Residential Specification

Affordable Single-Family Homes – Moraine Addition Phases 2 and 3

8672, 8684, 8706, 8718, 8730, 8737, and 8742 Moraine Drive Shakopee, MN

Developed by:

Scott Count CDA Community Land Trust
Scott County, MN
Executive Director, Julie Siegert
952-641-5185

Architect:

Marnie Peichel Architecture and Design, LLC
612-810-4791
marniepeichel@gmail.com

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

Signed: 

Date: 06-25-2026
MN License # 26662

June 25, 2026

Table of Contents

Division 1 - General Requirements

*For questions prior to bidding and to report any discrepancies between the plans and specifications, contact **Jo Foust** at jfoust@scottcda.org or attend the virtual conference indicated in the Invitation for Bid (July 21, 2026 at 10:00 a.m.). No questions will be received after the virtual conference and written clarifications and/or an Addendum will be posted on the Scott County CDA website by Monday, July 27, 2026 at 3:30 p.m.* Open Bids & RFPs - Scott County CDA *(https://scottcda.org/resource/open-bids-rfps/) See separate Bid Invitation and Bid Instructions for further requirements of bid process.*

01 01 00 - Summary of Work

The Work to include the following specifications for seven new construction, single-family homes at 8672, 8684, 8706, 8718, 8730, 8737, and 8742 Moraine Drive in Shakopee, MN for the Scott County CDA Community Land Trust. Homes at 8706, 8737, and 8730 are 4-bedroom, 1.75 bath, with unfinished basements. Home at 8742 is a 5-bedroom, 1 full bath and two 1.75 baths, and a finished basement. Homes at 8672, 8684, and 8718 are 3-bedroom, 1.75 bath, with unfinished basements.

It is the intent to construct the homes in two phases. The first phase (Phase 2 – 4 houses) will begin in fall of 2026 and the second phase (Phase 3 – 3 houses) should begin as soon as spring 2027 conditions allow foundation work.

Note that these specifications are to be used with all homes, but not every spec section will apply to all homes (i.e. 04 73 00 Manufactured Stone Veneer is only used on Lots 1 and 2). **For this reason, the spec must be used in conjunction with each individual drawing set.**

The following form the basis for the contracts. All documents listed below can be found at the Scott County CDA website: Open Bids & RFPs - Scott County CDA (https://scottcda.org/resource/open-bids-rfps/)

- **All Architectural Drawings (including Structural Notes) for each of seven sites**
- **Written Specifications (applicable to all seven sites),**
- **Lot Certificates for each of seven sites,**
- **Grading As-Built Survey (dated 5-1-2026)**
- **Geotechnical Report for Development Site**
- **Moraine Addition Site Construction Water and Sewer Plans**
- **Moraine Addition Final Plat, Shakopee, MN**
- **MN Green Communities Intended Methods for each of seven sites**
- **Projected Energy Model As-Designed for each of seven sites**
- **Sample Agreement between Owner and Contractor**

NOTE: At completion, project will need to be Energy Star rated (ESv3.1) and certified per a third-party rater. *The builder must be registered as an Energy Star program partner. Project also must comply with MN Green Communities 2023-24/Overlay on Enterprise Green Communities 2020 New Construction Standards.*

Both general contractor and HVAC contractor must be certified to work on this project per Energy Star requirements. All parts of the ESv3.1 checklists need to be reviewed and completed by the contractor and HVAC installer to assure all requirements will be met.

- HVAC Design Report (must be filled out prior to construction, also attached in Appendix C.) www.energystar.gov/sites/default/files/asset/document/National%20HVAC%20Design%20Report

_Rev%2012.pdf

- HVAC commissioning checklist to be completed at end of construction: https://www.energystar.gov/sites/default/files/asset/document/National%20HVAC%20Commissioning%20Checklist_Rev%2012.pdf

At completion, the blower door test should reach a max air change of 2.0 ACH50. *Note: this is an increase from the code requirement of 3.0 ACH50.*

Requirements toward satisfaction of the MN Green Communities 2023-24/Overlay on Enterprise Green Communities 2020 New Construction Standards are indicated in these specifications by the logo as shown and are required per funding source.

Contractor shall review above listed contract documents and provide all labor, materials, equipment, accessories, and related services necessary to furnish and install the work compete and as indicated on the drawings and specifications while complying with all applicable building codes. Contractor will be furnished with pdf documents of all Contract Documents.

The contract documents are complementary and what it required by any one shall be binding as if required by all. The Contractor shall use, and be bound by, the requirements of all the Contract Documents. Documents included it the plans and specifications by reference are a part of the contract documents.

For purposes of clarifying intent, in cases of contradictions in the documents, the following contract documents take precedence in descending order with the "1" being first: 1) Addenda; 2) Instruction to Bidders; 3) Special Conditions; 4) General Conditions; 5) General Requirements; 6) Technical Specifications and Drawings.

In case of conflict within the specifications or drawings, the more stringent requirements shall govern**. Inform Owner/Architect of all conflicts or inconsistencies**. The General Contractor shall be held responsible for the results of any errors, discrepancies, or omissions which the General Contractor failed to notify the Architect/Owner of prior to construction and/or fabrication of the work.

01 02 00 – Allowances

The Contractor shall include in his proposal the cash allowances noted in the allowances list. Unless otherwise indicated, the lump sum amount shall be for the material/products only. All installation costs shall be included in the base proposal of the contractor. Contractors and sub-contractors may include voluntary allowance in their bid without prior approval. These should be attached to the Bid Form.

01 02 50 - Payment and Schedule Procedures

Contractor may make **Application for Payment** as provided for in the Contract for Construction. See sample agreement between Owner/Contractor for supplemental attachments required along with all pay applications. At least ten (10) days before each progress payment falls due, the General Contractor shall submit to the Architect an itemized application for payment on the standard AIA "Request for Payment" form. The Contractor shall include affidavits attesting to off-site stored products that are being billed for (receipts, storage location, date stamped photographs of stored material/equipment, etc.)

- **Schedule of Values** – Contractor to provide Owner and Architect with a Sworn Statement of a Schedule of Values prior to application for payment.
- **Lien Waivers** – Each request for payment must be accompanies by the complete lien waivers from all sub-contractors for the previous month's payments, covering all portion of the work including labor and materials.
- **Final Payment** will be made in accordance with the Contract for Construction. Architect/Owner will complete a punch list inspection to assess completion of the project before closeout.

The Contractor shall prepare a schedule for completion of the project, which shall become a part of the Owner/Contractor Agreement. Architect shall visit the job site to verify quality and completion of Work in order to approve application for payment; this may be done in conjunction with regular progress site visits. Owner shall be notified as soon as possible in regard to revisions of the schedule due to supply chain issues, weather, or other causes. The Contractor shall be required to perform within the limits of the schedule as defined in the contract.

01 03 00 - Alternates

Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

Schedule of Alternates:

A. Alternate No. 1 –
    1. Basement stairs are not carpeted (except in 8742 with finished basement)
    2. Carpet stairs to the basement in additional 6 units.
B. Alternate No. 2 –
    1. Unfinished basements do not include future bathroom walls or wall finish.
    2. Finish all basement walls and ceilings, including interior walls (