. Copies of all bids, change orders, written field instruction, test reports, etc. shall be forwarded to the Engineering Technician in a timely manner.
7. Developer agrees to furnish to the City a list of contractors and suppliers being considered for retention by the Developer for the performance of the work required within the development.
8. Any changes or modification to the plans or specifications shall be submitted to the City and approved by the City Engineer in writing before they are implemented.
9. All time that the City provides for inspection work and related items will be charged back to the Developer. The City must be notified a minimum of 48 hours in advance of all tests required by the work so it's representative can be present at the time tests are made. Failure to notify or to provide adequate notice will require the tests to be repeated at a later date.
10. Upon completion of all work required, the Engineering Technician, sewer and water representative, a representative of the Contractor and a representative of the Developer's Engineer will make a final inspection of the completed work. Before final payment is made to the Contractor by the Developer, the Engineering Technician shall be satisfied that all work is satisfactorily completed in accordance with the approved plans and specifications including all utility tests. The Developer's Engineer shall submit a written statement to the Engineering Technician attesting that to the best of his/her knowledge the work has been completed in accordance with the approved plans and specifications. Acceptance of said work shall be made by resolution of the City Council upon the recommendation of the Community Development Director and the City Engineer.

11. Guarantee Period - If within the time prescribed by law or by the terms of any applicable special guarantees required by the contract documents, any of the work is found to be defective or not in accordance with the contract documents, the Developer shall correct it promptly after receipt of written notice from the City to do so. The City shall give prompt notice after discovery of the condition.

Unless otherwise noted for a longer period in the contract documents, the Developer shall guarantee all work, material and equipment furnished for a period of two year from the date of written acceptance of the work or project by the City Council. The Developer shall require any contractor doing work within the development to provide a contractor's maintenance bond to assure compliance with these guarantee provisions.

12. Upon completion of the work, the Developer shall provide the City a complete set of a full size and half size electronic PDF as-built plan set for the City records as outlined in this manual along with a full size and half size paper copy. Such record plans shall be completed and submitted to the Engineering Technician within three (3) months of completion of the work. At a minimum said as-built plans shall include:

General

- Keep all sheets as clean & simple as possible (eliminate unneeded data).
- On sanitary and water sheets, show storm and street info shaded (half-tone).
- On storm and street sheets, show sanitary and water info shaded (half-tone). Also include horizontal/centerline alignment information, these sheets only.
- Show addresses along with lot and block info on all sheets (contact building department for addresses if needed).
- Construction contractor's name should be noted on each page.
- Date of Record Plan should be shown on each page.

Sanitary

- As-constructed elevations (Rim & Invert), pipe types, size, length, and grades for all lines that vary from the plan should be noted in italics (No Cross-outs).
- Any deviation from the plan (Mainline, Manhole, or Service locations) will be shown in the as-constructed location on the Record Drawings.

Water

- Ties to all gate valves and plug ends from permanent structures, building corners, etc.
- Elevation of top nut on each hydrant.
- Any deviations of fittings from those shown on the plan should be tied and noted on plans.

Services

- Provide stationing for sanitary service wyes and corporation stops.
- Ties to all curb stops and sewer service locating boxes
- Any deviation from the plan will be shown in the as-constructed location on the record drawings.

Storm

- As-constructed elevations (Rim & Invert), pipe types, size, lengths, and grades for all lines that vary from the plan should be noted in italics (No Cross-outs).

- Any deviation from the plan (Mainline, Manhole, or Service Locations) will be shown in the as-constructed location on the Record Drawings.

Topographic

- Streets, Curb and Gutter, Sidewalk, Trees, and Hardscape Landscaping.

- * The City of Chaska recommends submitting an electronic or paper copy for review prior to creating the final record plan sets.

13. Along with a digital format copy, the Developer or its Surveyor/Engineer shall provide to the City a copy of the plat and utility improvements on compact disc. The format of this file shall be in an AutoCAD drawing file 2013 edition or newer (See Chapter 3, Part C).

- B. If the Developer requests the City of Chaska to install required public improvements within the development, and the City Council approves such request, the following procedures shall be followed:

1. Developer shall submit a preliminary plat and sufficient preliminary utility layouts to enable the City Staff to review the proposed development and to determine that the development can be provided with utility service.
2. The City of Chaska will provide a final design for the approved plat, and will prepare construction plans and specifications for the utility and street improvements. The City of Chaska will also administer the construction contract and arrange for construction financing.
3. The Developer will be responsible for providing a street section design when required by the Owner. The street section design would include, at minimum, current ADT, projected 20 year ADT, project design ESALS, assumed R value, proposed design section, and all documentation used to calculate these values.
4. Developer will be responsible for site grading and for rough grading the street right-of-ways. The Developer will also be responsible for erosion control at a minimum as outlined in the SWPPP, as outlined in Paragraph A.3 above.
5. Developer will provide all on-site improvements required by the final approval of the subdivision, including such items as landscaping; special berming; storm water holding ponds; paths and walkways; etc.
6. Project costs incurred by the City may be assessed to the property of the Developer, including construction, design, inspection, record plans, and administrative costs, consistent with the City's adopted special assessment policies.

- C. A request for interpretation of any provision of this manual shall be appealed first to the Community Development Director and then to City Council. The decision of the City Council is final.

End of Section

CHAPTER 3 - Construction Plan Standards

In order to standardize construction and record plans so as to make these plans uniform, the guidelines listed below shall be followed.

A. General Requirements:

1. All sheets shall be 22" x 34" or 24" x 36" in size.
2. A standard title sheet shall be prepared in accordance with Standard Plate GEN-3 for each project plan set. In addition, each plan sheet shall be clearly labeled with sheet number, project name, identification of improvement, and other appropriate information.
3. A location plan shall be prepared on a separate sheet, at the scale of 1" = 200', indicating the entire project. An index of the construction plan sheets involved with the work and their location within the project shall be shown on the plan.
4. All detail drawings shall be on a separate sheet or sheets and referenced to the proper sheet.
5. Standard Plate GEN-2 shall be used as a guide for all lettering and symbols.
6. Scale - Horizontal Scale - 1" = 50'
Vertical Scale - 1" = 10' or 1" = 5'(if necessary)
7. All parcels shall be properly labeled with lot and block numbers and plat name, or parcel identification number (PIN) in unplatted areas.
8. All streets shall be clearly labeled.
9. All match line breaks shall be clean with reference points clearly marked. All plans which are broken by a match line shall be on the same or consecutive sheets.
10. Existing utilities shall be shown, stationed, and labeled as existing.
11. Approximate locations of gas, electric, and telephone lines shall be shown.
12. Right-of-way and pavement or curb and gutter alignment data shall be shown.
13. All plans shall have properly placed north arrows for each plan sheet. Whenever possible, the north arrows should point up or to the left of the sheet.
14. Bench marks shall be placed on all plan and profile sheets.
15. All easement lines shown on construction plans.

16. The plan stationing should run from south to north and from west to east wherever practical.
17. Every sheet should have a bar scale, typically located in the lower right of the plan view.
18. Construction notes and labels should be done with a L120 style.

B. Specific Requirements:

1. The following utilities shall be located as indicated below, to the extent practical:
 - a. Sanitary Sewer - on centerline of street.
 - b. Water Main - 10 feet north and east of centerline.
 - c. Storm Sewer - under the south and west curb line.
2. All sewer and water main shall be shown in profile with the appropriate information for size, material, grade, invert elevations, etc. Water main profiles may be omitted if water main is existing or if the street grade is indicated and the water main is installed to a uniform and standard depth, with depth noted.

*add the following note to all water main plan sheets “**Contractors are not to operate existing gate valves or hydrants, except under extreme emergency conditions.**”

3. The profile shall be directly below the plan with the stationing aligned as closely as practical. Stationing shall be shown on the plan view as well as on the profile.
4. All manholes shall be numbered in both plan and profile views.
5. All hydrants, gate valves, and tees shall be stationed on the bottom of the profile. All hydrants shall be installed to the proper height and location as indicated in Standard Plate WAT-2. Hydrants spacing shall not exceed 300 feet as measured along the centerline of the street. Hydrants shall have an as-built elevation indicated. All water main fittings shall be called out on water main/sewer plans.
6. If risers are placed, the height of each riser shall be indicated on the plans and each riser shall be drawn on the profile view to scale.
7. All sanitary services shall be drawn on the plan to the constructed length and the length, size, and type noted. Indicate if jacked. Stationing of sanitary sewer wyes shall be indicated by an "S" in front of the stationing. Distance shall be measured from the downstream manhole or center line roadway stationing.
8. On combination sewer and water projects, services should be located in the same trench with the sanitary sewer service line placed three feet downstream of the water service line. This should be noted on the plans and "S & W" placed before the distance measured from the downstream manhole or center line roadway stationing.

9. If sanitary sewer wye only is constructed, it shall be noted as "Wye Only" after the distance measured from the downstream manhole or center line roadway stationing.
10. Stationing of water corporation stops shall be indicated by "W" in front of stationing, if separate from sanitary sewer service.
11. All water services shall be drawn to constructed length and length noted if other than to the easement. Indicate if jacked.
12. Storm sewer plans shall indicate boundary or limits of ponding easement, pond outline, normal water elevation, high water elevation, acre-feet of storage, discharge rate of flow, and outlet control device for each pond. Upon completion of pond construction, ponds shall be cross sectioned to confirm that they have been constructed to the proper volume and shape together with the outlet control elevations as part of the survey. Record plans shall be prepared for all ponding areas.
13. Street plans will indicate location of sump line as required for areas where site grading does not accommodate rear lot drainage. Additional provisions for site drainage improvements may be required by the City.
14. After completion of construction, all manholes, catch basins, hydrants and other elements of the project shall be re-measured with an as-built field survey. The plans shall be corrected and modified to show the correct locations, distances, elevations, dimensions and any other change in the specific details of the plans. All changes and modifications on the record plan shall be drawn to scale to accurately represent the work as constructed. Incorrect elevations, distances etc. shall be erased from the original plan sheets and redrawn as necessary to complete the record plan.
15. All record plans will be clearly legible drawings, accurately drawn to scale. Proper notes and statements as required in this manual will be placed on the plans.
16. All gate valves shall be field tied with at least 2 ties no greater than 200' using the following priority:
 - a. Fire hydrants.
 - b. Manholes.
 - c. Catch basins, if curb and gutter is constructed. (Back of Curb is acceptable for 1 tie)
 - d. Buildings or other permanent structures. (This option is least desired as such structures could be altered or removed without the City's knowledge)
17. All services shall be field tied with at least 2 ties, no greater than 200' using the following priority:
 - a. Fire hydrants.

- b. Manholes.
- c. Catch basins. (Back of Curb is acceptable for 1 tie)
- d. The building or structure being served, with address.
- e. Neighboring structures, with the address noted.
- f. Other permanent structures (bridges, tel. boxes, etc).

(Options d – f are less desired as such structures could be altered or removed without the City’s knowledge)

18. See electronic submittal standards for plans prepared using CAD.

C. Electronic Plan Submittal Standards:

1. Introduction:

- a. The purpose of this section is to acquaint the design professional with city standards. City standards must be followed for all improvement projects. While multiple consultants may prepare plans for the City, it is important that plans look consistent and data is submitted in a consistent format.
- b. It should be noted that individual projects might have drafting standards that vary from those outlined in this manual. The consultant should contact the City and explain conditions and get permission before varying from city standards.
- c. Each year the base maps of the city are updated with all of the projects that were constructed during that year. The following information must be submitted to the City of Chaska once the Record Plan is completed. After this information is submitted, the base maps are then updated to represent the As-Built information.

2. Deliverables:

- a. A complete PDF of both the construction plan set and the as-built/record plan set.
- b. Record Plan submittal must include AutoCAD .dwg base/model files and layout sheets.
- c. AutoCAD (survey as-built.dwg) base file with just the as-built survey shots along with a Comma Delineated (csv) file in PNEZD format of the as-built survey in Carver County Coordinate System (US feet).
- d. All plans shall be drawn using Carver County Coordinate System (US feet).

- e. All layering in CAD drawings shall conform to National CAD Standards layering guidelines.
- f. All drawing files should be submitted in AutoCAD release 2013 edition or newer.
- g. Submittals should include pen table used for plotting plan sheets.
- h. All sanitary and storm sewer lines representing pipes must be continuous between structures, with endpoints snapped to the insertion point of the structures. The direction of the line must be drawn from upstream to downstream and represent the actual pipe location from the as-built field survey. All water main lines representing pipes must be continuous poly lines with breaks only at tees, crosses, reducers, valves, and project limits. Force main should follow the same requirements as water main pipes. Line work must include updated object data attached to the appropriate entities described. (See l. below for more information on object data)
- i. Blocks must be used to represent structures. The insertion point of the block must represent the record plan survey location of the center of the structure and be the same as the endpoint of the lines. The blocks that should be used are provided by the City of Chaska on a CD. The blocks should be rotated accordingly for the type of structure it represents. Outlet structures, flared end sections, valves, and hydrants must align correctly relative to the pipe. Catch basins must be rotated to be aligned to the curb. Block work must include updated object data attached to the appropriate entities described. (See l. below for more information on object data)
- j. Services must be shown and drawn correctly. They must be on their own layer.
- k. Ponds must be represented by two closed polylines, representing normal water level and high water level.
- l. Object Data attached to line/blocks must at a minimum include:

Structures/Blocks

Layer Name

Rim Elevation (Storm and Sanitary)

Invert Elevation (Storm and Sanitary)

Casting Type (Storm and Sanitary)

Size

Top Nut Elevation (Water/Hydrant)

Pipes/Lines

Layer Name

Length

Pipe Size

From Invert Elevation (Storm and Sanitary)

To Invert Elevation (Storm and Sanitary)

Material

3. General Information:

- a. Base Drawings(s): These drawings typically include line work and symbols for the proposed improvements, i.e. property lines, sanitary sewer, water main, storm sewer, sewer and water services lines, manholes, hydrants, valves, curb lines, sidewalk, trails etc. This drawing will be used as an external referenced file in all your layout sheets.

When there are existing conditions, or other topography surveys, that information should be in a separate drawing. This drawing will be used as an external referenced file in all your layout sheets.

Base drawings will ultimately be incorporated into the city's base maps. It is critical that accurate drafting procedures are used. All line work representing pipes shall be continuous, with the endpoints of all lines snapped to the center of structures. The direction of the line drawn for sanitary sewer and storm sewer pipe must be drawn from upstream to downstream. All structures must be represented with a block. Blocks shall be positioned with the insertion point of the block at the center of the structure and at the end points of the pipes. Block scales shall be at the scale factor of the base drawing, usually 50. Rotation angles of block shall align correctly to relative pipe work. The blocks are provided on the CD.

- b. Layout Sheets: The sheets typically have the base drawing, existing conditions, and the border drawing referenced into them. All annotation should be done in these layout sheets. Typically all annotation is done in model space. ESC Plan sheets shall contain topographic and other information as required by the NPDES Construction Permit.

Sheets that contain profile views must show the plan view on the same sheet. Plan view should be on the upper half of the sheet and profile views on the lower half.

End of Section

CHAPTER 4 - Standard Plates

The following Standard Plates shall be used in the preparation of plans and specifications. Those Standard Plates that are appropriate to the project should be incorporated into the plans and specifications. Copies of Standard Plates may be obtained from the Public Works Coordinator for the cost of reproduction.

A. General:

1. GEN-2 - Drafting Guidelines
2. GEN-3 - Standard Project Cover Sheet
3. GEN-4 - Permanent Barricade
4. GEN-5 - Typical Utility Locations (Public and Private)
5. GEN-5A - Typical Small Utility Corridors with and without sidewalk
6. GEN-6 - Bedding Methods for RCP or DIP
7. GEN-7 - Bedding Methods for PVC
8. GEN-8 - Insulation Detail
9. GEN-9 - Landscape Structures
10. GEN-10 – Orange Construction Safety Fence

B. Sanitary Sewer:

1. SAN-1 - Sanitary Sewer Manhole
2. SAN-1B - Sanitary Manhole HDPE Pipe
3. SAN-2 - Sanitary Sewer Junction Manhole
4. SAN-3 - Sanitary Sewer Junction MH with Reinforced Top Slab
5. SAN-4 - Drop Inlet Manhole
6. SAN-5 - Watertight Casting For Sanitary Sewer MH
7. SAN-6 - Watertight Casting For Flat Slab Sanitary Sewer MH
8. SAN-7 - Typical Forcemain Installation

C. Water Main:

1. WAT-1 - Gate Valve and Box Installation
2. WAT-2 - Valve and Hydrant Installation
3. WAT-3 - Butterfly Valve and Box Installation
4. WAT-4 - Concrete Thrust Blocking
5. WAT-5 - Water Main Wet Tap
6. WAT-6 - Water Main Lowering with Insulation
7. WAT-7 - Typical Water Main Installation
8. WAT-8 - Air Bleed Installation
9. WAT-9 - DIP to C900 Water Main Transition For Tracer Wire
10. WAT-10-Tracer wire for PVC water main
11. WAT-11-Clow Medallion Hydrant and Valve Installation

C. Service Lines:

1. SER-1 - Sewer Service Connection
2. SER-2 - Water Service Connection
3. SER-2A - Water Service Connection
4. SER-3 - Service Riser
5. SER-4 - Service Line Cleanouts
6. SER-5 - VCP Sewer Service Cut In
7. SER-6 - Irrigation Service By Private Contractor

D. Storm Sewer:

1. STO-1 - Storm Sewer Manhole
2. STO-2 - Storm Sewer Junction Manhole
3. STO-3 - Storm Sewer Junction MH with Reinforced Top Slab
4. STO-4 - Perforated Sump Manhole
5. STO-5 - Type II Catch Basin Manhole
6. STO-5A - Type II Catch Basin Manhole Pond Skimmer
7. STO-6 - Type II Catch Basin
8. STO-7 - Double Catch Basin-Type II CB MH with Type II CB
9. STO-8 - Double Type II Catch Basin
10. STO-9 - Precast 27" Shallow Depth Beehive
11. STO-10 - Flared End Section and Trash Guard
12. STO-11 - Rip Rap at Outlets
13. STO-11B - Grouted Rip Rap at Outlets
14. STO-12 - Perforated PVC Pipe – Below Concrete Curb
15. STO-13 - Perforated Pipe – Trench Detail
16. STO-14 - Drain Tile Installation Into Catch Basin Manhole
17. STO-15 - PVC Sump Line Behind Curb
18. STO-16 - Seepage Collar
19. STO-17 - Standard Skimmer Structure
20. STO-18 - Skimmer Structure with Cast-in-Field Concrete Baffle Wall
21. STO-19 - Typical Pond Bench Detail

E. Streets and Trails:

1. STR-1 - Curb and Gutter
2. STR-1A - Non Standard Curb and Gutter
3. STR-2 - Concrete Driveway Apron
4. STR-3 - Commercial Driveway
5. STR-4 - B-618 Curb & Gutter Construction at Catch Basin
6. STR-5 - Surmountable Curb & Gutter Construction at Catch Basin
7. STR-6 - Typical Sections for Residential Streets, Rural
8. STR-7 - Typical Sections for Residential Streets, 7 Ton
9. STR-7A - Typical Sections for Residential Streets, Private
10. STR-8 - Typical Section 9 Ton Street
11. STR-9 - Typical Placement & Sections for Walks & Trails
12. STR-10 - Concrete Curb & Gutter Transition

13. STR-11 - Pedestrian Curb Ramp (Pathway/Sidewalk)
14. STR-12 - Typical Section For Sidewalk Across Commercial Driveway
15. STR-13 - Mailbox Installation
16. STR-14 - Median Sign Installation Detail
17. STR-15 – Stop Sign Installation Detail
18. STR-16 – Typical Street Components/Dimensions
19. STR-17 – Temporary Bituminous Cul-De-Sac

G. Erosion Control:

1. ERO-1A - Silt Fence – Machine Sliced
2. ERO-1B - Silt Fence – Heavy Duty
3. ERO-1C - Silt Fence – Standard
4. ERO-1D - Silt Fence – J-Hook
5. ERO-2 - Erosion Control Blanket Installation
6. ERO-3A - Floating Silt Curtain In Moving Water
7. ERO-3B- Floating Silt Curtain In Still Water
8. ERO-4A - Inlet Protection – For Catch Basin Before Curb Construction
9. ERO-4B - Inlet Protection – For Catch Basin After Curb Construction
10. ERO-4C - Inlet Protection – For Beehive Casting
11. ERO-5 - Ditch Check / Weeper Sizing and Materials
12. ERO-6 - Flared End Erosion Control
13. ERO-7 - Rock Construction Entrance
14. ERO-8A - Temporary Sedimentation Basin – Pipe Outlet
15. ERO-8B - Temporary Sediment Basin – Standpipe Outlet
16. ERO-9 - Temporary Sediment Trap
17. ERO-10 - Slope Tracking
18. ERO-11 - Erosion Control For Lot Grading
19. ERO-12 – Concrete Washout Pit

H. Site Grading:

1. GRD-1 - Required Lot Grading Information
2. GRD-2 - Required Lot Grading Information
3. GRD-3 - Required Lot Grading Information
4. GRD-4 - Required Lot Grading Information
5. GRD-5 - Emergency Overflow Information

I. Electrical:

1. ELC-01 – Light Pole Anchorage Guide and Location
2. ELC-01A-Banner Pole Anchorage Guide

I. Miscellaneous:

1. MIS-1A - Wastewater Pumping Station
2. MIS-1B - Wastewater Pumping Station
3. MIS-1C – Wastewater Pumping Station Miscellaneous Details

End of Section

CHAPTER 5 - Standard Materials

In order to standardize certain construction materials and assure quality construction, the following material requirements have been adopted. Alternative materials may be considered, provided they are approved in writing by the City Engineer prior to their use.

A. Sanitary Sewer:

1. Manhole Frames and Covers - Cast iron for manholes frames and covers shall be of the best grade of cast iron, free from all injurious defects and flaws and shall be Class 35 iron in accordance with ASTM Spec A-48. Each casting shall be sand blasted but no further coating or finish is required. Both the surface of the frame and the cover shall have machine bearing surfaces with two concealed pick holes. The cover shall be self-sealing and include a factory installed gasket. The words "Sanitary Sewer" shall be stamped on the cover in two inch letters. Manhole lids and frames shall be as per standards details.

See Standard Plates for specific manhole casting models and numbers.

2. Internal Seal – Sanitary Manhole Infiltration Barrier
 - a. The sanitary manhole infiltration barrier shall be an I/I Barrier by Strike Products.
 - b. I/I Barriers are to be installed on all sanitary manholes.
 - c. I/I Barriers are to be installed per manufactured recommendations with approved adhesion materials.
3. Exterior Manhole Damp Proofing
 - a. Outer surfaces of all pre-cast sections shall be coated with bituminous or water based acrylic damp proofing at the rate of 30 to 60 square feet per gallon applied in accordance with manufacturer's instructions.
 - 1) Bituminous damp proofing shall be applied in two coats at the rate of 30 to 60 square feet per gallon applied in accordance with manufacturer's instructions.
 - 2) Water based acrylic damp proof coating shall be applied in two coats at a rate of 138 to 344 square feet per gallon applied in accordance with manufacturer's instructions. Water based acrylic damp proof coating shall be ConSeal™ CS-55 manufactured by Concrete Sealants, Inc. or City approved equal.
4. Corrosion Resistant HDPE Manhole Liner - All interior manhole surfaces, except the invert and the casting, shall be covered with sheet liner. Only irregular shaped transition sections shall receive a spray-on coating. Sheet liner field joints will be required between each section of precast at all pipe penetrations and all other

openings. Sheet liner field joints shall be made with a separate 4-inch joint strip and 2 welding strips.

- a. HDPE liner shall be Studliner as manufactured by GSE Lining Technology, Inc., SureGrip as manufactured by AGRU, or City approved equal. Liner should be installed to all manufacturer specifications and requirements.
 - 1) The material used in the embedment liner and in all welding strips shall be made from 97 to 98-percent virgin high density polyethylene and 2 to 3-percent carbon black or pigmentation for purpose of an otherwise specified color. Plasticizers shall not be added to the resin formulation.
 - 2) Embedment sheets for field installation shall be produced in rolls that are 8-feet in width with 80 mils thickness for precast pipe and maintenance structures.
 - 3) Locking studs of the same material as that of the liner shall be integrally extruded with the sheet.
 - 4) Liner shall have demonstrated good chemical resistance.
 - 5) Weld strips shall have good impact resistance, be flexible, and have an elongation sufficient to bridge up to 0.5 inch settling cracks, which may occur in the pipe or in the joint after installation, without damage to the strip.
 - 6) The lining shall be repairable at any time after installation in pipe, maintenance structures by methods approved and recommended by the manufacturer.
 - 7) Pipe embedment sheets shall be supplied as pipe size sheets or tubes fabricated by shop welding the basic size sheets together. Shop welds shall be made by a butt weld and fusing the sheets together by a thermal process such as an extrusion weld, fusion weld, or equal so as to produce continuous welded seams. Specimens taken from shop-welded seams shall show no cracks or separations and shall be tested in tension. Each specimen shall withstand minimum shear strength of 60 percent of parent tensile yield strength.
 - 8) Joint strips for pipe seaming shall be a minimum width of 6 inches. Thickness of joint strips shall be equivalent to that of the liner.
 - 9) Corrosion Resistant Lining: The corrosion resistant liner shall meet the following criteria. The liner will be inspected by the Engineer for these criteria prior to acceptance of the liner at the Site:
 - a) Fabrication Defect Tolerances
 - i. Wrinkles that intrude into MH wall
 - a. Length: 6 inches maximum
 - b. Depth: 1/4-inch maximum
 - ii. Bubbles that intrude into the MH interior Tolerances
 - a. Bubble Area: 1 square foot maximum
 - b. Bubble Height: 1/4-inch maximum
 - c. No voids are permitted behind the liner
 - iii. Liner Tears
 - a. Length: 6 inches maximum
 - b. Must be factory repaired with liner patch welded in place

10) Liner Joints

- a) Transverse: Located at pipe riser joints only. No intermediate joints are permitted, except at cone sections. Overlap or cap-strip type is permitted.
- b) Longitudinal: Only liner manufacturer flush-faced, factory seamed longitudinal joints forming liner tubes are acceptable.

11) HDPE Liner Welder Qualifications

- a) Each welder shall pass a qualification test before doing any welding. Re-qualification may be required at any time deemed necessary by the Engineer. Test welds shall consist of the following:
 - i. 2 pieces of liner, at least 15 inches long and 9 inches wide shall be lapped 1-1/2 inches and held in a vertical position.
 - ii. 3 test specimens shall be cut from the welded sample and tested in tension across the welds. If none of these specimens fail when tested as indicated, the weld will be considered satisfactory.
- b) The weld specimen will be tested by the Engineer as follows:
 - i. Each welding strip tab, tested separately, shall be subjected to a 10-pound pull perpendicular to the face of the liner with the liner secured firmly in place. There shall be no separation between the welding strip and liner.
 - ii. 3 test specimens shall be cut from the welded sample and tested in tension across the welds. If none of these specimens fail when tested as indicated, the weld will be considered satisfactory.
 - iii. If 1 specimen fails to pass the tension test, a retest will be permitted. The retest shall consist of testing three additional specimens cut from the original welded sample. If all 3 of the retest specimens pass the test, the weld will be considered satisfactory.

5. Sanitary Sewer Pipe:

- a. Reinforced concrete pipe (RCP) shall conform to the requirements of the Standard Specifications for Reinforced Concrete Sewer Pipe, ASTM Designation C-76 of the class designated on the plans and in the specifications. Pipe joints shall meet the requirements of ASTM Specification C-361 and shall be the Bureau of Reclamation Type R-4.
- b. Polyvinyl chloride pipe (PVC) and fittings shall be used for gravity sewers 8 inches through 15 inches diameter up to a maximum cover of 22 feet and shall conform to ASTM Specification D-3034. Pipe shall be produced by a continuous extrusion process using Type 1, Grade 1 material as defined in ASTM Specification D-1784. SDR 35 pipe shall be used up to 16 feet in depth; SDR 26 shall be used from 16 feet to 22 feet in depth; C900 PVC (DR 18) shall be used from 22 feet + in depth.
- c. Ductile iron pipe (DIP) or C900 PVC (DR-18) shall be used for sanitary sewer force mains and for gravity sewer over 22 feet in depth. DIP shall conform to the requirements of AWWA Standard C-151 for the class of pipe indicated on the plans and the specifications. Minimum of class 52 pipe shall be used. PVC pipe and fittings shall conform to the requirements as specified in Watermain, paragraph

B.2.b. All ductile iron pipe shall be encased in a polyethylene film wrap in accordance with AWWA Standard C-115/ASTM A674. All ductile iron pipe shall have mechanical or push-on type joints. The interior coating of the pipe shall consist of a Protecto 401 Ceramic Epoxy lining or City approved equal product. The fittings shall have fusion-bonded epoxy and/or fusion bonded polyethylene lining. The total thickness for the fusion bonded epoxy/fusion bonded polyethylene lining shall be 50 mil minimum in the barrel of the pipe and shall extend through the bell of the pipe. All joints and fittings shall have an epoxy exterior coating in accordance with AWWA Standard C-116 and an interior coating recommended by the manufacturer for sewer service. Coatings and linings other than that list above shall NOT be used without written approval from the City of Chaska Utility Superintendent. All DIP sanitary sewer shall be televised prior to acceptance to ensure that the interior coating of the pipe has not been damaged or scratched. Alternate methods of verification of interior coating must be approved by the City of Chaska Utility Superintendent.

- d. Sewer Service pipe and fittings shall be Poly (Vinyl Chloride) (PVC) Schedule 40 installed in accordance with Standard Detail SER – 1. Services are to include tracer wire and tracer wire box as outlined on the Detail. Traceability of all installed services must be documented and provide to the City Utility Department.
 - e. Service riser pipe shall be in 4" PVC, Schedule 40 or C900 sewer pipe installed in accordance with Standard Detail SER-3.
 - f. Sewer wye – Match pipe material type standard PVC pipe. For deep sewer that requires C900 or Ductile Iron Pipe, use epoxy coated ductile iron tees. Epoxy coated ductile iron wyes may be used with approval of the City of Chaska Utility Superintendent.
6. Improved foundation for pipe sewer shall meet the requirements of MnDOT Specification 3149-H, Course Filter Aggregate, except that hard, durable crushed carbonate quarry rock may be used.

B. Water Main:

- 1. Water Materials used in the City of Chaska shall be all new, and conform to the requirements for class, kind, size and materials as specified below. All materials permanently installed in the work shall be Made in America in accordance with Minnesota State Statute 16b.101 Preference for American-Made Materials. The contractor shall submit in writing a list of materials showing the manufacturer designation of all materials. This list must be approved by the City of Chaska or Engineer. All material will be certified lead free with the NSF-372 and NSF/ANSI 61.
- 2. Water main shall be ductile iron pipe (DIP) or polyvinyl chloride (PVC).
 - a. Ductile iron pipe shall be in accordance with AWWA C-151 of the class shown on the plans. All pipe shall be furnished with standard thickness cement mortar lining

conforming to AWWA C-104. All pipe shall have push-on joints as specified in AWWA C-111 and shall be electrically conductive. All water main shall be wrapped with an approved plastic film wrap in accordance with AWWA C-105. Minimum class of pipe to 12" in diameter shall be Class 52; minimum class over 12" in diameter shall be Class 51; unless required otherwise by unusual conditions such as extra depth, bedding conditions or corrosive soil conditions.

- b. PVC water main pipe shall be in accordance AWWA standards as follows: 4 inch to 12 inch in diameter conform to AWWA C900. 14 inch to 48 inch conform to AWWA C-905. All PVC pipe will have cast-iron-pipe equivalent outer diameter. All pipes corresponding to AWWA C-900 (sizes 4 inch to 12 inch) shall have a minimum dimension ratio (DR) of 18 corresponding to a pressure class of 235 psi for PVC. All pipes corresponding to AWWA C-905 (sizes 14 inch to 48 inch) shall have a minimum dimension ratio (DR) of 18 corresponding to a pressure class of 235 psi for PVC. Laying lengths shall be 20 feet (+/- 1 inch) for all pipe sizes. The PVC compound 12454. All couplings shall be elastomeric-gasket conforming to AWWA C900 or AWWA C905.
3. Gate valve and box shall be resilient seat valves in accordance with Standard Plate WAT-1. Gate valves shall be used on water main through 12 inch diameter.
3. Butterfly valve and box shall be in accordance with Standard Plate WAT-3. Butterfly valves shall be used on water main over 12" in diameter.
4. Hydrants shall be Waterous furnished and installed in accordance with Standard Plate WAT-2 and the following requirements:
 - a. Model: WB-67-250.
 - b. Opening Direction: Counter-Clockwise Operating.
 - c. Cover To Top 6" Lead: 7-1/2' 8.0' Standpipe.
 - d. Operating Nut: 1-1/2" Pentagon Nut.
 - e. Caps: 1-1/2" Pentagon Nut W/Chains (One cap shall be vented).
 - f. Hose Connections: 2-1/2" I.D. W/Nat. Standard Threads.
 - g. Pumper Connections: 4-1/2" I.D. W/Nat. Standard Threads.
 - h. Traffic Break Off Section: 16".
 - i. Hydrant Valve Size: 5-1/4".
 - j. Hub: 6" W/Mechanical Joint Fittings.

- k. Break-off flange with breakable rod coupling
 - l. Color: Painted Waterous Enamel No. V1814-R at the place of manufacture. After installation and testing complete, the “field coat” of paint shall be applied with brush.
 - m. Fiberglass Flag: Hydarfinder Hydrant Marker, or approved equal:
 - 1) White fiberglass rod, with 4 red reflective bands without a bulb end.
 - 2) 54 inches long, 3/8 inch diameter.
 - 3) Provide 1 extra flag per hydrant and deliver to the City.
 - n. Epoxy Coated Base and Upper and Lower Valve Washer.
 - o. Bronze Cross Arm.
 - p. Stainless Steel Hardware.
 - q. After installation and testing is complete, the “field coat” of paint shall be applied with a brush
5. Fittings shall be mechanical joint in accordance with AWWA C153/A21.53, Ductile Iron. All fittings shall be designed for not less than 250 psi working pressure and shall have a standard thickness cement mortar lining conforming to AWWA C-104. Rubber gaskets for mechanical joints shall conform to AWWA C-111. All Ductile Iron joints shall be installed with an electrical contact through every joint. Meg-a-lug joint restraints shall be used on all fittings. All fittings shall be installed with one 6 oz. sacrificial zinc anode cap for every two bolts. Fittings shall be fully fusion bonded epoxy coated inside and out.
6. Tracer wire used for direct bury applications intended for locating PVC pipe shall conform to the Minnesota Rural Tracer Wire Specification including the following requirements listed below. Any tracer wire to be used fort Directional Drilling/Boring, Pipe Bursting. Slip Lining shall be approved by the Chaska Utility Superintendent.
- a. All tracer wire and trace wire products shall be manufactured in the USA.
 - b. Conform to applicable standards for NEMA WC3, WC5, WC7 as well as comply with ASTM D1248.
 - c. AWG No. 12 solid (0.0808 "diameter), 21% conductivity, copper clad stainless steel, high strength, with minimum 450 lb break load, with minimum 30 mil HDPE insulation thickness.
 - d. Shall be Underwriter Laboratories (UL) listed for use in direct burial applications (e.g. USE, UF, or tracer wire).
 - e. Outside Identification: volts(or V), AWG size, UL and designation (ex."tracer wire")

- f. Polyethylene jacket coating color shall conform to the APWA Uniform Color Code standards for the utility being installed.
 - g. Directional drilling/boring tracer wire shall be a minimum #12 AWG Copper Clad Steel, Extra High Strength with a minimum 1,150 lb. break load, and a minimum 30 mil HDPE insulation thickness.
 - h. Pipe Bursting/Slip Lining tracer wire shall be a minimum 7x7 Stranded Copper Clad Steel, Extreme Strength with minimum 4,700 lb. break load, and a minimum 50 mil HDPE insulation thickness.
7. Tracer Wire Connectors
- a. Spliced in connections shall be Copperhead Snake Bite Connector or 3M DBR splice kits unless otherwise approved by Chaska Utility Superintendent.
 - b. Mainline connectors must be interconnected in intersections, at mainline tees and mainline crosses.
 - c. Tee connections shall be joined using a single 3-way lockable connector. Crosses shall be joined by using a 4-way connector. No other types of connections are allowed.
 - d. Direct bury wire connectors shall be specifically manufactured for underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion and installed without having non-insulated wire exposure.
8. Corporation stop shall be as listed on Standard Plate SER-2. Minimum size shall be one (1") inch.
9. Curb Stop shall be as listed on Standard Plate SER-2. Minimum size shall be one (1") inch.
10. Curb box and stationary rod shall be Mueller H-10300-N, or equal, Minneapolis pattern with 1-1/4" upper section, adjustable from 78" to 90" and shall have stationary rods. Adjustments shall be at mid-range at installation.
11. Water Service Lines installed shall be HDPE piping unless otherwise approved by the Chaska Utility Superintendent. Upgrades or replacement of existing water service lines shall match the type and size of existing service unless approved by the City.
- b. City standard water service lines shall be seamless HDPE pipe. Minimum service size shall be a 1" main to the property line as well as a 1" main from the property line to the building. HDPE service lines shall comply with Standard Plate SER-2A including the following:

- 1) HDPE seamless service piping shall be EndoPure or Blue Ultra piping unless otherwise approved by the Chaska Utility Department.
 - 2) Piping must be NSF certified and listed under Standard 14 for potable water, SIDR 7, meet ASTM D3350, ASTM D2239, and AWWA C901-08.
 - 3) Ridged solid stainless steel liner inserts shall be required at fitting connections.
 - 4). Tracer wire shall meet requirements previously outlined in Chapter 5, Section B, tracer wire.
- a. Upon approval from the City, copper water service lines may be substituted for HDPE piping in areas of neighborhood residential development. Copper water service lines will only be considered where all neighborhood service lines apply to development. Copper pipe shall be seamless and shall conform to ASTM Specification B-88, Class "K" installed in accordance with Standard Plate SER-2. Minimum service size shall be a 1" main to the property line as well as a 1" main from the property line to the building.

C. Storm Sewer:

1. Material for manhole and catch basin frames and covers shall be as outlined in Sanitary Sewers, Paragraph A.1. with the exception of storm sewer cover need not be self-sealing. See Standard Details STO-1 through STO-8.
2. Storm manholes and catch basins shall meet the general requirements of ASTM-C478 and City standard details. Structures and bases shall be of precast concrete. Preformed concrete inverts are not allowed. Inverts shall be constructed as per standard details. It is the Contractor's responsibility to have the manhole sections and top and bottom slabs design and detailed Drawing prepared by a Professional Engineer. On structures where height requires more than 1 barrel section, the section immediately below the precast top slab shall be a maximum 16 inch height. Segmental blocks for manhole construction shall only be allowed under direct acceptance by the City. Manhole blocks shall conform to ASTM C139.
3. Pipe material shall be reinforced concrete pipe as specified in Sanitary Sewer, Paragraph A.2.a.
4. Corrugated metal pipe (CMP), if allowed, shall be in accordance with MnDOT Section 3236, Type I, 16 gauge material. Prior written approval from the City Engineer is required for use of CMP. CMP storm sewer will generally be limited to temporary culverts, areas of extremely steep grade, soft and unusual trench conditions, pond outlet areas, etc.
5. Foundation material for storm sewer - See Sanitary Sewer, Paragraph A.3.
6. Flared end sections shall be reinforced concrete pipe with trash guards in accordance with Standard Detail STO-10.

7. Rip Rap material shall be in accordance with MnDOT Section 3601. Special attention must be directed to the velocity of the discharge in determining the size and type of Rip Rap material. Generally, Type II Rip Rap material will be used, unless velocity conditions require large sizes. Filter material and geotextile fabric are both required under Rip Rap as outlined in Standard Details STO-11 and STO-11B.

D. Sump line:

1. Sump Line Pipe:

- a. Requirement: Sump lines are required to be installed where site grading does not accommodate rear lot drainage.
- b. All sump line pipe material shall be 6" PVC Schedule 40 for the mainline pipe, and 4" PVC Schedule 40 for individual sump service pipe.
- c. Location: See Chapter 7, paragraph D (Sump Line).
- d. General: Pipe and fittings shall be made of compounds conforming to ASTM D1784 in accordance with the material requirements of D1785 and ASTM D2665. PVC DWV fittings shall conform to ASTM D2665. Belled end pipe shall have tapered sockets conforming to ASTM D2672.
- e. Design: Integral belled pipe with a minimum wall thickness conforming to Schedule 40 and as shown on the Drawings.
- f. Solvent Cement Joints: The solvent cement used to join pipe and fittings shall meet the requirements of ASTM D2564.
- g. Marking: Each pipe shall be identified with the name of the manufacturer or trademark and code, nominal pipe size in inches, the PVC cell classification, and "Specification D3034."
- h. Sump Line Main line shall be installed with tracer wire along its entire length. The upstream end of the pipe shall terminate with a clean out with a metal cap that is locatable. The tracer wire is to be accessible within a Valvco Tracer Wire Box.

2. Sump Line Catch Basin

- a. General Requirements: 12 inch catch basin product series shall be that produced by NDS, Inc., or approved equal. Toll Free (800) 726-1994. Phone (559) 562-9888. Website www.ndspro.com.
- b. Grate: 12 inch x 12 inch, structural-foam polyolefin, grate with UV inhibitor (Part No.1211):
 - 1) Grate Openings: 3/8 inch.

- 2) Open Surface Area: 50.76 square inches.
 - 3) Inlet Capacity: 66.50 gpm.
 - 4) Load: 61 to 175 psi.
 - 5) Color: Black.
- c. Catch Basin: 12 3/8 inch x 12 3/8 inch x 12 15/16 inch (Part No. 1200).
 - d. Catch Basin Insert: 12 3/8 inch x 12 3/8 inch x 7 1/8 inch (Part No. 1216).
 - e. Catch Basin Universal Outlets: Part No. 1242.
 - f. All Catch Basin installation must include catch basin, catch basin insert, catch basin grate, and catch basin universal outlet.

E. Streets:

- 1. Street construction materials shall be in conformance with the Minnesota Department of Transportation, Standard Specifications for Construction, 2005 Edition and all subsequent revisions, except as specifically altered or modified herein.
- 2. Aggregate base shall be Class 5, 100 % crushed material meeting the requirements of MN/DOT Section 3138 and which has a maximum Liquid Limit (LL) of 25 and a Plasticity Index (PI) of 0 to 3.
 - a. Class 7 Recycle aggregate mixtures can be substituted for Class 5 aggregate as long as it meets Class 5 aggregate requirements as shown in MnDOT Spec. 3138 as well as a maximum Liquid Limit (LL) of 25, and Plasticity Index (PI) of 0 to 3.
 - b. Reclaimed glass shall not be used in the aggregate base.
- 3. Geotextile Fabric - Type V - Non-woven shall be installed after completion and approval of subgrade unless specifically waived as outlined in Standard Plates STR-6 through STR-8. Geotextile fabric shall be a non-woven fabric consisting of polymeric filament or yarns such as polypropylene, polyethylene, polyester, polyamide or polyvinylidene chloride, formed into a stable network such that the filaments or yarns retain their relative position to each other. The geotextile shall be inert to commonly encountered chemicals, resistant to ultraviolet radiation, and conform to the properties in the following table:

<u>Geotextile Spec.</u>	<u>Test Method</u>	<u>Value</u>
Grab Tensile Strength either principal direction, lbs.	ASTM-D-4632	200
Grab Tensile Elongation, %, Max.	ASTM-D-4632	50
Ultra Violet Light Stability	ASTM-D-4355	70% Retained*

Burst Strength p.s.i., min.	ASTM-D-3786 (Diaphragm Method)	400
Trapezoid Shear Strength, lbs. min. (any direction)	ASTM-D-4553	80
Puncture Strength LB., MIN.	ASTM-D-4833 5/16" diameter hemispherical Tip steel cylinder centered within ring clamp	130
Permittivity (sec ⁻¹)	ASTM-D-4491	1.5
Flow Rate Gal./Min./ft. ²	ASTM-D-4491	80
Minimum Fabric Weight		8
EOS (U.S. Sieve)	AASHTO-M-288	70-100

*Percent retained of specified fabric strength as determined by ASTM D-4632 (Grab Tensile) when exposed for 150 hours as per ASTM D-4355

All splices shall be overlapped a minimum of 18 inches or seamed (sewed, glued, welded,) to produce equivalent fabric strength. Fabric shall not be left exposed to the sun for a period in excess of 3 days. Rips shall be patched with fabric lapped a minimum of 36 inches around the rip.

4. Bituminous material for mixture shall conform to MN/DOT 3151. All asphalt binder shall meet AASHTO MP-1, Specification of Performance Graded Asphalt Binder. The following asphalt binder will be required for designated construction. Only asphalt binder from a certified source will be allowed.

Overlays: PG 58-28
New Construction: PG 58-34

5. Bituminous surface mixture shall be in accordance with MN/DOT Section 2360 Gyratory Design Specification, Type SP12.5 (SPNWB330C) for base course paving, Type SP9.5 (SPWEA330C) for binder course paving, and Type SP9.5 (SPWEA330C) for wear course paving. Base course will only be used for designs requiring more than 4" of pavement. For low volume residential roads a Type SP9.5 (SPWEA230C) mixture will be used for the base and wear mixture. Aggregate shall meet the requirements of MN/DOT 3139. At a minimum the upper 3.5" of all bituminous sections shall contain the specified wear course mixture.
6. Scrap Asphalt Shingles are not allowed in Wearing Course Pavements.
7. Waste incinerator Ash (WIA) will not be allowed in any bituminous pavements.

8. Bituminous Tack Material shall be in conformance with MN/DOT Section 3151.2.E, for Emulsified Asphalt. The bituminous material shall be emulsified asphalt, catatonic, CRS-1 or CRS-2.
9. Material for concrete curb and gutter shall be accordance with MN/DOT Section 2531 with the following exceptions: Manual placement-Mix No. 3F52B, Slip Form Placement-Mix No. 3F32B. Reinforcing rods are required when new curb and gutter crosses service trench.
10. Material for concrete sidewalks to conform to MnDOT Spec. 2461, with the following mix designations: Manual placement-Mix No. 3F52B, and Slip Form Placement-Mix No. 3F32B.
11. Subsurface drain pipe shall be PVC or PE perforated pipe installed in accordance with Standard Details STO-14 and STO-15.

F. Trails:

1. Materials used for trail and sidewalk construction shall be as outlined above under Part D, Streets. Materials required include aggregate base, concrete, bituminous, seed, sod, and related miscellaneous items.

G. Topsoil

1. Conform to the current rules of Carver County for topsoil management.
2. Imported topsoil is to conform to MnDOT Spec. 3877.2B, except as modified below.
 - a. All topsoil shall be screened and pulverized
3. The maximum allowable percentage of clay in topsoil borrow shall be 20 percent.
4. Corrective action shall be required for topsoil with a clay content exceeding 20 percent. Procedure for corrective action must be approved by City.

End of Section

CHAPTER 6 - Testing Requirements

In order to assure quality materials and workmanship, the following tests shall be required:

A. Sanitary Sewer:

1. Sanitary Sewer Line Cleaning

- a. The Chaska Sewer Department will jet-vac all sanitary sewer lines prior to televising.
- b. Materials/Obstructions will be removed by the Contractor from all manholes prior to jetting.
- c. The cleaning of all lines shall be at the Contractor/Developer's expense. Cost will be billed on a per hour basis of time spent cleaning.
- d. A 2-week notice to schedule cleaning is required. If the sanitary sewer is inaccessible, the Contractor/Developer will be billed a minimum fee of \$200.00 for mobilization. The Contractor must then make all sanitary sewer accessible prior to the City returning to site.

2. Closed Circuit Televising – Chaska Sewer Department will perform televising on all Sanitary Sewer lines.

- a. Televising will be performed regardless of visual inspections, leakage testing, or deflection testing results.
- b. The purpose of sewer line inspection via closed circuit televising is to obtain quality recorded images of the interior condition of the sewer lines. Proper and correct documentation of recorded images of a sewer line is imperative.
- c. WinCan software for inspection reports is required, software must be compatible with Chaska's GIS.
- d. All sanitary sewer lines shall be televised at the Contractor's expense upon completion of cleaning. Cost will be per lineal foot of sewer line televised.
- e. A two week notice to schedule televising is required. If the sanitary sewer is inaccessible, the Contractor/Developer will be billed a minimum fee of \$200.00 for mobilization. The Contractor must then make all sanitary sewer accessible prior to the City returning to site.
- f. Water will be introduced into the sewer line prior to televising. The purpose of this is to assist in distinguishing any sags or alignment problems with the pipe.

- g. No part of the project will be considered complete or accepted until payment has been paid in full for all cleaning and televising.
3. Lamping – Physical inspection of all lines and manholes required in addition to TV inspection.
 4. Infiltration – 100 gals/inch diameter/mile of pipe/24 hours. If infiltration is present, tests will be required from manhole to manhole. At the start of sanitary sewer construction, an inflatable test ball shall be placed in all downstream connection points to the existing system. During the course of construction, the ball is to remain in place until all infiltration has been eliminated and the city is satisfied that no infiltration is present. See Chapter 7 – Construction Requirements for specific details.
 5. Exfiltration – Required if water table is less than 3' above pipe. After bulk-heading downstream pipe of test section, upstream manhole shall be filled with water to three feet above invert or three feet above water table level, whichever is greater. Water level shall be maintained for one hour during which time it will be presumed that full absorption of the pipe body has taken place. Thereafter, the water head shall be maintained for an additional one hour test period. During the one hour test period, the measured water loss within the test section, including service stubs, shall not exceed 100 gals/inch diameter/mile of pipe/24 hours. If measured water loss exceeds the allowable amount, corrective action shall be taken and the test repeated until it meets requirements.
 6. Gravity Pipe Leak Testing
 - a. General
 - 1) Test all systems (pipe and structures) for leakage before being put in service. Notify Engineer of the date and time for each test 1 day prior to actual testing. Test in section length increments deemed necessary by the Engineer.
 - 2) Test each section by 1 of the following methods.
 - 3) Individual segments MH to MH pipe runs must be tested and accepted by the Engineer prior to starting construction of the next pipe run.
 - b. Low Pressure Air Test
 - 1) Diameter: Less than or equal to 24 inches.
 - 2) Must meet criteria set forth in ASTM F1417.
 - 3) Groundwater level shall be no higher than 2 feet above the top of pipe at upstream end.
 - 4) Acceptable time for loss of 0.5 psig of air pressure shall be the larger of the 2 times below:

Pipe Size	Min. Time (Min's)	Time (s/ft of pipe)
8	3:50	0.760
10	4:40	1.187
12	5:40	1.709
15	7:05	2.671
18	8:30	3.846

Pipe Size	Min. Time (Min's)	Time (s/ft of pipe)
21	9:55	5.235
24	11:20	6.837

- 5) Requirement may be waived for reconstruction projects where reconnection of active sewer services prevents testing with permission from Owner.
 - c. Pipe Joint Acceptance Testing
 - 1) Diameter: 36 inches or larger.
 - 2) Must meet criteria set forth in ASTM C1103, or as modified by pipe manufacturer.
 - 3) Must observe confined space procedures.
 - d. Infiltration and Exfiltration Acceptance Testing
 - 1) Diameter: 36 inches or larger.
 - 2) Must meet criteria set forth in ASTM C969.
 - 3) If this method is to be used for testing manholes, test must be performed prior to welding sheet liner (if applicable).
7. Mandrel – Maximum 5.0 % deflection for all PVC pipe, 30 days after installation. Any pipe failing the mandrel test shall be replaced. The Contractor will excavate the area around the failed portion of pipe and the remove the damaged portion. The new pipe will be installed with ductile iron sleeves with transition gaskets. All failing lines will be re-mandrelled 30 days after repairs are completed. Use of rounders is not permitted.
8. Mechanical compaction tests required on all trench backfill. See Chapter 7, Paragraph A.3.

These tests shall be observed by the Chaska Engineering Technician.

9. Manhole Liner Testing and Repairing of Damaged Surfaces -
- a. After the manhole has been installed, surfaces covered with lining, including welds, shall be tested with an approved electrical hole detector (Tinker and Rasor Model No. AP-W with power pack) with the instrument set between 18,000 and 22,000 volts.
 - b. The Contractor is responsible for inspecting each lined structure installed. The City shall be contacted a minimum of 24 hours in advance to witness testing. The Contractor shall submit to the City an inspection report for all testing. The Contractor shall also certify each inspected weld/section in the manhole by including a signature, and date of inspection written directly on the liner in the field.
 - c. Welds shall be physically tested by a probing method. Patches over holes or repairs to the liner wherever damage has occurred, shall be in accordance with the manufacture requirements.
 - d. Each transverse welding strip which extends to a lower edge of the liner will be tested by the Engineer. The welding strips shall extend 2 inches below the liner to provide a tab. A 10-pound pull will be applied to each tab. The force will be applied perpendicular to the face of the structure by means of a spring balance. Liner adjoining the welding strip will be held against the concrete during application of the force. The 10-pound pull will be maintained if a weld failure develops, until no further separation occurs. Defective welds will be retested after repairs have been

made. Tabs shall be trimmed away neatly by the installer of the liner after the welding strip has passed inspection. Inspection shall be made within 2 days after joint has been repaired.

B. Water Main:

1. Pressure – 150 psi for 2 hours, to curb stops or service valves with no drop in pressure.
 - a. Each section of pipe to be tested shall be filled with water and all air expelled at the highest point. The required taps to expel air or to fill the water main shall be supplied and installed by the Contractor and shall be 3/4” and shall include an approved service saddle when required. The test apparatus shall be applied at the lowest elevation on the section to be tested. The apparatus shall be connected to the main at a service tap or special tap location. The pressure gauge shall be a standard pressure gauge. The dial shall register from 0-200 psi and have a dial size of 4 1/2” with 1 psi increments.
 - b. During the hydrostatic pressure test, the contractor, along with a representative from the City, will walk thru the job and verify all valves are open on the sections being tested. All service valves (4”+) will be open during the time of testing to insure that the water main is installed and free of any leaks.
 - c. When the hydrostatic test is nearing completion, the contractor along with a representative from the City will isolate sections of the water main to test interior valves. This will be done by bleeding the pressure behind closed interior valves for 5 minutes with zero drop on the test gauge.
 - d. When performing individual hydrostatic tests on multifamily, fire protected buildings, the test will be performed at 200 psi. When the hydrostatic test is completed and a flush is performed, the 4” line must be flushed with a minimum 3” diameter hose. If testing during the winter months, the line must be blown dry to prevent freezing. The contractor may, with approval from the city, use air at 100 psi in lieu of the standard hydrostatic test.
2. Continuity – In the presence of the representative of the City, physically locate all mainline pipe and services larger than 4 inches by use of an electronic locating device such as a “Metrotech”. Completing a low voltage circuit with use of a suitable voltage source and meter to ensure continuity of the tracer wire shall be allowed at the discretion of the City representative.
3. Disinfection – Before being placed in service, the completed water main installation shall be disinfected and flushed, and after the final flushing the water shall be tested for bacteriologic quality and found to meet the standards prescribed by the Minnesota Department of Health. Disinfection materials and procedures, and the collection and testing of water samples, shall be in accordance with the provisions of AWWA C-651 and as will meet the requirements of the Minnesota Department of Health.

A representative from the City of Chaska and the Contractor shall collect a field sample. The City will submit the sample to a qualified testing agency. Coliform bacteria shall not be present in the water sample. A copy of the test results indicating a satisfactory sample shall be submitted to the Contractor prior to opening valves which will connect the new pipe to the public system. Fees for testing shall be the responsibility of the Contractor.

4. Mechanical compaction tests required on all trench backfill. See Chapter 7, Paragraph A.3.

These tests shall be observed by the Chaska Engineering Technician. Gate valves are to only be operated by the City Water and Sewer Department.

C. Storm Sewer:

1. Pipe Class – Pipe class to be stamped on pipe, certification documentation may be required at the discretion of the City Engineer.
2. Mechanical compaction tests required on all trench backfill. See Chapter 7, Paragraph A.3.

These tests shall be conducted by the Chaska Engineering Technician.

3. Lamping – Physical inspection of all lines and manholes required. In the event repairs are necessary, the City may require the lines be televised with costs incurred to be passed on to the Owner/Contractor.

D. Streets:

1. Soil Borings – Logs and recommendation required for subgrade correction, and section design.
2. Geotextile Fabric – Certification documentation.
3. Compaction Tests - In accordance with MnDOT Section 2105, Paragraph F-1, Specified Density Method.

These tests shall be observed and reviewed by the Chaska Engineering Technician.

4. Subgrade – Test rolling. Prior to placement of aggregate base, the subgrade shall be test rolled substantially in accordance with MnDOT Section 2111. The City Engineer or authorized representative may allow some modification in the procedures outlined in Section 2111 to accommodate on-site equipment.
5. Tolerances – Physical inspection of subgrade and aggregate base by Engineering Technician. Tolerance limits include $\pm 1/2$ " on subgrade and $\pm 1/4$ " on aggregate base.
6. Aggregate Base Analysis – Gradation. These tests shall be conducted by the developer representative and reviewed by the Chaska Engineering Technician.

7. Bituminous Mixture Analysis:

a. Mixture Quality Management (Quality Control/Quality Assurance) shall conform to MnDOT Spec. 2360.4, except as modified herein:

- 1) Quality Control Testing: The Contractor will be allowed to provide historical testing data from the previous 3 days of production for each mixture type to meet the Production Sampling and Testing Rates indicated in Table 2360.4-E for Course Aggregate Angularity and Fine Aggregate Angularity. The Contractor will be allowed to provide historical testing data from the previous 10 days of contractor production for each mixture type to meet the Production Sampling and Testing Rates indicated in Table 2360.4-E for TSR, Aggregate Specific Gravity, and Asphalt Binder Content.
- 2) Quality Assurance testing will be completed at the discretion of the Engineer, testing rates will not exceed Table 2360.4-D and 2360.4-E:
 - a) A verification sample will be taken by the Engineer. The Contractor will be required to use the verification companion sample as part of the QC testing program.

b. Pavement Density shall conform to MnDOT Spec. 2360.6, except modified herein:

- 1) Conform to MnDOT Section 2360.6, except as modified herein:
 - a) Pathways, Driveways, Small Parking Lots, Leveling Courses, and Patching shall conform to Section 2360.6C – Ordinary Compaction Method.
 - b) All other Pavement Density shall conform to Section 2360.6B – Maximum Density Method.
 - c) Modify Table 2360.6-B2a Lot Determination as indicated below:

Daily Production (Tons)	Lots
200 to 1000	1
1001 to 2000	2
2001 to 3600	3
3601 to 5000	4
5001 +	6

Daily production, 0 to 200 tons is at the discretion of the Engineer.

- 2) Vibrating steel drum roller and a pneumatic tired roller employed in conjunction with each other during compaction of all wear courses.

8. Concrete Analysis – Slump, air, strength. Mix design may be required. Chaska Engineering Technician may require concrete to be replaced that does not meet slump,

air, and/or strength requirements per MnDOT Spec. 2461. Any replacement costs shall be at the expense of the developer.

These tests shall be observed and reviewed by the Chaska Engineering Technician.

E. Trails and Sidewalks:

1. Testing of trail and sidewalk construction materials shall be the same as for street construction outlined above under Part D, Streets.

ALL TESTING SHALL BE DONE BY INDIVIDUALS QUALIFIED TO PERFORM AND EVALUATE SUCH TESTS. ALL TESTS REQUIRED IN THESE GUIDELINES SHALL BE PAID FOR BY THE DEVELOPER. COPIES OF THE TEST RESULTS SHALL BE SUBMITTED TO THE CHASKA ENGINEER TECHNICIAN.

End of Section

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CHAPTER 7 - Construction Requirements

A. Sanitary Sewer:

1. Trench widths must, in all cases, be held to a maximum width of two (2') feet greater than the outside diameter of the pipe measured at the top of the pipe, unless the pipe is designed for unlimited trench width conditions. Bedding of pipe shall be Class "C" or greater.
2. When the bottom of the trench is soft or where in the opinion of the Engineering Technician unsatisfactory foundation conditions exist, the Contractor shall excavate to a depth to insure proper foundation. The excavation shall then be brought up to grade with thoroughly compacted granular materials as outlined in Chapter 5, Paragraph A.5.
3. Backfill at the "pipe zone" shall be accomplished with select material hand placed and tamped carefully around and over the pipe to a depth of one (1') foot above the top of the pipe. Each successive layer of backfill material shall be thoroughly compacted using suitable mechanical compaction equipment. The type of compactor is dependent on the type of backfill material used. The backfill material shall be compacted to 95% of the standard moisture density relationship of soils (ASTM D-698-70) except for the upper three (3') feet of the trench if the sewer lies within an existing or future street right-of-way, alley, parking lot, etc. The upper three (3') feet shall be compacted to 100% density.
4. Sewer services shall have an individual wye connection from the main and extended to a location 10' beyond the property line. Sewer services may NOT be connected directly into manholes.
5. Inside drop manholes are NOT allowed.
6. Sanitary utilities shall be held to a maximum of 0.20' fall across sanitary structures, and 5% slope on all sanitary pipe, unless approved by the City of Chaska.
7. Contractors are required to complete a City of Chaska Water and Sewer Permit for approval of all sewer services prior to construction.
8. Concrete adjusting rings shall be required for all sanitary sewer structures.
 - a. Mortar on top and bottom surfaces of all concrete adjusting rings; between surface of top slab or cone and bottom ring; between surface of top ring and casting; on entire surface of area of ring with no gaps:
 - 1) Mortar Thickness: 1/4 to 1/2 inch.
 - b. No shims of any material allowed.
 - c. Required cross slope of casting to be achieved by varying thickness of mortar.

- d. Do not plaster the inside surface of rings.
 - e. Wipe clean all excess mortar from the joints inside all rings and frame.
 - f. Remove all mortar spills from the structure.
 - g. Minimum of 2 inches and maximum of 12 inches of adjusting rings allowed.
 - h. Use a 6 inch ring where applicable.
9. The discharge of surface or ground water into the City's sanitary sewer system is prohibited. To protect from accidental discharge of inflow and infiltration, the following procedures shall be followed:
- a. One week prior to connecting any new sanitary sewer to an existing sanitary sewer system, the Contractor shall notify the Chaska Sewer Department or City Engineer to schedule sewer construction activities.
 - b. The Contractor shall install an inflatable test ball in the most downstream connection points to the existing system through which no sewage is flowing. The Contractor shall notify the Chaska Sewer Department or City Engineer 48 hours prior to installation.
 - c. After installation of the inflatable test ball, the Contractor may proceed with installation of the sanitary sewer lines. Upon completion of the work, the Contractor will be required to remove collected water from the downstream manhole prior to conducting the required testing. Once all sewer extensions pass all specified testing, the Contractor will remove the test ball.
 - d. The Contractor shall not disturb any test balls in place during construction, and is required to immediately notify the Chaska Sewer Department or City Engineer of any water released into the sanitary sewer system.

B. Water Main:

- 1. Shall be placed with a minimum of 7.5 feet of cover over the top of the pipe.
- 2. All ductile iron water main pipe and fittings shall be wrapped with an approved plastic film wrap in accordance with AWWA C-105.
- 3. Backfilling at the "pipe zone" shall be selected backfill material and shall be deposited in the trench by hand and mechanically tamped in 6" layers to an elevation of one (1') foot above the top of the water main to provide Class "B" bedding of the pipe. Backfilling above the pipe shall be as stated under Sanitary Sewer, Paragraph A.3.
- 4. Stabilization of pipe shall be as stated under Sanitary Sewer, Paragraph A.2.

5. Water services for copper and HDPE Pipe shall be installed per SER-2 and SER-2A respectively.
6. Water services shall be extended from the main to a location 10' beyond the property line. One (1") inch services shall be the minimum required waterline.
7. Gate valves shall be required on all hydrants. Hydrants and valves and leads shall be restrained with meg-a-lug thrust restraints or equal. See Standard Plate WAT-2.
8. Concrete thrust blocking shall be installed in accordance with Standard Detail WAT-4.
9. Megalug joint restraints shall be used on all fittings.
10. Water services shall end at either a valve or curb stop with no exceptions.
11. Contractors are required to complete a City of Chaska Water and Sewer Permit for approval of all water services prior to construction.
12. Tracer Wire for PVC water main:
 - a. Shall be connected to all valves, curb stops, and fire hydrants.
 - b. Attach to bolt on the break off flange of the hydrant or as directed by the City representative.
 - c. Splices shall not be more frequent than 1 splice per 250 feet. See Chapter 5, B.7 for tracer wire connectors.
 - d. Tracer wire shall be laid directly under all pipe, fittings and hydrants.
 - e. For a transition of PVC to DIP water main the tracer wire shall be installed with a tracer wire access box as shown in detail plates.

C. Storm Sewer:

1. Storm sewer pipe shall be installed in accordance with MNDOT Section 2501, except as modified or altered herein.
2. Pipe foundation, backfilling and compaction shall be as outlined under Sanitary Sewer, Paragraphs A.2 and A.3.
3. Catch basin leads or storm sewers which cross the street in areas where soils are highly frost susceptible shall be backfilled in accordance with the guidelines outlined in the MNDOT Road Design Manual, Sections 8-6.02.08 and 8-6.02.09. A perforated drain pipe shall be placed on the bottom of the aggregate bedding, which shall drain into a catch basin structure. A detail for this construction shall be included on the plans. In lieu

of the MNDOT method, the City may consider an alternative design. Any alternative design shall be reviewed and approved by the City Engineer.

4. See Standard Plates STO-14 and STO-15 for location and installation details of perforated drain pipe.
5. Manholes and catch basins shall be constructed in accordance with Standard Detail Plates STO-1 through STO-9. In certain areas, sumps will be required.
6. Minimum catch basin lead is 12 inches in diameter.
7. Concrete adjusting rings shall be required for all sanitary sewer structures.
 - a. Mortar on top and bottom surfaces of all concrete adjusting rings; between surface of top slab or cone and bottom ring; between surface of top ring and casting; on entire surface of area of ring with no gaps:
 - 1) Mortar Thickness: ¼” to ½”.
 - b. No shims of any material allowed.
 - c. Required cross slope of casting to be achieved by varying thickness of mortar.
 - d. Do not plaster the inside surface of rings.
 - e. Wipe clean all excess mortar from the joints inside all rings and frame.
 - f. Remove all mortar spills from the structure.
 - g. Minimum of 2 inches and maximum of 12 inches of adjusting rings allowed.
 - h. Use a 6 inch ring where applicable.

D. Sump Line:

1. Sump line shall be installed at all necessary location on the Project to allow of one (1) sump service line per each individual residence.
2. The sump line, services and boxes shall be installed inside of the City Right of way. For streets with sidewalk or bituminous trail, the sump line shall be installed 1’ either side of the permanent sidewalk/trail and shall maintain a minimum of 5 feet separation from private utilities. For streets without sidewalk or bituminous trail, the sump line shall be installed a minimum of 2 feet behind the back of curb or sidewalk and shall maintain a minimum of 5 feet separation between private utilities.
3. The 4” individual sump service lines shall extended to each individual residence off of the 6” main sump line.

4. A sump catch basin (as specified in chapter 5) shall be installed at the property line, or an alternate location as approved by the City.
5. The Developer may propose alternate sump main line and service locations. These locations must be approved by the City.
6. A piece of rebar will be taped to the side of the catch basin to allow for ease of locating during and after construction.
7. Cleanout: A PVC cleanout will be installed at the end of each sump line run and at 300' intervals located to the nearest property line. The Contractor will provide a long sweep bend (or two 45-degree bends) at the base of the cleanout. The clean out cap shall be threaded malleable iron (galvanized) and located 3 inches below finished grade.
8. The Developer is responsible for protection of all sump lines, cleanouts, and catch basins. Any damage shall be reported to the City and all damaged materials shall be replaced to an acceptable condition by the Developer.

E. Streets:

1. Street construction shall be in accordance with the following MNDOT specifications:
 - a. Common excavation and embankment - MNDOT Section 2105. Roadway embankments shall be compacted by the method described as "Specified Density Method" as outlined in Paragraph 2105.3.F1.
 - b. Aggregate Base - MNDOT Section 2211. Compaction by "Specified Density Method" as outlined in Paragraph 2211.3.C1.
 - c. Plant-mixed Bituminous Base and Binder - MNDOT Section 2360, Type HMA. Design mix required to determine optimum oil content.
 - d. Plant-mixed Bituminous Wear - MNDOT Section 2360, type HMA. Design mix required to determine optimum oil content. Steel wheel and rubber tired rollers required for finish. The Contractor shall have a Tester on site to establish rolling pattern to achieve specified densities using a nuclear device.
 - e. Cold Weather Paving – No bituminous paving shall be performed after October 15. Also, no bituminous wear course paving shall be performed when air temperature is less than 50°F, in the shade and any from artificial heat. All other restrictions shall be in accordance with MnDOT Section 2360.3A.4. The Engineering Technician shall make determinations on suitability of paving conditions.
 - f. Tack Coat - Installed in accordance with MnDOT Section 2357.
 - g. Concrete Curb and Gutter - MnDOT Section 2531. Curb section shall be as indicated on Plans in accordance with Standard Detail STR-1. Two (2) No. 4 reinforcing rods, 20 feet long, shall be placed in the lower portion of the curb

crossing all sewer and water service trenches, fire hydrant leads, storm sewer trenches and other excavations or trenches. Two (2) No. 4 reinforcing rods shall also be placed on each side of all catch basins located within the curb and gutter. Joints shall be installed as outlined in Paragraph 2531.3.C. Maximum spacing of expansion joints shall be 60 feet for hand formed curb; 200 feet for slip formed curb. Concrete curing and protection shall be in accordance with Paragraph 2531.3.G. All concrete placed after October 1 will be poured using high early concrete mix to accelerate curing. Given appropriate weather conditions, this requirement may only be waived by the City. Submit a proposed time schedule and plans for cold weather protection and curing of the concrete in writing to the City Engineer for acceptance that provides provisions for adequately protection the concrete during placement and curing. Do not place concrete until the City Engineer accepts the cold weather protection and curing plans.

2. Intersection Radius - Minimum radius of curb at intersecting streets shall be twenty (20) feet to face of curb. Where surmountable curb and gutter is used, the radius portion shall be changed to B-618 curb and gutter, with a ten (10) foot transition extending from each end of the radius portion. See Standard Plate STR-11.
3. Street shall be constructed to not less than the minimum standards shown on the typical sections indicated on Standard Plates STR-6, STR-7 and STR-8. Subgrade conditions, traffic volumes or other circumstances may require a larger section.
4. The Developer or their Engineer shall have soils analysis prepared for the street within the project area. Soils report shall identify all peat, muck, organic, black dirt and other unsuitable material to be removed from beneath the subgrade. The soils report shall also identify and make recommendations on the subgrade design; the subgrade stability (R value); the amount of subgrade correction to be anticipated; the location and estimated amount of subsurface drain tile; the pavement design section and other factors that may affect the life and utilization of the street, based on a 20 year anticipated design life. The Engineer shall compare the geotechnical recommendations to the Chaska Standard Plates and use the one with the greatest strength.
5. Prior to placement of geotextile fabric and base course, the Contractor shall test roll the street subgrade. The Contractor shall provide a loaded tandem axle truck with a minimum gross weight of 25 tons and a weight ticket for the test roll vehicle if required by the Engineering Technician. The test rolling shall be done under the direction of the Engineering Technician. The City may require test rolling of the aggregate base, once the base section has been constructed.
6. After acceptance of test rolling and completion of the tolerance of subgrade, a geotextile subgrade stabilization fabric shall be installed in accordance with manufacturer's recommendations.
7. Subsurface drain pipe shall be installed in all street construction locations as shown on detail plates. The drain tile will be connected to the upstream side of each catch basin it passes by at a depth of 6" below the subgrade. Drain tile shall also be installed parallel

to any storm drainage pipe exposed above the subgrade during street construction and connected to the downstream catch basin.

8. The Developer shall complete the street subgrade and the aggregate base within the same construction season as the utility installation. If approved by the Engineering Technician the Developer may be permitted to install curb and gutter and the first layer of bituminous surfacing in the same construction season as the installation of utilities. Installation of final wear course in the same season is prohibited.
9. If the Developer is allowed to install curb and gutter and the first layer of bituminous in the same season as the utilities, all castings within the roadway shall be adjusted to a point 3/4" to 1" below the level of the bituminous surface, and readjusted later prior to placement of final wear course. After placement of final wear course, all castings shall be 3/4" to 1" below the level of the bituminous surface. Ramping of castings will not be permitted.
10. After placement of the final wear course, the Developer shall repair, replace and/or correct any and all settlements, cracks, breakups, markings, scars, or other damage or abuse caused by construction activity prior to acceptance by the City. After repair of the roadway, the Developer will also be required to seal coat or mill and overlay where repairs or corrections were required, prior to acceptance by the City. The Engineering Technician will make the final determination as to what method is used.
11. City will plow snow on Developer's streets only if at least one course of bituminous surfacing is in place and all castings within the roadway are adjusted to proper elevation and crown.
12. The City will not be liable for concrete curb damaged by snow plows prior to final acceptance of the Project.
13. Before any excess excavation material is deposited on private property, the Contractor must get permission in writing from the property owner. Special care is directed to areas of surplus material disposal that may involve future buildings or foundations.

F. Trails and Sidewalks:

1. Trails and sidewalks shall be constructed in accordance with "Bikeway Design Manual, State of Minnesota Department of Transportation" and the "Trails Plan, Chaska, Minnesota".
2. Avoid long steep grades; 6.0% maximum slope preferred, 8.0% maximum where unavoidable by existing terrain. Use flatter grades or slopes at intersections with streets or other trail ways; 2.0% maximum to allow adequate time to stop.
3. Provide positive surface water drainage away from the trail way with shallow drainage swales or ditches, culverts and/or storm sewer as required. For drainage purposes, preferred minimum slope is 1.0%; absolute minimum slope is 0.5%. Use 0.02' per foot cross-slope or crown.

4. Shape and compact subgrade to 100% standard proctor density. Excavate and remove all topsoil, black dirt, peat, muck or silt soils from beneath pathway; backfill with select grading material. Subgrade of trail way to be a minimum of two feet above water table.
5. Avoid sharp or sudden changes in horizontal and vertical alignment. Provide adequate site distance for bicycles at intersections and on vertical changes in alignment. Provide clearance for vertical obstructions (trees, power poles, signs, etc.); four foot preferred minimum, two feet absolute minimum for bicycle facilities.
6. Bicycle trails to be marked and signed in accordance with the Manual on Uniform Traffic Control Devices, latest edition.
7. Minimum standards shall be increased as necessary where required by poor subgrade soil, traffic volumes, hazardous conditions, or other special circumstances. Extra width and/or flatter curves required on long downhill slopes for additional reaction space.

G. Topsoil

1. Place topsoil material a minimum of 6” thick in all disturbed areas. Restoration shall be completed in accordance with requirements in Chapter 10.

End of Section

CHAPTER 8 - Other Utility Information

A. The City of Chaska, through its Public Works Department and its Utility Department, provides sanitary sewer, water, storm sewer, street lighting and electric utilities for the City. Additional utility service is provided by the following agencies:

1. Telephone service is provided by Century Link.
2. Cable TV service is provided by Comcast, where available.
3. Natural Gas service is provided by CenterPoint Energy, where available.

B. Service Connections:

1. Sanitary sewer and water service line stubs are generally installed to a location ten (10') feet beyond the property line of individual parcels of land at the time the sewer main and/or the water main are installed in the right-of-way. The service lines are installed at the property owner's expense. The service line is defined as the total length of pipe connecting a building or structure to the main line pipe, including the portion of the service line pipe installed in the right-of-way, and including the connection to the main line. The property owner owns and is responsible for the upkeep and maintenance of the sanitary sewer service from the main line to the structure and the water service from curb box to structure. The City of Chaska owns and maintains the mainline pipes in the street or right-of-way and the water service lines from main to curb box.
2. In designated underground electrical service areas, the electrical service is installed to the property line, terminating in a pad mount transformer or service pedestal. Forty percent of the cost of this work will be charged to the property developer/owner. All of the cost of installing street lighting will be charged to the property developer/owner. The City owns and maintains the electrical distribution system and the street lighting system described above.
3. It is the responsibility of the Builder to hire a qualified contractor to extend the sewer and water services along with the tracer wire into the building. All installations must be inspected by the Superintendent of Utilities prior to backfilling. A City of Chaska Water and Sewer Permit is required to perform this work.
4. It is the responsibility of the Builder to hire a licensed electrician to install a bypass meter socket, an outside ground rod and underground service from the building to the property line, leaving enough wire for connection into the service pedestal or transformer. All single phase meter boxes for signs or irrigation must be wired 120/240. Upon receipt of the blue copy of the "Certificate for Connection by Utility", the City will connect the service and install the meter. The same procedure is required for the installation of a temporary service.

5. All sewer and water connection charges and the water meter fees must be paid prior to issuance of a building permit.
6. Temporary Electrical Service - If electrical service has been installed to the property line, the Builder's electrician may install a temporary service in accordance with Paragraph 4, above. The Builder will be charged a connection fee when the temporary service is connected.

If temporary extensions of the City's electrical system are required to provide temporary service for construction or other purposes, the Builder or Developer shall request the City Electrical Director to make such extensions. If the Electrical Director determines that the extension project is feasible, the City shall install such temporary facilities as are deemed necessary by the City. The Builder or Developer shall pay for all costs of labor and equipment necessary to install, maintain, and remove the temporary facilities, and for the costs of lost or unusable material resulting from the installation. Cost will be billed upon completion of installation of the temporary facilities including a charge for removal.

C. Multi-Residential, Commercial and Industrial Electrical Service:

1. If electrical primary service is to be installed into the property with a pad mount transformer near the building, contact the Electrical Director to make arrangements for service installation.
2. The Developer or Builder will be charged 40% of the cost of these facilities upon completion of the work. The Developer or Builder shall provide and install the concrete transformer pad and any secondary wiring, including the connections within the transformer.
3. Electrical Metering - If the Electrical Director has determined that reactive demand metering is required, the meter socket shall be supplied by the City, at the Developer's or Builder's expense, and shall be installed by his electrical contractor.

All other meter sockets shall meet City specifications for the type of service being metered and shall be furnished and installed by the electrical contractor.

If current transformers (CT's) are required, they will be provided by the City. The CT cabinet shall be furnished and installed by the electrician, who shall also install the CT's. Electric meters shall be furnished and installed by the City.

D. Chaska Directional Boring Policy

1. All directional bores in the City of Chaska shall be called in as a meet. Work may not start for at least 48 hours after the meet time and date. An approved established running line is required prior to beginning directional boring. The City of Chaska must be notified 24 hours prior to starting directional bore. Any variation to the approved running line is prohibited unless reapproved by the City of Chaska, Engineering, Electric

and Water & Sewer Departments.

2. Prior to beginning the directional bore, the Contractor will be required to have in possession, an approved Chaska Right of Way Permit and all associated conditions of said permit. All conditions put forth on the approved permit must be followed, unless approved otherwise by the City of Chaska.
3. Once field locates have been field verified, the Contractor shall coordinate verification of existing utilities including but not limited to Water Main, Valves, Water Services, Sanitary Sewer Main, Sanitary Sewer Services, Storm Sewer, Chaska Electric (Primary & Secondary). Bored lines shall provide a minimum of 60 inches horizontal separation, and 24 inches vertical separation from all Chaska Utilities. Any boring depth greater than 48 inches in depth, or less than 60 inches in parallel to an existing city utility, will require potholing. Any modification in depth or separation must be approved by the City of Chaska, Engineering, Electric and Water & Sewer Departments.
4. If a utility is potholed, a Water & Sewer and/or Electric Department representative must be on site to witness the bore going through the pothole to verify separation. The City of Chaska Electric and/or Water & Sewer Department may request additional potholing for field verification at any time. Potholing may be done by hand digging or vacuum extraction to expose the existing utility. 4" of clean fill will need to go on top of any utility with no compaction within 6" of the utility.
5. The Contractor will be required to record on a drawing/plan both the horizontal and vertical location of their new utility and the existing utility crossed. Record drawing shall be submitted the City of Chaska Engineering Department. Deviation from the approved Right of Way Permit is prohibited and if a variation to the permit is requested, the permit applicant needs to resubmit the Right of Way Permit for approval by the City of Chaska.
6. Guidance system (sensor devices) need to be calibrated and recorded daily and will need to be +/-2% accurate.
7. At all times the Contactor will need to provide and maintain a bore tracking system. The tracking system shall be capable of recording the alignment every 25 feet as well as depth of bore when crossing utility.
8. The Contractor shall immediately contact the City of Chaska in the event of a directional bore encountering an existing utility.
9. The Contractor will be responsible for locating any and all facilities and shall be responsible for all losses and repairs to facilities damaged from directional boring.
10. The Contractor will follow requirements set forth in MN Statutes Chapter 216D and MN Rules Chapter 7560 and shall not install facilities at a depth greater than four feet below grade, unless specifically approved by the City of Chaska, Engineering, Electric and Water & Sewer Departments.

End of Section

CHAPTER 9 - Miscellaneous

- A. Prior to starting construction, a representative of the Developer, a representative of the Consulting Engineer and a representative of the Contractor shall meet with the Chaska Engineering Technician and other interested parties to discuss the method and means of supply, a work schedule as to the construction phases and a general review of the specifications and City requirements. Within 10 days of the pre-construction conference, the Developer shall submit to the Engineering Technician a written schedule of proposed construction activity, including estimates of time to complete each phase.
- B. The Developer's Contractor shall make arrangements for receiving water from public or private sources and shall secure the necessary permits and pay the regular charges. Disposal of any waste water or any test water into the city sanitary sewer system is prohibited unless written approval is obtained from the City. The Engineering Technician shall be notified 48 hours prior to commencing any work. Contractors shall be subject to being shut down if proper notification is not given to the City. Contractors are not to operate existing gate valves or hydrants, except under extreme emergency conditions.
- C. Proper notification of improvements shall be given by the Developer or his/her Engineer to the proper governmental agencies, watershed districts, etc. that could be affected by said construction. All necessary permits shall be obtained prior to commencing any work. All special requirements of the governmental agencies having jurisdiction over the work shall be complied with.
- D. The Developer's Contractor shall furnish, erect and maintain signs and barricades as provided in MN/DOT Section 1710, "Traffic Control Devices" to protect the public. The Superintendent of Public Works shall be notified 24 hours prior to the proposed partial blockage or closure of any street, alley or public right-of-way. No street or public right-of-way shall be closed without the proper approval of the Superintendent of Public Works.
- E. It is the responsibility of the Developer's Contractor to protect and leave undisturbed markers or monuments set for the subdivision of land. In the event that any are destroyed, they shall be replaced at the Developer's and/or Contractor's cost.
- F. The Developer shall immediately repair or replace, without additional compensation, any defective workmanship or material during the construction period, or within one year after the date of final acceptance of the work, regardless of prior inspections and approvals.
- G. City streets utilized for access or egress to and from the project site shall be kept free of dirt and other debris resulting from construction activity, including material delivery. Any damage to access or egress streets shall be repaired or corrected by the Developer at his expense. Adequate control of dust shall be maintained by the Developer's Contractor.
- H. The City will require the Contractor to submit a list of materials and respective suppliers as well as all tests of materials to the Engineering Technician.

- I. Where material or labor supplied by the Contractor or Developer shall be rejected by the City as defective or unsuitable, then such rejected material shall be removed, disposed of off the project site, and replaced with approved material. The work shall be done over to the specifications and approval of the City.
- J. The Contractor shall supply the City with a list of all subcontractors.
- K. The City requires barricades to be placed at the end of all dead-end streets as well as temporary cul-de-sacs. Barricades shall be furnished and installed in accordance with Standard Detail GEN-4.
- L. All trees, stumps, brush, etc., shall be cleared within two (2) feet of the edges of trails. The exception will be only hardwood specimen trees or other exceptional items of high significant value, as determined by the Engineering Technician.
- M. The standard ten (10') foot utility and drainage easement adjacent to the street right-of-way shall be cleared and grubbed for the placement of utilities. The exception will be only hardwood specimen trees or other exceptional items of high significant value, as determined by the Engineering Technician.
- N. All work shall be accomplished between the hours of 7:00 A.M. and 7:00 P.M. Monday through Friday, and 9:00 A.M. to 5:00 P.M. on Saturday. No construction activity will be permitted on Sundays or Holidays, unless necessitated by an emergency or authorized in writing by the owner or its representative.

End of Section

CHAPTER 10 - Policy for Erosion and Siltation Control

Section 1 – Stormwater Pollution Prevention Plan

For the purpose of alleviating harmful or damaging effects of on-site erosion and siltation on neighboring downhill or downstream lands and water in the City of Chaska and adjacent communities during and after development, adequate control of erosion and sedimentation of both a temporary and permanent nature shall be provided by the Developer during all phases of land disturbing activities. Plans and specifications for such controls shall be submitted to and approved by the City Engineer (SWPPP – Stormwater Pollution Prevention Plan). Said plans and specifications will be a part of the development contract and compliance will be assured by the development bond. No development shall be permitted until said plan is approved by the City Engineer. At a minimum, the Stormwater Pollution Prevention Plan shall contain the following information:

- A. Existing site map. A map of existing site conditions showing the site and immediately adjacent areas, including;
 1. The name and address of the applicant, the section, township and range, north point, date, and scale of drawing and number of sheets;
 2. Location of the tract by an insert map at a scale sufficient to clearly identify the location of the property and giving such information as the names and numbers of adjoining roads, railroads, utilities, subdivision, towns and districts or other landmarks;
 3. Existing topography with a contour interval appropriate to the topography of the land but in no case having a contour interval greater than two (2) feet;
 4. A delineation of all streams, rivers, public waters and wetlands located on and immediately adjacent to the site, including depth of water, a description of all vegetation which may be found in the water, a statement of general water quality and any classification given to the water body or wetland by the Minnesota Department of Natural Resources, and/or the Army Corps of Engineers;
 5. Location and dimensions of existing stormwater drainage systems and natural drainage patterns on and immediately adjacent to the site delineating in which direction and at what rate stormwater is conveyed from the site, identifying the receiving stream, river, public water, or wetland, and setting forth those areas of the unaltered site where stormwater collects;
 6. A description of the soils of the site, including a map indicating soil types of areas to be disturbed as well as a soil report containing information on the suitability of the soils for the type of development proposed and for the type of sewage disposal proposed and describing any remedial steps to be taken by the developer to render the soils suitable;

7. Vegetative cover and clearly delineating any vegetation proposed for removal; and
8. 100 year Floodplain, Flood fringes and Floodways.

B. Site Construction Plan. A site construction plan including;

1. Project description: the nature and purpose of the land disturbing activity and the amount of grading, utilities, and building construction involved;
2. Locations and dimensions of all proposed land disturbing activities;
3. Locations and dimensions of all temporary soil or dirt stockpiles;
4. Locations and dimensions of all construction site erosion and sediment control measures necessary to meet the requirements of this ordinance;
5. Schedule of anticipated starting and completion date of each land disturbing activity including the installation of construction site erosion and sediment control measures needed to meet the requirements of this policy for erosion and siltation control;
6. A plan for the maintenance and inspection of the construction site erosion and sediment control measures during construction;
7. Designate the site's areas that have potential for erosion;
8. Any other information pertinent to the particular project which in the opinion of the Applicant or City is necessary for the review of the project;

C. Plan of Final site conditions. A plan of final site conditions on the same scale as the existing site map showing the site changes and showing how the site will be stabilized after construction is completed:

1. Finished grading shown at contours at the same interval as provided above or as required to clearly indicate the relationship of proposed changes to existing topography and remaining features;
2. A landscape plan, drawn to an appropriate scale, including dimensions and distances and the location, type, size, and description of all proposed landscape materials which will be added to the site as part of the development;
3. A drainage plan of the developed site delineating in which direction and at what rate stormwater will be conveyed from the site and setting forth the areas of the site where stormwater will be allowed to collect;
4. The size alignments and intended use of any structures to be erected on the site;
5. A clear delineation and tabulation of all areas paved or surfaced, including a description of the surfacing material used.

Section 2 - Required Control Measures

The following control measures are required for the Stormwater Pollution Prevention Plan:

- A. The plan shall be suited to the topography and soils so as to create the least erosion potential.
- B. The land shall be developed in increments of workable size on which adequate controls of erosion and siltation can be provided and maintained during the construction period. Operation shall be staged so that the area being developed is not exposed for long periods of time without stabilization. All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time;
- C. All disturbed ground left inactive for fourteen (14) or more days must have temporary or permanent stabilization year round. For discharges to special or impaired waters within 1 mile of the project as defined in the NPDES Construction General Permit all exposed soils shall be stabilized as soon as possible but in no case later than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.
- D. Sediment basins, debris basins, de-silting basins, or silt traps shall be installed and maintained to remove sediment from runoff waters from the land undergoing development. Storm sewer inlets shall be provided with debris guards and micro-silt basins to trap sediment and avoid possible damage from blockage. The silt shall be removed when necessary. Prior to project acceptance, any ponds that have received sedimentation shall be cleaned out to their original design contours. The condition of all ponds must be accepted by the Chaska Engineering Technician before final project acceptance. Temporary and permanent Sediment basins shall be installed on site in accordance with the requirements of the NPDES Construction General Permit.
- E. Perimeter sediment control measures shall be placed along all down gradient perimeters, sidesteps, and downsides of the site. If a channel or area of concentrated runoff passes through the site, perimeter sediment control measures shall be placed along the channel edges to reduce sediment reaching the channel. All perimeter sediment control measures must include a maintenance and inspection schedule.
- F. All storm drain inlets shall be protected during construction with control measures as approved by the City. A regular inspection and maintenance plan shall be developed and implemented to assure these devices are operational at all times.
- G. Any soil or dirt storage piles containing more than ten (10) cubic yards of material should not be located with a downslope drainage length of less than twenty-five (25) feet from the toe of the pile to a roadway or drainage channel. If remaining for more than seven days, they shall be stabilized by mulching, vegetative cover, tarps, or other means and enclosed with perimeter sediment controls. Piles which will be in existence for less than seven (7) days shall be enclosed with perimeter sediment controls.
- H. Pipe Outlets must have energy dissipation installed within twenty-four (24) hours of connection to a water of the state.

- I. Site dewatering, all water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upflow chambers, hydroclones, swirl concentrators or other appropriate controls as appropriate. All water from dewatering must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in Wetlands causing significant adverse impact to the wetland. All discharge must be dispersed over natural rock riprap, sandbags, plastic sheeting or other accepted energy dissipation measures. Adequate sedimentation control measures are required for discharge water that contains suspended solids
- J. Hazardous materials such as oil, gasoline, paint, and any other hazardous substances must be properly stored, including secondary containment, to prevent spills, leaks, or other discharges. Restricted access to storage areas must be provided to prevent vandalism. Concrete wash must be limited to a defined area of the site and runoff must be contained within the defined area. Concrete washouts must be constructed and maintained as defined in the NPDES Construction General Permit.
- K. All waste and unused building materials (including garbage debris, cleaning wastes, wastewater, toxic materials or hazardous materials) shall be properly disposed of off site and not allowed to be carried by runoff into a receiving channel or storage sewer system.
- L. The permanent vegetation and structures shall be installed as soon as practical. Installation, maintenance, and removal of erosion control devices (siltation fences, hay bales, etc) shall be the responsibility of the Developer.
- M. Vehicle tracking of sediment from the construction site (or onto streets within the site) must be minimized by BMPs such as stone pads, concrete or steel wash racks, or equivalent systems.

Section 3 - Permit

An NPDES Permit application to the PCA must be submitted and on file with the City prior to initiation of work.

Section 4 - Financial Guarantee

Before any grading is started on any site, all control measures as shown on the approved erosion control plan shall be installed. A financial guarantee shall be provided to the City to insure compliance during construction. Such financial guarantee shall be equal to 1.1 times the estimated cost of erosion control, grading, and related items, including administrative costs. This financial guarantee will not be returned until all the disturbed area has permanent vegetation reestablished which consists of a uniform perennial vegetative cover with a density of 70% over the entire pervious surface area. The City will use the guarantee for the penalty included in Item 4a and for any invoice for work performed by the City that is not paid by the Developer within 30 days.

Section 5 - Enforcement Measures

- A. If an unsatisfactory condition exists and it is determined by the Engineering Technician or the City Engineer that it is the Developer's responsibility to correct same, the Developer shall be given written or mailed notice of such defective condition and the date by which same shall be corrected and if same is not corrected within said time frame, the City will proceed to complete said work deemed necessary by the City. The City shall then bill the Developer for actual costs incurred plus any penalties imposed by Ordinance of the City.
- B. Builders will be given a notice at the time of building permit issuance that erosion control on the lot being built upon, and street cleanup of any and all materials originating from the lot being built upon are their responsibility. No inspections will be approved if the street is not clean and erosion control in place. In the event the City is required to clean the street, the Builder will be billed and payment received prior to any further inspection or occupancy permit.
- C. When an applicant fails to conform to any provision of this policy within the time stipulated the City may issue a stop work order, withhold the scheduling of inspections, and/or the issuance of a Certificate of Occupancy.

Section 6 - Street Cleaning and Dust Control

The project contract shall provide for separate bid items for street cleaning and dust control on a unit basis. The contractor shall perform the work on a regular basis and as required by the City to address special conditions. The Contractor shall provide dust control and street cleaning within the same day as requested from the Engineering Technician. If there is additional safety concerns due to street condition or dust condition, Engineering Technician may require street cleaning or dust control within a certain time frame. Failure of the Contractor to comply with a request for dust control or street cleaning from the Engineering Technician in the time specified shall be cause for the Engineer to stop the work on the Project until the Contractor comes in compliance. If the Contractor is unable to supply dust control or street cleaning within the specified time period, the City will perform the work for the Contractor and bill the Developer for actual costs incurred plus any penalties imposed by Ordinance of the City.

Section 7 - Boulevard Sod and Erosion Control Blanket

All boulevards must be sodded with a minimum width of two (2) rolls of sod behind the curb and gutter. The rest of the boulevard will then be seeded with disc anchored mulch or erosion control blanket. If sidewalk or trail is present behind the curb, the entire area between curb and sidewalk/trail shall be sodded. Also, the first two feet behind the sidewalk and trail shall be sodded. The rest of the area behind that shall be seeded with disc anchored mulch or erosion control blanket.

All pond slopes on site shall be restored with seed and erosion control blanket in a timetable in accordance with the NPDES permit.

Section 8 – Contractor Developer Inspections and Maintenance

- A. The Contractor or Developer shall be responsible for erosion control inspections and maintenance on site in accordance to the NPDES permit requirements.
1. Inspections, maintenance, and rain fall on site must be documented and readily available for review. Inspections are required as followed:
 - a. Once every 7 days on exposed soil areas.
 - b. Within 24 hours after a one half inch or greater rain event over 24 hours.
 - c. Once every 30 days on stabilized areas.
 - d. As soon as runoff occurs or prior to resuming construction on frozen ground.
 2. Maintenance is required as follows:
 - a. When sediment reaches $\frac{1}{3}$ the height of the BMP on perimeter control devices, sediment must be removed within 24 hours of discovery.
 - b. If the perimeter control device is not functional it must be repaired or replaced within 24 hours of discovery.
 - c. Temporary sediment basins shall be maintained when sediment reaches $\frac{1}{2}$ the outlet height or $\frac{1}{2}$ the basin storage volume. Basin must be drained or sediment removed within 72 hours of discovery.
 - d. Construction site vehicle entrance and exit locations sediment must be removed from paved surfaces within 24 hours of discovery.

End of Section

CHAPTER 11 – Policy On Working Within Public Right-Of-Way

Section 1 – When Permits are Required

It shall be unlawful for any person or company to do any work within public right-of-way without having obtained a permit from the Public Works or Engineering Departments unless part of an approved improvement plan.

Section 2 – Application - Form; Contents; Accompanying Documents

- A. No permit shall be issued unless an application for the work has been submitted to the City.
- B. Each application shall contain the following:
 - 1. The contact information, including name, address, phone number, and email address of the applicant and local representative for the work.
 - 2. The nature, location and purpose of the work.
 - 3. The date of commencement and date of completion of the work.
 - 4. Certificate of Insurance of self-insurance, together with the expiration date of the policy.
 - 5. Such other data as may reasonably be required by the City .
- C. If required, an application shall be accompanied by:
 - 1. Plans showing the extent of the proposed work, including, but not limited to shop drawings, special details, specifications or other written information indicating methods of installation, safety procedures and restoration processes.
 - 2. Such other information as may be prescribed by the City.

Section 3 – Reference

All work shall be in accordance with the City's Standard Detail Plates and these Engineering Guidelines.

Section 4 – Fees

A permit fee will be charged to each applicant, which must accompany the application.

CHASKA APPLICATION FOR PERMIT FORM

End of Section

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CHAPTER 12 – Policy on Building Permits & Occupancy Permits

Section 1 – Issuance of Building Permits

- A. The Building Official will not issue building permits for structures or buildings in new subdivisions until the following items have been successfully completed.
1. All sanitary sewer and watermain testing has been completed and passed and is fully operational. An initial walkthrough inspection of all utilities is completed by the City and a formal inspection notice with any deficiencies noted. Any deficiency noted has been corrected and accepted by the City.
 2. Properties zoned as RR-2 are subject to all City building policies and permit requirements.
 3. Final site and boulevard grading have been completed and the work has been certified as complete by the Developer's Engineer.
 4. Class 5 aggregate base has been installed to provide full access to the site for inspections and emergency response.
 5. Building location must meet all fire protection code requirements.
- B. A single building permit may be issued for each development site if the following conditions are met:
1. Construction of grading, utility and street improvements is in progress.
 2. The platted building site is directly adjacent to an existing paved street, which will provide continuous and safe access to the site for inspection and emergency vehicle purposes. Further, a site access is constructed to a twenty-foot width that can accommodate a 52,000 lb. truck. A site-specific plan shall be submitted for City approval as part of the building permit process. Signs shall be placed to prohibit parking along this access at all times.
 3. The developer/builder shall execute a Building Permit Agreement that restates the condition of this section and indemnifies the City from issues resulting from issuance of this permit.
 4. All conditions of Sections 2 and 3 of this Chapter shall continue to apply in terms of occupancy requirements.
- C. The issuance of individual building permits for residential property shall be based on the subdivision grading plan approved by the city as part of the development site plan process. Changes to the actual grading of the lot or structure type noted on said plan shall be subject

to a separate review and approval process by the City. To initiate this review process, the applicant shall submit a revised grading plan clearly indicating proposed contours, drainage patterns and trees to be removed along with elevation views of the proposed structure. Further, the developer shall be required to acknowledge the revised plan as a modification to the original overall site-grading plan. It is Chaska's intent to assure the revised plan fits the lot, is consistent with area development and does not negatively impact adjacent property or structures.

- D. Commercial and industrial building permit applications shall be accompanied with a Certified Survey of the lot, locating all existing and proposed buildings, outlining all setbacks, setting the first floor elevation and indicating the utility connection points.

Section 2 - Occupancy Permits / Contractor Deposit

- A. Any applicant for a one or two - family dwelling building permit desiring a temporary Certificate of Occupancy shall deposit with the City a fee, determined annually by the City Council, as security to insure compliance with subsection (B) of this section.
- B. Any person engaging in the construction of a one- or two- family dwelling within the City shall complete all items associated with such construction, including but not limited to grading, placement of black dirt, sodding, landscaping, driveways, siding and exterior landings within such time given for the temporary Certificate of Occupancy. Should the person allow a temporary Certificate of Occupancy to expire, without completing such work, said person shall forfeit one-third (1/3) of his or her deposit.
- C. Should the person fail to comply with subsection (B) of this Section, the City Building Inspector shall notify the person in violation of subsection (B), who shall then have ten (10) days to comply with subsection (B). Any person not in compliance after such time has elapsed shall forfeit his or her deposit and shall be billed for the clean-up or corrective work to rectify the problem. A person allowing a temporary certificate of occupancy to expire shall automatically forfeit one-third (1/3) of his or her deposit.
- D. Upon proper compliance with subsection (B) of this section, the City shall refund in full or the remaining portion of the deposit provided for in subsection (A) and (C).

Section 3 - Occupancy Permits.

- A. No structure or building shall be occupied without first obtaining an Occupancy Permit from the Building Official.
- B. Occupancy Permits shall not be issued until permanent sanitary sewer, water and electric services are connected to the building and in operating condition, and they have been inspected and approved.

- C. Occupancy Permits shall not be issued until there is suitable street access to the parcel being occupied. Such suitable street access shall consist of a completed subgrade, minimum aggregate base and the base course of black top as outlined in Standard Details STR-6 & 7.

If curb and gutter and at least one layer of bituminous have not been installed and a building permit has been issued for a structure, the Developer shall be responsible to maintain and plow snow on all streets within the development required for safe and proper access to the lot.

If curb and gutter and one layer of bituminous have been installed, manhole and gate valve castings must be adjusted in accordance with Chapter 7, Paragraph E.9. before the City will provide snow plowing.

End of Section

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CHAPTER 13 – Policy on Underground Electric Distribution Construction

Section 1 – Drawing Requirements

A Pre-construction meeting is required prior to the beginning of any part of the project including rough grading. Within two weeks following this meeting, the Project Engineer shall provide a plan showing all grading and utilities including water, sanitary and storm sewer, gas, electric, phone, and cable TV facilities. The plan shall also include project landscaping. The plan will then be reviewed by the Project Engineer, the Chaska Electrical Department, and the Chaska Engineering Department to insure that no conflicts prior to approval of the plans.

Section 2 – Installation Requirements

Underground electric distribution facilities will not be installed until the following work is completed:

- A. All water, sanitary and storm sewer lines, and curb and blacktop have been installed.
- B. Boulevard or other designated utility corridors have been graded with +/- 0.2 feet of final grade.
- C. Project Engineer has provided construction staking in the field with cut and fill elevation to final grade. Staking is required at each lot corner and at the back side of the utility corridor where property lines intersect for proposed transformer and pedestal locations.
- D. Removal of all construction materials, vehicles, storage, and equipment from within the utility corridor.
- E. Chaska Electric Department and Engineering have reviewed and approved all utility plans for private utility installation.
- F. Gas lines and sidewalk grading and installation shall not be completed prior to installation of electric, phone, and cable TV facilities.

Section 3 – Cost of Facilities

- A. The developer or property owner is responsible for 40% of the cost of Underground Distribution Facilities and 100% of the cost of Street Lighting Facilities.
- B. Work will be invoiced after construction of the facilities and shall be paid within 30 days upon receipt of the invoice.
- C. The developer or owner shall be responsible for all costs associate with relocation and field adjustments following the installation of electric facilities.

Section 4 - Lighting

All street lighting facilities located within the public right of way shall be reviewed and approved by Chaska Electric. Chaska Electric will coordinate with the developer or owner for lighting needs based on development layout. It is the intent of the department to maintain standard lighting facilities within the City.

Section 5 - Frost Conditions

Chaska Electric does not allow for the installation of permanent electric facilities to be installed during conditions when frost exists or when a freeze-thaw cycle is occurring

Section 6 – Electric Conduit

- A. The developer or owner and their contractor are responsible for the installation of all conduit crossings for electric facilities where electric lines are to be installed within public street. Conduit crossing locations shall be coordinated in the field with the electric department.
1. Conduits are to be installed after the street sub-grade is accepted and should be installed at a depth of four feet below the final grade and below the roadway fabric, granular borrow and gravel base improvements.
 2. Conduit crossing material shall be 4” Schedule 40 unless otherwise directed by the electric department. A marker post shall be installed to mark the ends of each conduit crossing.
 3. Conduit crossings **not** installed with street subgrade operations shall be installed via trenchless operations at the developer or owner’s expense.

End of Section

CHAPTER 14 – City of Chaska Special Assessment Policy

- I. The Basis of Special Assessments. As a statutory City, Chaska has the authority to levy special assessments under the provisions of the State Local Improvement Code (MSA Chapter 429). Special assessments are levied by the City Council on particular parcels of property based upon the special benefit those parcels derive from the improvements as determined by the City Council. The policy attempts to assure that all persons are treated fairly and equitably in addition to assuring that the financial risk to the community is minimized.

For the purposes of allocating costs for public improvement projects in the City of Chaska, the Council has defined two forms of benefits:

A. Special benefit.

B. General benefit.

Special Benefit. The general application of both law and court decisions holds that properties receive a special benefit from improvement projects. For example, public utilities brought to an area not served with sanitary sewer, water, road and drainage result in the properties in question increasing in market value. The City has historically assessed most public project costs on the basis of special benefit to the parcels within the improvement district.

General Benefit. The concept of general benefit holds that in some types of improvement projects the community at large derives a benefit distinct from the special benefit derived by the properties within the project boundaries. For example, a major thoroughfare may be deemed to have a general benefit to the community at large, as well as the special benefit derived by the abutting property.

In the application of its assessment policies, the City Council shall define and distinguish between the special benefits received by particular parcels of property within an improvement district, as compared to any general benefit derived by the community at large. The Council shall also determine preliminarily the degree to which the community at large may receive a general benefit for any proposed public improvement project prior to ordering such an improvement project. City owned land except right-of-way, park land or ponding areas will be assessed consistent with the method used for privately owned property.

II. Public Improvement Assessment Policies

A. Sanitary Sewer:

1. Functional Classification. For purposes of benefit determination, the following two functional classifications are adopted:

- a. Trunk. Trunk sanitary sewers are those lines normally sized larger than eight inches which are required to be constructed to provide service to a sewer district or sub-district. These trunks lines are identified in the City's Trunk Sewer Plan. The cost of trunk facilities is deemed to be a central system cost. Trunks may provide lateral benefit and where such benefit is determined the property will be so assessed. Trunks may be constructed in an alignment to develop lateral benefit which requires deeper pipe construction. In such instances, the Council shall consider the degree to which extra depths may be treated as a trunk versus a lateral cost.
 - b. Laterals. Lateral sanitary sewer lines in most residential zones are not larger than eight inches while other zoned areas may have lateral benefit up to twelve inches. Laterals are designed to be sized to collect the sewage from a project area for conveyance to a trunk facility.
2. Trunk/Central System Costs. Central system costs are divided into the following two categories:

- a. Connection Charge: Sanitary Sewer Residential Equivalent Connection (REC) charges are established by the City to finance central system costs: sewer trunks, force mains and pumping stations, etc. These improvement costs are incurred before property can develop.

Residential Equivalent Connection (REC) charges for sanitary sewer service to dwelling units or other structures shall be collected at the current rate prior to the issuance of a building permit.

Land uses in all other zones will be charged on the basis of the estimated demand placed upon the sanitary sewer system. The charge shall be in accordance with the classification and computation of the Metropolitan Council Environmental Services (MCES) procedures for classification and computation of its service availability charge as more particularly set forth in that document identified as Service Availability Charge (SAC) Procedures Manual of the Metropolitan Council Environmental Services (MCES), a copy of which is on file in the office of the City Clerk.

- b. Area Charges. Sanitary sewer area assessments, to finance central system costs, shall be levied against all benefiting properties within an improvement district. Sanitary sewer and water area assessment will usually be levied at the same time.

Area charges are reviewed and, if deemed necessary, revised each November, effective January 1st of the following year.

3. Lateral Assessments. It is the policy of the City to assess fully the costs of all lateral sanitary sewers to a given project area. These costs shall include the costs associated with bringing the sanitary sewer to the property at a point and depth needed to serve not only the property in question, but adjacent parcels outside of the current project boundary if the line is to be extended in the future. It shall be the intent of the policy to insure that the most economical and effective sanitary sewage collection system can be constructed so as to meet the ultimate needs of the community at large. Reconstruction of the sewer lateral shall also be 100% assessed in that all benefits are local in nature.
4. The acreage availability charge, if not paid in cash, shall be assessed at the time the Developers Agreement is processed in accordance with Division 3, Article VI, Chapter 19 of the City Code of Ordinances.

B. Water:

1. Functional Classification. For purposes of benefit determination, the following two function classifications are adopted:
 - a. Trunk. Trunk water mains are normally sized twelve inches or larger. These trunk lines are identified in the City's Water Distribution Plan. The cost of trunk facilities is deemed to be a central system cost. Trunks may provide lateral benefit and where such benefit is determined the property will be so assessed.
 - b. Lateral. Lateral lines are normally not larger than eight inches in most residential zones and twelve inches in other zones. Laterals are designed to be sized to provide water in sufficient volumes and such pressure as required to serve a project area.
2. Trunk/Central System Costs. Central system costs are divided into the following categories:
 - a. Connection Charge: Water Basic Equivalent Connection (REC) charges are established by the City to finance central system costs, representing trunk water mains, reservoirs, wells, pumping stations, treatment facilities, etc.

Residential Equivalent Connection (REC) charges for water service to dwelling units or other structures shall be collected at the current rate prior to the issuance of a building permit.
 - b. Area Charges: Water area assessments, to finance central system costs, shall normally be levied against all benefiting properties within the applicable improvement district at the area assessment rate then currently in effect when water is available to the property. Normally the area assessments will not be levied unless sanitary sewer is also available.

Area charges are reviewed and, if deemed necessary, revised each November, effective January of the following year.

3. Lateral Assessments: It is the policy of the City to assess fully the costs of all lateral water mains to a given project area. These costs shall include the costs associated with bringing the water main to the property at a point needed to serve not only the property in question, but the adjacent parcels outside of the current project boundary if the line is to be extended in the future. It shall be the intent of the policy to insure that the most economical and effective water distribution system can be constructed so as to meet the ultimate needs of the community at large. In all residential developments, lateral water main special benefit shall be limited to pipe sizes no greater than eight inches in diameter, while in commercial and industrial zoned properties, the special benefit shall be limited to a pipe no greater than twelve inches in diameter. Reconstruction of the water lateral shall also be 100% assessed.

C. Storm Drainage:

1. General

Storm drainage facilities are designed to convey storm and other surface water so as to enhance the public health, safety and welfare. The benefits to the citizens of Chaska from such facilities are numerous. They include, but are not limited to:

- a. Protection and preservation of wetlands, marshes and ponds for the enhancement of ground water recharging, filtration of pollutants, wildlife habitat, and general aesthetic beauty associated with such natural areas.
- b. Conveyance of surface water through piping system to prevent flooding and damage to property.
- c. Establishment and maintenance of pond and lake levels to prevent flooding downstream in the watershed.

A comprehensive storm drainage system benefits all properties in the watershed district. Projects undertaken within a watershed or major drainage district, which improvements are designed as “trunk” in the Storm Drainage Plan and “water quality” in the Chaska Water Quality Plan, are deemed to be of general benefit to all of the property within the watershed or major drainage district. The Council shall determine whether the trunk or water quality benefit is present in a project. If trunk or water quality benefit is present, the cost of that part of the project will be shared by all within the watershed or major drainage district and financed through one or a combination of the following sources:

- a. Ad valorem taxes collected from property within the watershed.
- b. Storm sewer area charge.

- c. Water quality charge.
- d. Special assessments levied on property within the watershed or major drainage district.
- e. Other revenue sources such as State and Federal grants, other governmental agencies or tax increments.

The City of Chaska has established area charges to finance a portion of the trunk and water quality storm drainage system. Because different land uses have different rates of storm water run-off, the charges are adjusted to land-use, in accordance with the following:

<u>Land Use</u>	<u>Run-off Percentage</u>	<u>Ratio of Area Charge</u>
Residential	40%	1.00 (Base)
High density Res., Ind./Comm.	60%	1.50

The trunk and water quality charges are reviewed and, if deemed necessary, revised each November effective January of the following year.

Trunk Storm Sewer Charges/Water Quality Charges

All new development should pay the storm sewer area and water quality charges to be collected at the time of platting or to be assessed as a public improvement project, whichever is determined to be appropriate for a specific situation by the City Council. Net developable land would be used for calculating the charge. Net developable land excludes undevelopable areas designated as wetland, open water, steep slopes (18 percent or greater) and woodland preservation areas.

When a pond is required within new development, consistent with the Storm Water Management Plan or Water Quality Plan, the reasonable value of the additional increment of land required for ponding that is not already encumbered by restrictions shall be credited against the area charge. Restrictions may include open space requirements of the plat, natural habitat areas, extreme unsuitable soil or water table conditions, etc. This credit shall not apply to land used for ponds that are primarily for aesthetic purposes or to enhance the value of the adjoining property. The credit may also be modified by the transfer of density credits from the land dedicated for ponding purposes to other parts of the property.

Where storm sewer is required in new development, the Owner shall pay 100% of the cost of the portion of the storm sewer required to collect storm water runoff from within his property and to convey that water to a reasonable discharge point. This cost shall be in addition to the storm sewer area and water quality charges. If a new development constructs trunk or water quality storm sewer as part of the

project, credit equal to the estimated cost of the facility shall be applied against the storm sewer charge for the project.

Where storm sewer is required to be upgraded or expanded in existing development, the property within the drainage district shall be assessed up to, but not exceeding the current area charge rate for the appropriate land use.

The Storm Sewer and Water Quality Charges are reviewed and, if deemed necessary, revised each November, effective January 1st of the following year.

2. Storm Sewer Improvement Tax Districts. The Council has created, by ordinance, two storm sewer improvement tax districts. The Council has the policy of levying within each of the districts a tax levy to finance storm drainage improvements benefiting property within the districts. The storm sewer improvement tax district boundaries are defined as outlined in the City's plans and are identified as follows:

Storm Sewer Improvement Tax District No. 1 - West Creek Watershed

Storm Sewer Improvement Tax District No. 2 - East Creek Watershed

D. Streets:

1. This policy outlines the general street assessment policy which will be applicable for various street functional classifications and zoned or guided properties. The policy will assure property owners they are being treated in an equitable manner with respect to the special benefits their property receives through street improvements.
2. Functional Classification.
 - a. Minor Arterials. Minor arterials are roadways designed to provide for the through movement of traffic and are generally associated with the most intense land uses. Access to such arterials is generally limited to public streets. Arterials are normally designed to 9-ton standards with concrete curb and gutter and a width of 52 feet. Arterials may include medians and turning lanes.
 - b. Major Collectors. Major collectors are roadways designed to distribute traffic from major generators or from minor collectors to the arterial system. Access to major collectors shall be minimized, however, insuring that abutting parcels are properly served. Major collectors are designed to 9-ton standards with concrete curb and gutter and a width of up to 52 feet. Major collectors may include medians and turning lanes.
 - c. Minor Collectors. Minor collectors are roadways designed to distribute traffic from the major collectors and/or arterials to the local street system and vice versa. Land access and local traffic movement within the various neighborhoods and areas are provided. Minor collectors are designed to 9-ton standards with

concrete curb and gutter and width between 44 and 48 feet in commercial/industrial and higher density residential area, and to 7-ton standards and a width between 32 and 36 feet in residential zones.

- d. Local Streets. Local streets are roadways designed to serve as access to abutting residential or industrial/ commercial properties. The design shall discourage through traffic. Residential streets are designed to 7-ton standards and a width of 32 feet and commercial/industrial streets are designed to 9-ton standards and a width of 36 feet.

3. Assessment Procedures:

- a. Low Density Residential. It is the normal City policy to fully assess the cost of new residential street construction (32 feet wide, 7-ton design, concrete curb and gutter) to the low density residential areas if the property has direct access to the street. Reconstruction of existing street will be assessed at a rate of 25% provided the project is included in the current 5 Year Capital Improvement Program. Such residential reconstruction shall be assessed on a per buildable lot basis.
- b. Higher Density Residential and Commercial/Industrial. It is the normal City policy to fully assess the cost of all new streets to the higher density residential, commercial and industrial areas if the property abuts the roadway.
- c. Upgrading of existing collector streets which do not provide direct access to individual residential lots, but do provide an area benefit to the adjacent residential areas shall be financed as follows:
 - 1) 20% of the total cost assessed to benefiting property owners.
 - 2) 80% of the total cost from either Municipal State Aid Funds or City general tax levy.
- d. New collector streets which open an undeveloped area up for development are deemed to result in a higher benefit to adjacent property. Consequently, financing for street will be obtained by levying a special assessment against adjacent property owners based on the equivalent cost of constructing the typical residential street. The difference between the cost of the collector street and the estimated cost of a typical residential street will be financed through the use of Municipal State Aid Funds, Tax Increment Financing, tax levy or other City sources.
- e. Special Considerations.
 - 1) The general rule is to assess platted lots on an adjusted front footage basis, however, where curvilinear and/or cul-de-sac streets produce odd shaped

lots, consideration will be given to a "unit" assessment if the special benefit to the property in the district is essentially the same.

- 2) Corner lots shall be assessed on a unit basis. If a project is figured on a front foot basis, the assessment shall be calculated consistent with assessment policy.
- 3) In those cases where the project street benefits undeveloped homogeneous areas, the Council may assess such project cost to the parcels on the basis of the relationship of the area of each parcel to the total within the homogeneous area to be assessed.
- 4) General maintenance such as seal coating, patching, etc. shall not typically be assessed. Major reconstruction and/or overlaying of roadways in use 10 or more years will be assessed based on the general street assessment policies.

4. Sidewalks:

Sidewalks shall be assessed on an adjusted front foot method with 100% of these costs assessed to benefiting properties. If a sidewalk is consistent with the City's overall linear trail system plan and located adjacent to developed properties, 50% of the cost will be assessed to benefiting properties. In reconstruction projects sidewalk shall be included as a part of the street cost.

III. General Special Assessment Policies

The assessment rate for any special assessment district is computed by dividing the total assessable cost of such improvement by the total number of assessment units, such as dividing the total cost of a water lateral project by the total adjusted front footage of property served by the project. The entire project is considered as a whole in computing the assessment rates and applying it to all properties.

The project cost of improvements shall consist of the following items:

1. All necessary construction work required to complete the project.
2. Cost of actual hours charged to the City by its Consulting Engineer for the feasibility report and design of the project construction.
3. Inspection hours required of the City Inspector at a rate two times his hourly salary.
4. Legal costs.
5. Miscellaneous, publication, printing and preparation costs.

6. An Administrative charge of 1.5% of the actual construction costs.
7. Cost of issuing bonds including fiscal consultant bond discount and bond rating.
8. Capitalized interest incurred from the date the contract is awarded until the date that the assessment role is adopted.
9. All costs of acquisition of right-of-way, if applicable.

If one or more of these costs are attributable to more than one project, the costs will be distributed proportionally based on the total construction costs of each project.

The individual annual assessments will be calculated based on the concept of even principal payments over the life of the assessment. The interest rate for assessments will be established at one and a half percent above a net effective rate at which the City sells its bonds or 8%, whichever is greater.

Details of computing adjustment frontage footage. In the adjustment front footage method odd shaped lots are adjusted to an average footage that would be the equivalent to the frontage of a rectangularly shaped lot of the same area and depth.

Public Improvements in Development Areas/Assessment Terms

Public improvements may be financed by the City serving existing development areas. Assessments levied for the various assessment terms. Following is a list of the public improvements and their respective assessment terms.

1. Trunk sanitary sewers - 15 years.
2. Lateral sanitary sewers - 15 years.
3. Storm sewers - 15 years.
4. Bituminous streets - 15 years.
5. Sidewalks - 10 years.
6. Water main trunk lines - 15 years.
7. Watermain lateral lines - 15 years.

In newly developing areas the maximum assessment term for all public improvements will be 10 years.

End of Section

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CHAPTER 15 - WASTEWATER PUMPING STATION STANDARDS

In order to assure quality, equipment compatibility and consistent operational functions among wastewater pumping stations, the following requirements have been adopted. Alternate materials and configurations may be considered, provided they are approved in writing by the City Engineer prior to their use.

I. GENERAL REQUIREMENTS

- A. The standard station layout, equipment positioning and some details are shown on City Plate No. MIS-1a, MIS-1b and MIS-1c, Wastewater Pumping Station.
- B. The station shall be a non-clog submersible pump type pumping station utilizing a stainless steel dual guide rail system for pump removal and a natural gas emergency generator.
- C. Design Requirements:
 - 1. Pump shall not overload the motor nameplate horsepower rating anywhere along the manufacturer's published performance curve for the selected impeller size.
 - 2. All equipment and piping shall pass a three-inch sphere or equivalent non-clog design approved by the Minnesota Department of Health.
 - 3. Set "pump off" set point at top of pump such that the motor remains submerged during operation.
 - 4. Provide wastewater storage volume between "lead pump on" and "pump off" set point to provide a cycle time appropriate for the pump horsepower with one pump out of service. Minimum cycle time occurs when inflow is one-half pump capacity.
- D. Shop Drawings: Submit three copies of shop drawings on pumps and accessories, control panel, natural gas generator, valves, precast manhole section, precast slabs and hatch for review by City Engineer. One copy will be returned with comments.
- E. Operation and Maintenance Manuals: Furnish two copies of operation and maintenance instruction for pumps, valves and controls, including "as built" copy of the control drawings, and equipment warranties.
- F. Pump Factory Tests: Run pump dry to establish current rotation, mechanical integrity and detect excessive vibration. Perform motor and cable insulation test, then operate pump submerged in at least 6 feet of water for 30 minutes. Once 30-minute submerged operation is complete, again perform motor and cable insulation test. Provide written report of factory testing with operation and maintenance manual.

- G. Bearing Rating Certification: On pumps of 10 HP and higher provide certified bearing calculation by a registered engineer showing a minimum AFBMA 1310 rating of 100,000 hours at design conditions. Submit with shop drawings to City Engineer for review.
- H. Certified Performance Test: On pumps 10 HP and higher provide a non-witnessed factory performance test in accordance with Hydraulic Institute Test Standards. Test each pump at a minimum of 6 points, including design condition. Establish curves for head, capacity, efficiency, horsepower and input KW. Submit certified test curve to City Engineer for approval prior to shipping pump from the factory.
- I. Startup: Perform a complete operational test of the pumping station in the presence of the City Engineer. Testing shall include a pump down test to field verify pump capacity and a generator connected test to field establish correct phasing and operation. Provide factory trained technician to instruct City's operating personnel in operation and maintenance of the system.

II. MATERIALS

A. SUBMERSIBLE PUMPS

- 1. Approved Base Bid Manufacturers: Flygt with N-impeller technology.
- 2. Casings:
 - a. Heavy cast iron, Class 35B, of sufficient thickness to withstand stresses at full operating pressure.
 - b. Exterior wetted surfaces coated with an epoxy coating resistant to sewage.
 - c. Fasteners exposed to wastewater of stainless steel.
- 3. Impellers:
 - a. Impeller and Inwert Ring shall be Hard-Iron™ (ASTM A-532 (Allow A) 25 percent chrome cast iron) of the N-Technology Design.
 - b. Semi-open, multi-vane back swept, screw-shaped, non-clog design.
 - c. Dynamically balanced.
- 4. Shafts:
 - a. Stainless steel, ASTM A-276, Type 420.

- b. Carbon steel shaft with stainless steel shaft sleeve is acceptable if the steel shaft is protected and completely isolated from pumped media.
- 5. Bearings:
 - a. Two (2) sets of ball bearings and/or roller bearings.
 - b. Permanently grease or oil lubricated.
- 6. Seal Chamber:
 - a. Oil filled with air space for oil expansion.
 - b. Inspection and drain plug.
 - c. Moisture sensor in chamber and monitoring unit by pump manufacturer in control panel.
- 7. Seals:
 - a. Tandem mechanical seals.
 - b. Oil lubricated.
 - c. Seals tungsten faced.
 - d. Seals held into contact by springs supplemented by external liquid pressures.
 - e. Seals shall be easily inspected and replaced.
- 8. Wearing Rings:
 - a. Replaceable case and impeller wear rings having a minimal Brnell hardness of 200 with case ring being harder than impeller ring.
- 9. Cooling System:
 - a. Pump capable of continuous operation without damage under full load with only the pump volute immersed in the liquid.
 - b. Thermal radiators, integral to the stator housing, where necessary for cooling.
- 10. Motors and Cable:
 - a. Minimum 1.15 service factor.

- b. Sealed explosion proof motor submersible type, NEMA Design B with stator windings and moisture resistant Class H insulation.
- c. Motors capable of sustaining a minimum of 10 starts per hour.
- d. Winding thermal sensor imbedded in each phase with thermal monitoring units by pump manufacturer in control panel.
- e. Power entry cable sealed with epoxy compound or elastomer grommet with close-tolerance fit against the cable outside diameter and inside entry seal to effectively prevent water from leaking into the junction box and motor consisting of stator lead sealing gland or terminal board.
- f. Pump Cable: Continuous from pump to the control panel above the wet well. 600 V, 60 degrees C, UL approved, containing thermal sensor wiring.

11. Guide Bracket:

- a. Cast iron sliding guide bracket as an integral part of the pump or secured to pump discharge with stainless steel bolts.
- b. Non-binding guide bracket to slide easily on vertically mounted bars and guide the pump during raising and lowering operations.

12. Guide Bars:

- a. Dual Schedule 40 stainless steel guide bars for each pump.
- b. Stainless steel upper guide bar holders bolted to the access hatch.
- c. Lower guide bar holders an integral part of the discharge connection of cast iron or stainless steel.
- d. Stainless steel intermediate guide rail supports at maximum 15-foot intervals.
- e. All supports, support brackets, anchors and fasteners Type 300 stainless steel.
- f. Guide cable systems or single guide bar systems are not approved.

13. Pump Discharge Connection:

- a. Volute casing discharge flange, which automatically connects to the cast iron elbow discharge connection when lowered into place.

- b. Discharge elbow bolted to the floor of the station and the discharge line. Mating of the machined pump and discharge flanged connections without need of adjustment, fasteners, clamps, or similar devices to create a positive seal.
- c. Sealing of the pump to the discharge connection accomplished by means of the eccentric weight of the pump acting against the discharge flange.
- d. Pump shall have essentially zero leakage at discharge connection.

14. Lifting Chains:

- a. Type 300 Stainless steel chain, clevis, bolts and hooks of adequate length to permit raising and lowering of each pump.
- b. Chain capacity 150 percent of pump weight.
- c. Chains secured to each pump and to the top of the station in a location so as to allow pump removal without need of entering the station.
- d. Type 300 stainless steel bracket attached to the hatch opening to secure pump lift chain and pump cable.

B. ACCESS HATCHES

- 1. Approved Manufacturers: Bilco, U.S. Foundry & Manufacturing, Halliday, or approved equal.
- 2. Pump supplier to verify hatch size and location in top slab for clearance of pumps positioned as shown on detail plates. Minimum clearance of 2 inches required.
- 3. Double door leaves of 1/4-inch aluminum diamond pattern designed for a live load of 300 pounds per square foot without center support.
- 4. Channel frame of 1/4 inch welded aluminum with anchor flange or clips around the perimeter. Channel shall be self-draining or provided with 1-inch threaded pipe connection to allow frame to drain.
- 5. Each door leaf equipped with heavy duty, recessed hinges, torsion bars for easy operation, stainless steel safety chain that pulls across the opening when doors are in the open position, drop handle and automatic hold open arm release handle. Door leaf shall be replaceable.
- 6. Each door leaf secured with snap lock with removable handle and recessed padlock hasp covered by a hinged lid flush with the surface.

7. Aluminum surfaces mill finished with bituminous coating applied to the exterior of the frame exposed to concrete.
8. All mechanical fasteners and hardware of stainless steel.
9. Hatch manufacturer to supply stainless steel ladder-up safety post on valve vault steps. Safety post shall be mounted to the fixed ladder and manhole steps and shall telescope up and down through the use of a stainless steel spring balancing mechanism. The telescoping section shall lock in the upright position.
10. Wet Well Hatch to include dual hinged and lockable protective grating panels for each door leaf opening. Grating panels to be powder coated aluminum in safety orange color and a 300 pound per square foot load rating.

C. PIPING AND VALVES

1. Underground Forcemains: Conform to "Chapter V - Standard Materials - B. Water Main" for ductile iron force main and resilient seat gate valves, except valve box covers to be locking lid and no words.
2. Interior Flanged Pipe:
 - a. Pipe: Class 53 ductile iron with ductile iron flanges in accordance with AWWA C-115 for 250 psi working pressure. "Uni-flange" type connections are not allowed.
 - b. Fittings: Flanged joint ductile iron conforming to AWWA C-110 for a 250 psi working pressure.
 - c. Jointing: Full-face rubber gaskets and stainless steel bolts of strength for specified working pressure.
 - d. Outside Coating: Pipe and fitting shall be cleaned and coated with a rust inhibitive primer.
 - e. Inside Coating: AWWA C-104 cement lined pipe and fittings.
3. PVC:
 - a. Pipe: PVC, Schedule 80, Class 12454-B, Type 1, Grade 1, conforming to ASTM D1784 and ASTM D1785.
 - b. Joints: Socket weld, except where connecting to unions, valves, and equipment with threaded connections that may require future disassembly.

- c. Fittings:
 - 1) Socket Type: Schedule 80 PVC consistent with ASTM D2466.
 - 2) Threaded Type: Schedule 80 PVC consistent with ASTM D2464.
 - d. Unions: Schedule 80 PVC, socket type, consistent with ASTM D2466.
 - e. Solvent Cement: Solvent bond all socket connections with primer and PVC solvent consistent with ASTM D2564. Manufacture and viscosity as recommended by the pipe and fitting manufacturer to assure compatibility.
4. Swing Check Valves:
- a. Manufacturers:
 - 1) Clow, Golden Anderson or equal.
 - b. Materials and Construction:
 - 1) Conforming to AWWA C-508.
 - 2) Cast iron body and disc with resilient seat ring.
 - 3) Replaceable bronze seat ring in body.
 - 4) Stainless steel hinge shaft.
 - 5) Tight sealing.
 - 6) Adjust spring and lever keyed to shaft. Provide spring mounting brackets.
 - 7) Lever arm easily changed side to side.
5. Gate Valves:
- a. Manufacturer:
 - 1) AFC.
 - 2) Kennedy.
 - 3) Clow.
 - b. Gate valves shall be resilient wedge type conforming to AWWA C509/C515.
 - c. Cast iron wedge shall have sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM tests for rubber to metal bond ASTM D429-73.
 - d. Cast iron body with flanged ends. Fusion bonded epoxy coating. All exterior bolts to be stainless steel. One 6 oz. sacrificial zinc anode caps for every two bolts shall be installed.

- e. Non-rising stainless steel stem, open to left, handwheel operated. Operator shall be geared and include a position indicator.
- 6. Rubber Check Valve:
 - a. Type: Reinforced all-rubber duck bill check.
 - b. Material: Reinforced neoprene.
 - c. Mounting: Slip on sleeve with stainless steel clamp.
 - d. Performance Requirements:
 - 1) Cracking Pressure: 2 inches of H₂O.
 - 2) Maximum Back Pressure: 10 feet of H₂O.
 - e. Manufacturer: Red Valve Co., Tideflex, or others, which meet the requirements of this Specification.
 - f. Use for drain from valve vault to station.

D. MANHOLES

- 1. Conform to "Chapter V - Standard Materials, A. Sanitary Sewer." Except as noted.
- 2. Wet Well to be coated with Thermoplastic resin and hydraulic cement based products resistant to biologically induced hydrogen sulfide corrosion of concrete.
- 3. Curing compound shall be resin based conforming to ASTM C309.
- 4. Coating/lining products as manufactured by Raven Lining Systems, Sauereisen Cements, Polymorphic Polymers Corporation or Tnemec which meet these specifications shall be acceptable as base bid.
- 5. Strict adherence to the manufacturer's recommendations for surface Preparation and Application shall be strictly enforced. A meeting shall be held prior to the work to review the proposed procedures.

E. FIXED STAINLESS STEEL LADDER

- 1. Furnish and install stainless steel ladders as shown on detail plates.
- 2. Fabricate ladders from Type 316 or Type 316L stainless steel as detailed on the Drawings.
- 3. Provide prefabricated ladder rungs with serrated, non-slip surface.

4. All ladders shall conform to OSHA Section 1910.27 and ASTM A276.

F. CONCRETE

1. Concrete:

- a. Coarse Aggregate Size (1-1/2 in. to No. 4) ASTM C-33 - Size 467
- b. Min. Compressive Strength at 28 days 4000 psi
- c. Maximum Water-Cement Ratio .45
- d. Minimum Cement Content 564 lbs/cu. yd.
- e. Maximum Slump 3" ± 1 inch
- f. Entrained Air Content 6% ± 1-1/2%

2. Reinforcing:

- a. Bars: Deformed billed steel bars conforming to ASTM A-615, Grade 60.
- b. Welded Wire Fabric: Steel wire spot-welded at intersections conforming to ASTM A-185.

G. HARDWARE AND ACCESSORIES

1. Flanged coupling adapter to be Smith-Blair 913, dresser Style 128, or equal. Steel or semi-steel body. Thrust Restraint: Provide sufficient restraint to withstand a pressure of 350 psi by rodding back to the nearest suitable restrained joint or structure.
2. Provide stainless steel cable racks for pump cables, floats and transducer.
3. All fasteners and mechanical anchors used in the lift station shall be stainless steel.
4. If an inside drop is required by the City of Chaska, it shall be IntraFlow or approved equal.

H. PAINTING

1. All metal surfaces inside the wet well, except aluminum access hatch, galvanized guide bars, factory finished pumps and metal faces of the pump discharge connections, shall be painted with two coats of Kop-Coat Bitumastic 300-M or approved equal. The pump manufacturer shall supply a touch-up kit for repairing the

pump finish. All items shall be painted at least one coat before installation in wet well.

2. Paint exterior vent pipe and valve vault piping and valves with Kop-Coat Rustarmar 500 Speed Alkyd or approved equal. Color selected by the Owner.

I. ELECTRICAL CONDUIT

1. All conduit shall be Schedule 80-PVC.
2. Underground conduit shall have 6" wide warning tape laid approximately 9" below the surface.

J. GROUNDING MATERIALS:

1. Class B stranded copper conductor which is bare or with green insulation.
2. Copperweld ground rod 5/8 inch by 10 feet.
3. Tool-compressed connectors and lugs; Burndy Hyground, Thomas & Betts 53,000 Series, or approved equal.
4. Burndy Type QGFL bar taps.
5. UL listed.

K. PUMP CONTROL PANEL

1. Quality Assurance:
 - a. The supervisory control supplier shall be Total Control Systems Inc., Stanchfield, MN.
 - b. All panels provided under this Section shall meet the requirements of UL-508. The supervisory control system supplier shall maintain in-house UL-508 shop procedures for both open and enclosed Industrial Control Panels.
 - c. Control panels with intrinsically safe circuit extensions shall meet the requirements of UL-698A and shall be labeled as such, thereby certifying that the panel satisfies the UL requirements for an enclosed industrial control panel relating to hazardous locations with intrinsically safe circuit extensions.
 - d. All panels shall be UL labeled or third party certified in accordance with Minnesota Board of Electricity requirements for approval of electrical equipment, Minnesota Rules Parts 3800.3619 and 3800.3620.

- e. All panels shall be labeled when delivered to the Site. All field modifications shall be in conformance with the pertinent UL Requirement. When the Owner accepts the panels, the Contractor certifies that the panels have retained their UL label.
- f. their present name designing and implementing municipal water supply and treatment system controls and telemetry in the State of Minnesota for a minimum of 10 years. Past experience of companies purchased may be included as relevant experience as long as the purchased company's experience relates directly to this type and size of Project.
- g. The supervisory control system supplier shall carry a minimum of \$1,000,000 in both product liability and errors and omissions insurance.
- h. The supervisory control system supplier shall maintain a licensed Professional Electrical Engineer (State of Minnesota) on staff as a permanent employee. This engineer shall certify design concepts established by the Contractor to meet the Functional Specifications of this Section.
- i. The supervisory control system supplier shall have programmers, designers, and field service personnel who are permanent, full time employees. The field service personnel shall be available 24 hours each day to assist the Owner with on Site issues.
- j. If requested by the Owner or Engineer, the supervisory control system supplier shall provide data supporting their compliance to the above items within 48-hours of Bid Opening.

2. Control Description:

- a. The pump control system shall operate the 2 pumps based on the liquid level in the wet well. On a rising level, the lead pump shall be started followed by the lag pump. Operating pumps shall be stopped at separate low levels. A submersible level transducer PLC shall provide normal control.
- b. All system set points shall be adjustable via SCADA Mode or PLC operator interface Mode (selectable via operation interface).
- c. Pumps shall automatically alternate lead duty every cycle. Operator shall be able to select manual alternation via SCADA and PLC operator interface.
- d. An adjustable 0 to 3 minute timer shall delay the starting of the lag pump.
- e. The control system shall have means for manually simulating wet well level for testing purposes via the PLC operator interface.

- f. Backup control shall be provided by 2 floats and programmable relay (C3 Controls Series 900) independent of the transducer and PLC:
 - 1) A high level alarm float shall initiate a “High-Level” wet well alarm and start both pumps with an adjustable time delay of 0 to 15 minutes between each pump’s starting. Pump starting sequence during the backup control mode shall be fixed (1 to 2).
 - 2) Once the elevation drops below the high level alarm float, no additional pumps shall be started.
 - 3) A low level alarm float shall initiate an alarm and stop both pumps with a 0 to 60 second time delay between each pumps stopping.
- g. Phase monitor shall initiate an alarm upon phase failure. Phase monitor shall auto-reset if conditions return to normal.
- h. A pump fail alarm shall be initiated if the pump circuit breaker trips or the pump starter overloads trip.
- i. Pump motor over temperature trip, indication and alarm from thermal sensor in motor winding. Starter shall be locked out until manually reset.
- j. Pump motor moisture sensor alarm and indication from moisture sensor.
- k. The “Hand” position of each H-O-A switch shall be wired directly to the associated pump starter, bypassing all interlocks, except motor overload or any other alarm that would void the pump manufacturer’s warranty.
- l. Alarm Handling:
 - 1) Appropriate alarm light(s) on the panel inner door shall flash until the alarm condition is acknowledged.
 - 2) The inner door light(s) shall stay on continuously until the alarm condition is cleared.
 - 3) All alarms shall be telemetered as specified below.
- m. Power Fail:
 - 1) A UPS shall be provided to provide back-up power to the control circuit.
 - 2) A UPS fail alarm shall bypass the UPS and initiate an alarm upon activation.
 - 3) Upon restoration of power, time delays shall be provided between starting of the lead and lag pumps.
 - 4) A relay shall be provided ahead of the UPS to indicate normal power failure.

n. Flow Measurement:

- 1) The PLC shall calculate station flow total.
- 2) Estimated pump flow rate shall be input via the SCADA PC. This rate shall be readily adjustable by the operator.
- 3) PLC shall calculate the flow rate of the station based on pump run time.
- 4) Shall accumulate flow total and shall transmit flow total to the SCADA master where it shall be displayed, totalized, and trended as specified in SCADA Modifications portion of this Specification.

o. Telemetry

- 1) Control panel shall communicate to the SCADA master PLC located at the Water Treatment Plant.
- 2) Telemetry shall be via a Verizon Cradle Point.
- 3) Points to be telemetered to the existing SCADA master are as follows:
- 4) Pump fail (each pump)
- 5) Pump running (each pump)
- 6) Pump over temperature (each pump)
- 7) Pump seal failures (each pump)
- 8) Pump over run (each pump)
- 9) Pump run time (each pump - accumulated by the RTU)
- 10) Wet well high level alarm
- 11) Wet well low level alarm
- 12) Wet well level (analog)
- 13) Telemetry fail
- 14) Pump over run set point (from master)
- 15) Manual/automatic start sequence (from master)
- 16) Alarm acknowledge (from master)
- 17) Power fail
- 18) Phase fail
- 19) UPS fail.
- 20) Wet well high-high level alarm (back up float).
- 21) Flow Total.
- 22) Generator run.
- 23) Common alarm.
- 24) Battery voltage low.
- 25) Low coolant temperature.
- 26) Generator not in Auto.
- 27) Automatic Transfer switch position.

p. Existing SCADA system modifications:

- 1) Provide modifications at the SCADA master located at the Water Treatment Plant to add the lift station to the existing SCADA system.
- 2) The SCADA master consists of a Personal Computer running FactoryTalk HMI software and SCADAAlarm alarm dialing software. The master PLC is an Allen-Bradley SLC5/05.
- 3) Provide control features and monitoring of the lift station as specified in this section. A lift station screen shall be added which matches the existing lift station screens as much as possible. All telemetered data shall be displayed.
- 4) Revise existing reports to include the new lift station. Reporting shall include daily and monthly flow totals, pump run times.
- 5) Integrate all new information into the existing data base.
- 6) Revise the dialing software to include the new lift station.

3. Enclosure Construction:

- a. Double sided, free-standing, low profile, rainproof, Type 3R per UL-508UL/698A.
- b. Stainless steel, 12 gauge minimum, door-in-door.
- c. 18-inch floor stands, 60-inch maximum overall height, vented skirts to cover space between floor stands. Finish to match the panel.
- d. Exterior gasketed doors (front and back) with continuous hinge and three-point, handle-operated latching system. Handle with provisions for padlocking; tumbler type lock is not acceptable.
- e. Internal doors with continuous hinge and quarter-turn latches.
- f. Control devices and indicating lights mounted on interior doors.
- g. Circuit breaker operating handles and overload relay reset push buttons accessible with interior doors closed.
- h. Internal heaters with adjustable separate thermostat control to prevent condensation and to prevent freezing.
- i. 12" x 12" x 1" pocket inside exterior door for clipboard and information storage.
- j. Power side of panel shall have main breaker, generator receptacle breaker, CT compartment (if required), lighting transformer (if required), surge protection, phase monitor, and automatic transfer switch.
- k. Control side of panel shall have the remaining components.

- l. Door stop kit to hold exterior doors in desired position; Hoffman A-DSTOPK or equal.
 - m. LED lighting package for panel interior with manual switch.
 - n. Door switch for monitoring position of exterior door.
4. Service Entrance:
- a. Verify voltage and single phase/three phase availability and requirements on each station.
 - b. Neutral bus for terminating the service neutral, the grounding electrode conductor, and the equipment grounding conductors.
 - 1) Bond neutral bus to the control panel enclosure.
 - 2) Provide bonded ground stud on the exterior of the panel to allow Owner to clamp their generator frame grounding cable during periods when station is powered by the standby generator.
 - c. Mechanically interlocked (key interlocks not acceptable), dual circuit breakers for service entrance and standby generator:
 - a. Service entrance breaker shall be UL listed for service entrance.
 - b. Both breakers shall be molded case, thermal-magnetic with interrupting capacity as required for electric service specified above.
 - c. Breakers shall be manufactured by Cutler-Hammer.
 - d. Interlock shall permit only 1 breaker to be closed at a given time and shall permit both breakers to be locked open with a single padlock.
 - d. Standby generator receptacle for 120/208V stations shall be 100 amp., 4 wire, 4 pole, Style 1, 600 Vac, reversed contacts, tool-crimped connections, heavy duty, circuit breaking, weatherproof with 45 degree angle adapter and spring door; Crouse-Hinds AR1041-S22-T with angle adapter. (FOR CHASKA'S 120/208V STATIONS)
 - e. Standby generator receptacle for 480V stations shall be 100 amp., 4 wire, 4 pole, Style 1, 600 Vac, reversed contacts, special polarity, tool-crimped connections, heavy duty, circuit breaking, weatherproof with 45-degree angle adapter and spring door; Crouse-Hinds AR1041-S22-T-S4 with angle adapter. (FOR CHASKA'S 480V STATIONS)
 - f. Automatic transfer switch:
 - 1) The current rating shall be based upon all classes of load and shall be UL listed
 - 2) (UL-1008).
 - 3) Transfer switch shall be designed, manufactured, and tested in accordance with
 - 4) UL-1008.

- 5) Switch shall be open transition quick-make, quick-break type with contact transfer speed of less than 100 milliseconds.
- 6) Automatic/Manual Operation Selection.
 - i. Transfer switch shall have adjustable 3 phase under/over voltage and 3 phase under/over frequency sensing for normal and generator sources.
 - ii. When the selector switch is in the automatic position and the voltage on any phase of the normal source is below 90 percent or above 110 percent of rated voltage for an adjustable time of 0 to 10 seconds, a pilot contact shall close to initiate starting of the generator.
 - iii. When the generator is delivering not less than 90 percent of rated voltage and not less than 58 Hz, the load shall be transferred to the generator.
 - iv. When the normal source has been restored to not less than 90 percent of rated voltage on all phases, the load shall be re-transferred to the normal source after a time delay adjustable from 0 to 30 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
 - v. A delayed transition adjustable from 0 to 2 minutes shall be provided so that the main contacts are locked in a center-off position for transfer in both directions or an in-phase monitor shall control switching in both directions.
 1. If the switch has a center-off position, the switch shall be mechanically locked in all 3 positions.
 2. If the switch uses an in-phase monitor in lieu of having a transition position, the in-phase monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero-crossing point to minimize switching transients.
 - vi. The generator shall run for an adjustable period of time (default setting of 5 minutes) unloaded and then automatically shutdown and be ready to start upon the next failure of the normal source.
 - vii. If the standby generator should fail while carrying load, retransfer to the normal source shall be initiated immediately upon restoration of all 3 phases of the normal source.
- 7) Manually initiated, electrically operated manual transfer:
 - i. Provide Auto/Manual selector switch and 2 pushbuttons. When the switch is in the "Manual" position, the pushbuttons shall transfer from normal power to generator and vice versa with normal power available.
- 8) Manually initiated, manually operated manual transfer (maintenance mode):
 - i. Provide handle to perform manual transfer.
 - ii. Automatic transfer shall be disabled with a switch mounted on the front of the transfer switch enclosure.
 - iii. Switch operation shall be load make/break rated, quick-make, quick-break, high-speed operation.

- 9) The transfer switch shall be equipped with a microprocessor based control panel. The control panel shall perform the operational and display functions of the transfer switch. The display functions of the control panel shall include ATS position and source availability. The digital display shall be accessible without opening the enclosure door and shall be provided with a 4 line by 20 character LCD display screen with touch pad function and display menus. The programming functions shall be pass code protected. The control panel shall be opto-isolated from electrical noise and provided with the following inherent control functions and capabilities:
 - i. Multipurpose display for continuous monitoring and control of the ATS functions and settings. All field changeable functions shall be pass code protected and accessible through the keypad.
 - ii. Built-in diagnostic display that includes the capturing of historical data, such as number of transfers and time on emergency power source for ease of troubleshooting.
 - iii. Touch pad test switch with Fast Test/Load/No Load positions to simulate a normal source failure.
 - 10) Isolated neutral bus for terminating the utility and generator neutral conductors.
 - 11) Ground bus for terminating the utility, generator, and load side grounding conductors.
 - 12) Isolated form 'C' contacts shall be provided for remote indication of
 - i. Normal power available.
 - ii. Generator power available.
 - iii. Switch in normal position.
 - iv. Switch in generator position.
 - 13) Isolated adjustable timed (0 to 60 seconds) normally closed contact shall be provided to allow motor loads to be disconnected prior to transfer in either direction.
 - 14) Provide input and control logic to allow operator to operate the facility on generator power (via the SCADA system) for extended periods of time while still maintaining the logic to automatically switch back to normal power should the generator fail.
 - 15) A load/no load clock exerciser shall be incorporated within the microprocessor and shall be programmable to start the engine generator set and transfer the load (when selected) for exercise purposes on a weekly basis. The exerciser shall contain a lithium battery for memory retention during an outage.
 - 16) Switch shall be Cummins to match transfer switch furnished at the existing Chaska Cloverfield lift station or equivalent Caterpillar transfer switch.
- g. Incoming electric service surge capacitors and lightning arrestor.
- h. Provide control circuit surge protection; EDCO HSP-121-BT1 or equal.

5. 480 Volt to 120/240 volt transformer (if required) and secondary circuit breaker panel with 60 amp, 2-pole main circuit breaker and with five 20-A, single pole, thermal-magnetic circuit breakers for the following loads (circuit breakers shall have adequate RMS symmetrical interrupting capacity for fault current available):
 - a. Control power.
 - b. Duplex GFCI receptacle.
 - c. Condensation heaters.
 - d. 2 Spares.

6. Pump Starters shall be variable frequency drives as specified below:
 - a. Application
 - 1) Submersible centrifugal sewage lift pump.
 - 2) Variable or constant torque as required by pump characteristics.
 - 3) Distance from VFD to motor will be approximately ___ feet.
 - b. Power Source
 - 1) Electric utility or standby generator.
 - 2) Potential: ___ volts plus or minus 10 percent.
 - 3) Frequency: 60 Hz plus or minus 2 Hz.
 - 4) Type: ___ phase, ___ wire.
 - c. Output
 - 1) Pulse width modulated (PWM) voltage waveform. (Third generation IGBT power electronics).
 - 2) Potential: ___ volts maximum at 60 Hz.
 - 3) Frequency: 0.1 to 60 Hz.
 - d. Equipment Requirements
 - 1) NEMA 1.
 - 2) UL listed.
 - 3) Main disconnect with handle position that indicates ON, OFF, and TRIPPED condition. The handle shall have provisions for padlocking.
 - a. Pump circuit breaker in control panel may serve as the disconnect.
 - 4) 5-percent input reactance.
 - 5) dVdT filter or load reactor (if required due to VFD to motor distance)
 - 6) All cooling fans shall be thermostatically controlled including fans integral to VFD and enclosure cooling fans if applicable.
 - 7) Emergency stop push button.

- 8) Dry contact outputs for "Run" and "Fail" indication.
- 9) Operator interface with alpha-numeric LCD or LED display and keypad. Interface shall allow the operator to view all operating parameters, including but not limited to output voltage, current, power, and frequency. Interface shall also allow the operator to adjust all application, protection, programming, and control parameters. Operator interface shall be mounted on front door.
- 10) Over-voltage and under-voltage protection.
- 11) Loss of phase and phase reversal protection.
- 12) AC line transient protection to meet ANSI C62.41 (MOV or LC Filter).
- 13) Over-current protection.
- 14) Over-temperature protection.
- 15) Adjustable electronic overload protection.
- 16) Microprocessor fault protection.
- 17) Ground fault protection.
- 18) Adjustable voltage boost.
- 19) Phase-to-phase short circuit protection at ___ volts plus 10 percent.
- 20) Integrated equipment fault current rating shall be _____ amp. RMS symmetrical.
- 21) Independent low and high speed limit adjustments.
- 22) Acceleration and deceleration rates independently adjustable: Up to 1,000 seconds.
- 23) Adjustable carrier frequency.
- 24) Stop Mode: Ramp to stop. (or Coast to rest)
- 25) Field programmable "Critical Frequency Avoidance" (minimum of 3 bands).
- 26) Field programmable "Preset Speeds" (minimum of 3).
- 27) Relays to interface with controls as specified herein.
- 28) Storage Temperature: -4 degrees F to 150 degrees F.
- 29) Operating Ambient Temperature: 32 degrees F to 104 degrees F.
- 30) Altitude: Less than 3,300 feet.
- 31) Maximum Relative Humidity: 95-percent non-condensing.
- 32) Low voltage controls isolated from high voltage components.
- 33) Automatic restart after power interruption.

e. Performance Requirements

- 1) Rated Continuous Current:
 - a. 100 percent of motor nameplate current for VFDs with 3 phase input and 3 phase output.
 - b. 200 percent of motor nameplate current for VFDs with 1 phase input and 3 phase output.

- 2) Overload Current Capability:
 - a. 110 percent of rated current for 1 minute for variable torque loads where VFD has 3 phase input and 3 phase output.
 - b. 150 percent of rated current for 1 minute and 200 percent rated current for 3 seconds for constant torque loads where VFD has 3 phase input and 3 phase output.
 - c. 220 percent of rated current for 1 minute for variable torque loads where VFD has 1 phase input and 3 phase output.
 - d. 300 percent of rated current for 1 minute and 400 percent rated current for 3 seconds for constant torque loads where VFD has 1 phase input and 3 phase output.

- 3) Current Limit.
- 4) Frequency Stability: Plus or minus 0.6 Hz.
- 5) Speed Regulation: 3 percent from no load to full load.
- 6) Control Power Ride-Through: 50 milliseconds.
- 7) Minimum Efficiency: 97 percent at 100 percent speed and rated load.
- 8) Minimum Apparent Power Factor: 95 percent.
- 9) Speed Control
 - a. Automatically from speed control signal in the supervisory control panel.
 - b. Manual via speed potentiometer or VFD HIM module when local H-O-A switch is in the “Hand” position.

- f. Manufacturer
 - 1) Allen-Bradley Power Flex 523 for 240 volt pumps up to 20HP and 480 volt pumps up to 30HP.
 - 2) Allen-Bradley Power Flex 753 for 240 volt pumps over 20HP and 480 volt pumps over 30HP.

- g. Harmonic Distortion
 - 3) Drives shall be designed to limit the harmonic currents which are generated on the AC service and which would produce electromagnetic interference (EMI) or radio frequency interference (RFI). Individual current harmonic distortion and the total demand distortion expressed as percent of maximum demand load current shall not exceed the values specified in IEEE 519 – Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, Table 10.3.

7. PLC shall be Allen-Bradley Micrologix 1400 with I/ O cards as required.
 - a. Battery backed RAM as required to provide a minimum of 25 percent spare capacity at completion of the project.
 - b. Communications port, modems, cards, software, programming, and all required appurtenances for interfacing with the wireless telemetry system.
 - c. Panel space for a minimum of 2 expansion cards.
 - d. Minimum of 2 spare digital inputs (each type used) and 2 spare digital outputs (each type used).
8. PLC Operator Interface shall be Automation Direct C-MORE Operator Interface 6” Model EA9 TGRL.
9. Cellular communication device shall be a Verizon Cradle Point.
10. Miscellaneous control panel hardware:
 - a. Phase Monitor:
 - 1) Monitor phase loss, low voltage and phase reversal.
 - 2) Adjustable trip delay of 1.0 to 10 seconds; automatic reset; contacts for phase failure indicating light and pump trip.
 - 3) UL listed or recognized; Time Mark Model 2644, or approved equal.
 - b. Pump overtemperature / seal fail alarm relays (furnished by pump supplier for installation in the control panel).
 - c. Indicating lights for each pump as follows:
 - 1) Called-for (amber).
 - 2) Running (green) which operates from an auxiliary contact on the motor starter.
 - 3) Failure (red) which operates from an output of the telemetry unit.
 - 4) Over temperature (red) which operates from the pump motor thermal sensor and interface unit furnished by the pump supplier.
 - 5) Moisture (red) which operates from the pump motor moisture sensor and interface unit furnished by the pump supplier.
 - 6) Pump over run (red) which operates from an output of the telemetry unit.
 - d. Hand-off-auto selector switch for each pump.
 - e. Indicating lights (red) for high water level and low water level.
 - f. Phase failure-indicating light (three phase stations only).

- g. Push-to-test push-button which illuminates all indicating lights.
- h. Alarm acknowledge push-button.
- i. Six-digit running time meter which measures the running time of each pump to one-tenth of an hour. Use an auxiliary contact on the motor starter and 120-volt control voltage; Engler Model 710 or equal.
- j. Push-Button Devices:
 - 1) 30 MM oil tight units.
 - 2) Selector switches with knob operator.
 - 3) Push buttons with black operator.
 - 4) Allen-Bradley Bulletin 800-T, Square D, Class 9001, or equal.
 - 5) Indicating lights shall be high visibility LED FVLU120XX or equal.
- k. Uninterruptible Power Supply (UPS):
 - 1) True on-line with spike, line noise, and RFI/EMI Filtering.
 - 2) UL listed.
 - 3) Battery sized to power 115 percent of the panel power requirements for 10 minutes.
 - 4) Surge protection shall pass ANSI/IEEE C62.41.
 - 5) Fail alarm circuit internal to the UPS which bypasses the UPS and initiates an alarm upon activation.
 - 6) MGE or equal.
- l. Relays:
 - 1) 120 Vac, 60 Hz, general purpose, plug-in type with contacts rated 10 amp. at 240 Vac, screw terminal base, and dust-proof cover; Potter & Brumfield Type KRP, Square D Class 8501 Type KP, or equal.
 - 2) 120 Vac, 60 Hz, solid state, general purpose, plug-in, adjustable time timing relays with contacts rated 10 amp. at 240 Vac, screw terminal base, and dust-proof cover; Square D Class 9050 Type JCK, or equal.
- m. 120 Vac intrinsic safety barriers for the float switches.
- n. Panel Wiring:
 - 1) Stranded copper conductor.
 - 2) Color-coded 600 volt insulation; blue for intrinsically safe wiring.
 - 3) 300 volt terminal blocks with box lug for terminating all field control wiring; motor leads shall be terminated at the overload relay lugs. Terminals shall be identified with the number on the wiring diagrams.

- 4) Both ends of all conductors identified with wire tags which are numbered in accordance with the wiring diagrams and which are protected with a clear, heat-shrinkable sleeve.
 - 5) Complete wiring diagrams prepared specifically for this project. All termination points shall be numbered.
- o. Identification:
- 1) Devices on interior doors shall be identified with laminated plastic nameplates which are engraved with white lettering on a black background and which are attached with stainless steel screws.
 - 2) Devices mounted inside the panel shall be identified with embossed labels, Dymo or equal, as shown on the wiring diagrams. Label shall be on the mounting panel, near the device.
- p. Device Location:
- 1) All circuit breakers and starters shall be mounted on the lower portion of the panel.
 - 2) All running time meters, lights and push buttons devices shall be mounted on the top portion of the panel.
- q. 15 amp, 120 Vac GFCI duplex receptacle mounted on an inner door.

SUBMERSIBLE LEVEL TRANSDUCER:

1. Type 316 stainless steel body.
2. Two-inch minimum diameter Teflon faced pressure-transmitting diaphragm.
3. Solid-state type internal transducer.
4. Accuracy (including effects of linearity, hysteresis and repeatability) of $\pm 0.3\%$ of full span.
5. Sealed cable entry.
6. Stainless steel connecting hardware, clamps, cables, etc. as required for mounting in a stilling well as shown on the plans.
7. Pressure range as required.
8. Waterproof shielded cable with sufficient length of cable to reach from the bottom of wet well to the control panel.
9. Base bid: KPSI-LTB8ADA5A015PG060 Series 0-15PSI (minimum 60-foot cable)

L. FLOAT SWITCHES:

1. Impact/corrosion resistant ABS float body.
2. Non-Mercury mechanical switch rated 13.0 amp. at 120/240 Vac.
3. Foam-filled body.
4. Heavy duty, Type SJOW #16/2 cord. Cable long enough to reach control panel without a splice and a minimum of 2 foot slack in wet well for float level adjustments.
5. Completely potted switch-to-cable-to-body connection.
6. Stainless steel cable and 15 lb. plastisol-coated cast iron weight for mounting float switches.
7. Stainless steel fasteners with rubber sleeve for attaching floats to the stainless steel cable.
8. Warrick Controls Series M, Anchor Scientific Eco-Float, or equal.

M. EXTERNAL METER SOCKET:

9. An electric utility approved meter socket shall be provided for 208 or 240 volt direct metered services or 480 volt ct metered services.
10. A combined electric utility approved meter socket / cold sequence disconnect with circuit breaker disconnect shall be provided for 480 volt direct metered services.
11. NEMA 3R enclosure.
12. Voltage and current rating appropriate for the service provided.

N. SPARE PARTS:

1. 2 spare fuses of each type used.
2. 2 spare relays of each type used.
3. 2 spare lights of each type used.
4. 1 spare power supply of each type used (not including PLC power supply).

5. 1 spare intrinsic safety barrier of each type used.
6. 1 spare submersible level transducer.
7. 1 set of motor over load heaters.
8. 1 spare float switch.
9. 1 spare PLC I/O and communications card of each type used.
10. 1 spare PLC CPU (fully programmed).
11. All spare parts shall be delivered to the Chaska Municipal Services Building. Parts shall be appropriately packed and labeled for storage. Label shall identify the part(s) and shall also state the project's name.

O. ENGINE GENERATORS

1. Approved Manufacturers

a. Base bid manufacturers are as follows:

- 1) Caterpillar.
- 2) Cummins.

2. Natural Gas Engine

- a. Multi-cylinder, 4 cycle, spark ignited, for natural gas fuel.
- b. Engine shall be certified to meet all required EPA and governing environmental control agencies air emission limits.
- c. Rated horsepower sufficient to drive the generator at rated kW.
- d. Block, crankshaft, liners, and connecting rods of same quality used in a comparable diesel engine.
- e. Water cooled, thermostatically controlled utilizing an engine mounted radiator with flanges for duct connections. Provide a readily accessible and viewable overflow tank.
- f. ___ volt, 1 phase jacket water heater to maintain engine block at 100 degrees F to assure rapid starting.
 - 1) Provide disconnect/automatic sealing couplers to isolate the heater for replacement of the heater element.
 - 2) The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
- g. Pressurized circulating lube oil system complete with filtering system.
- h. Crankcase breather kit with heater kit.
- i. Heavy duty, dry element type air cleaner with restriction indicator.
- j. Electric isochronous governing system.
- k. DC starting motor capable of cranking engine at starting speed for a duration of at least 30 seconds.
- l. Battery charging alternator.

- m. Vibration isolation dampers between engine/generator and fuel tank.
- n. Vibration isolation dampers between base of generator assembly and concrete pad.
- o. Clear access shall be provided to all filters and to the oil drain to facilitate on site maintenance.
- p. Readily accessible manual fuel shut off valve.
- q. Automatic fuel shut off valves, secondary regulators, and test port for measuring gas pressure.
- r. Oil Heater: A thermostatically controlled crankcase oil heater shall be provided to maintain oil temperature at 70 degrees F while in an ambient of 0 degrees F. The heater's surface temperature shall be designed such that no oil carbonization occurs.
 - 1) A toggle switch shall be provided in the generator enclosure for turning the oil heater on and off.
 - 2) Oil Temperature Indication: An oil temperature sensor shall be provided and wired into the control system for indication and alarming.

3. Generator

- a. Synchronous machine with brushless revolving field.
- b. ___ volt, ___ phase, ___ wire, ___phase windings.
- c. Skewed stator and 2/3 pitch windings.
- d. Separately excited generator that uses a separate permanent magnet generator (PMG) to power the voltage regulator.
- e. Automatic static voltage regulator that senses all 3 phases to regulate output voltage from no load to full load within 0.5 percent, and shall include under-frequency protection.

4. Battery and Charger

- a. Lead acid battery.
- b. Sufficient amp-hour rating to match cyclic starting control for a minimum of 3 cranking cycles.

- c. Automatic standby battery charger with dual charging rates and charging DC ammeter.
- d. Charger shall disconnect either during starting or operation.
- e. The battery package shall be complete with cables and hardware.
- f. Charger shall be mounted within the generator assembly footprint.

5. Control Panel

- a. Manufactured to minimize field wiring and terminations. Locate so all controls, gages, and meters are readily accessible from the floor or ground. Top of control panel shall not exceed 6'-6" above the floor, ground or catwalk.
- b. Contain all engine and generator controls, meters, switches, and annunciator indicators.
- c. Control panel lamps shall be provided for night time viewing.
- d. Provide manual spring wound timer (0 to 30 minute) for interior DC lights
- e. Panel shall be mounted on vibration isolators.
- f. Control Provisions:
 - 1) Generator set controller shall have a graphical display with positive image, transfective LCD, and adjustable backlight/contrast.
 - a. Graphical display shall display at a minimum: modes of controls, alarms and generator status, and electrical measurements.
 - 2) Automatic cyclic engine start controller which will start or stop generator under the control of an automatic transfer switch.
 - 3) Mode selector switch which is capable of selecting automatic, manual, off, and lock-out modes.
 - 4) Voltage adjust potentiometer to regulate voltage manually in the range of ± 5 percent.
 - 5) Emergency Stop pushbutton switch.
 - a. If switch is located on exterior of enclosure, generator shall initiate a common alarm output contact.
 - 6) Safety shutdown controls and alarm notification for the following:
 - a. Low oil pressure.
 - b. High coolant temperature.
 - c. Overspeed.
 - d. Overcrank.
 - e. Activation of Emergency Stop switch.
 - f. Low coolant level.

- 7) The following features, at a minimum, shall be provided at the panel:
 - a. Alarm horn with Alarm acknowledge button.
 - b. Auto/Start(Run)/Stop buttons or switch.
 - c. Engine Running notification.
 - d. Engine cool down timer.
 - e. Low oil pressure warning alarm.
 - f. High coolant temperature warning alarm.
 - g. Failure to start alarm.
 - h. Overspeed warning alarm.
 - i. Over crank warning alarm.
 - j. Charger fail (low battery voltage) alarm.
 - k. Low coolant temperature alarm.
 - l. System ready notification.
- 8) Provide isolated SPDT contacts (rated for a minimum of 2A @ 120V) for the following:
 - a. Generator run.
 - b. Common alarm.
 - c. Battery voltage low.
 - d. Low coolant temperature.
 - e. Not in Auto.
- 9) At a minimum, provide the metering devices as required for the following, each point shall be displayed on the control panel graphical interface:
 - a. Generator AC Voltage - 3 phase (L-L & L-N).
 - b. Generator AC Current (per phase & average).
 - c. Generator Power kW (total & per phase).
 - d. Generator kVA (total & per phase).
 - e. Generator kW-hr (total)
 - f. Generator Frequency.
 - g. Generator Power Factor (average & per phase)
 - h. Battery Voltage.
 - i. Engine Hours.
 - j. Engine RPM.
 - k. Engine Oil Pressure.
 - l. Engine Coolant Temp.
 - m. Engine Crank Attempt Counter.
 - n. Service Maintenance Interval (Engine Operating Hours and Calendar Days)
 - o. Real Time Clock
 - p. Twenty Event Fault Log.
- 10) Overload protection
 - a. 3-pole thermal-magnetic main circuit breaker for each voltage provided.
 - b. The circuit breaker(s) shall be identified with engraved phenolic nameplates which have white lettering of not less than 3/16 inch on a black background. Nameplates shall be attached with stainless steel screws.

6. Silencers

- a. "Critical Grade" muffler mounted inside the generator enclosure.
- b. Attenuation of 35 decibels in the 200 to 500 Hz range, 27 decibels above 500 Hz.

1) DESIGNER NOTE: CONFIRM DECIBEL RATING REQUIRED FOR EACH SITE BASED ON APPROPRIATE SOUND ORDINANCE.

7. Sound Attenuating Weatherproof Housing

- a. Operating handles for latching the panels shall be lockable. 2 sets of keys shall be provided.
- b. All metal parts shall be cleaned, primed, and painted with a durable, weather-resistant, semi-gloss, baked enamel finish. Color as selected by the Owner from color chips which shall be provided with the shop drawings.
- c. Stainless steel hinges.
- d. Bird / rodent screens over intake and exhaust louver opens. Screen openings shall be no larger than ¼ inch.
- e. Provisions inside the enclosure accessible from the back for securing and hanging the cord and plug assemblies.
- f. Adequate size to contain the engine-generator set and all accessories including the silencer.
- g. Oil/moisture resistant acoustical insulation.
- h. Sound performance at rated load; 75dBA at 7 meters.
- i. **DESIGNER NOTE: CONFIRM DECIBEL RATING REQUIRED FOR EACH SITE BASED ON APPROPRIATE SOUND ORDINANCE.**
- j. Provide steel cage around exhaust discharge to prevent vandalism.

8. Convenience Lights

- a. 2 lamp holders for DC lighting inside the enclosure. Mount the lamp holders for most effective lighting. Provide rough service lamps for each lamp holder.
- b. Control from manual timer in control panel.

- c. Toggle switch mounted at a convenient location for control of the above lamp holders. Toggle switch shall be identified with laminated plastic nameplate which has white lettering of not less than 3/16 inch on a black background. Nameplate shall be attached with stainless steel screws.

9. Convenience Receptacles

- a. Provide 2 weatherproof duplex GFCI convenience receptacles inside the enclosure. Mount 1 on each side of the engine-generator in readily accessible location.
- b. Wire receptacles to 20 amp, 1-pole circuit breaker fed from the generator output.

10. Load Center

- a. A load center shall be provided to feed all 120 V and 240 V equipment associated with the generator (block heaters, battery chargers, receptacles, lights, etc).
- b. Load center shall be provided with a __amp main breaker and branch breakers sized as required to feed all loads. Load center shall be mounted in the generator enclosure.
- c. Load center shall be fed from a __amp, __pole circuit breaker in the lift station control panel.

11. Spare Parts

- a. Block heater.
- b. Air filter.
- c. Oil filter.
- d. Fuses (2 of each type used in generator set).

12. Submittals

- a. Submit the following items consistent with Section 01 33 00.
- b. The following information shall be included with each submittal:
 - 1) Engine-generator assembly base dimensions, unit enclosure dimensions, equipment weights and loading data. This information shall include detailed dimension and weight data for the generator silencer and exhaust stack (where applicable).

- 2) Drawing(s) showing the general arrangement and dimensions of the engine generator unit and the outdoor enclosures (where applicable). Include location of all auxiliary system component connections and engine-mounted equipment.
 - 3) Catalog cut sheets on generator assembly including major on and off-engine auxiliary components (those items not integral with the manufacturer's package purchased from other vendors) indicating size, capacity, performance, design data, materials of construction and operating conditions. If catalog data is not available, include a Bill of Materials for the equipment proposed and all available data.
 - 4) Provide locations of and specifications/dimensions for all required field connections to generator assembly.
 - 5) Provide guaranteed fuel rate data for engine operation. Fuel rates shall include operation at 50 percent, 75 percent and 100 percent of design rated net Standby Power output in kW.
 - 6) Provide guaranteed emission data. Provide supplemental information on other pollutants that are regulated by the governing environmental control agency relevant to this project.
 - 7) Detailed schematic wiring diagrams showing Automatic Transfer Switch (ATS) wiring terminations, SCADA monitoring terminations, and all other internal and external wiring terminations. Drawings shall be developed custom for this project. Terminal numbers shall be coordinated and reflect the actual terminal numbers used at the ATS and SCADA control panels.
 - 8) Cable/plug assemblies.
 - 9) Color chips for enclosure.
 - 10) Certified copies of factory production test results.
- c. Operation and Maintenance Manual
- 1) The following information shall be included:
 - a. Include all the information provided with the shop drawings and manufacturer's information.
 - I. Update and complete control system drawings and descriptions for all equipment.
 - II. All documentation shall include modifications made which reflect the final installation.
 - 2) Operating instructions.
 - 3) Maintenance information.
 - 4) Recommended spare parts list with pricing.
 - 5) Accurate wiring diagrams for trouble shooting purposes.
 - 6) Manufacturer's literature on all equipment and systems.
 - 7) Name, address, phone number of manufacturer's local representative and maintenance facility.
 - 8) Warranty information.
 - 9) Copy of test results and certifications.
 - 10) Statement of origin to allow Owner to apply for title.

13. Design Criteria

- a. Ratings shall be for service at 60 Hz, ___-phase, 4-wire, ___/___volts, and 0.80 power factor.
- b. Engine-generator shall have minimum nominal standby electrical output ratings as described below.
- c. Each engine-generator shall be capable of carrying 110 percent of rated net Prime Power output at a 0.80 power factor for two hours out of any 24-hour period.
- d. All ratings shall be based upon the equipment located at an elevation of 1,000 feet above sea level.
- e. Engine-generator shall be sized by the manufacturer to operate the required loads, however, engine-generator assembly shall have a standby power output rating of not less than ___kW without written approval of Engineer
 - 1) The following loads shall be started and operated in the order mentioned below:
 - a. Step 1: ___kW of single phase load (lighting, receptacle, heat, etc.).
 - b. Step 2: Lift pump with ___HP ___Code Letter, VFD driven motor.
 - c. Step 3: Lift pump with ___HP ___Code Letter, VFD driven motor.
 - d. Step 4: Lift pump with ___HP ___Code Letter, VFD driven motor.
 - 2) Instantaneous voltage drop shall not exceed ___ percent as measured at the lift station panel main bus.
 - 3) Instantaneous frequency drop shall not exceed ___ percent as measured at the lift station panel main bus.
- f. Harmonic distortion levels when powered from its associated generator, shall not exceed the guidelines and recommendations put forth by IEEE 519, latest edition. The Point of Common Coupling shall be the lift station panel main bus.
- g. Each engine-generator unit shall be emissions certified for the calendar year in which it is installed. Guarantees are to be provided for verification of allowable emission levels for pollutants that are regulated by the governing environmental control agency relevant to this project.

14. Factory Tests

- a. All system components and hardware necessary for complete and fully functional standby generation systems shall be factory tested as complete assemblies prior to installation at the project site. These tests shall include, in addition to “standard” factory tests, additional testing as described below.

- b. Factory production tests shall be conducted, certified, and documented by Contractor. Tests shall be performed at rated standby load and at 0.8 power factor in accordance with NFPA 110. These tests shall include, but not be limited to
 - 1) Steady state voltage and frequency analysis.
 - 2) Transient response.
 - 3) Maximum power output analysis.
 - 4) Supplier's standard factory engine tests.
 - 5) Supplier's standard factory generator tests.
 - 6) Safety shutdowns.
 - 7) Hydrostatic test of radiator and oil cooler.
 - 8) Continuity test and insulation resistance on electrical power and control system components and circuits. Do not include in these tests any device or equipment not design to withstand an insulation resistance test.
 - 9) 100-percent prime rating block load acceptance test per NFPA 110.
 - 10) Load carrying capability tests:
 - a. 1 hour at 100-percent prime rated net output (0.8 p.f.).
- c. Contractor shall give Engineer a minimum of 2-weeks advanced notice of scheduled testing of engine-generator so that Engineer and/or Owner may observe testing.
- d. The Owner shall retain all copyrights to the test data.
- e. Test result data shall be submitted to the Engineer for approval before the generator assembly is released for delivery to the project site.

15. Field Load Bank Test

- a. Provide a 2-hour field load bank test at 100 percent of standby rating.
- b. Record beginning fuel level, ending fuel level, KW load, output voltage, output current, oil pressure, water temperature, and ambient temperature at 15-minute intervals throughout the test.
- c. Include copies of the load bank test in each O&M manual.

16. Warranty

- a. The Contractor shall be held responsible for any and all defects in workmanship, materials and equipment that may be found in any part of the engine-generator assemblies (except for batteries). Contractor shall immediately replace and make good without expense to the Owner any such faulty parts and damage done by reason of same, during the period of 5 years or 1,500 machine hours, minimum, from the date of final project completion.

- b. Where installed materials and/or equipment carry a manufacturer's warranty for a longer period; the generator assembly supplier shall, at no additional cost to Owner, replace any and all parts that fail during the manufacturers' warranty periods.
- c. All warranties shall be comprehensive covering parts and labor. No deductibles or costs shall be allowed for travel time, service hours, repair parts, tools, etc.

17. Installation

- a. The engine generator set shall be installed complete with all accessories.
- b. Anchor the engine generator set to the concrete pad with stainless steel anchor bolts.
- c. Provide cover plates (painted to match the skid) to cover any openings in the enclosure and / or skid.
- d. Rodent proof the installation by sealing all openings and gaps.

18. Full Fluid Reservoirs

- a. The batteries, radiator, crankcase, and any other reservoir shall be filled as part of this Contract.

19. Testing

- a. Prior to delivery, the engine generator set and all support components shall be factory tested and certified by the manufacturer. Engineer and Owner shall be given a 2-week notice prior to test date.
- b. Prior to field tests, manufacturer's field service representative shall inspect the complete installation to assure that all components have been installed and connected in accordance with the manufacturer's requirements.
- c. After completion of the installation, the generator set and support components shall be field tested by manufacturer's field service representative. The test shall include actual start-up and operation in both the automatic and manual modes. Engineer and Owner shall be given a 2-week notice prior to test date.

20. Training

a. Training shall include demonstration and/or review of features, including but not limited to:

- 1) All accessories.
- 2) Lubrication procedures.
- 3) Removal and installation of filters.
- 4) Start up and shut down procedures.
- 5) Power outage simulation.
- 6) Transfer switch operation.
- 7) Control panel features.
- 8) Alarm and shutdown features.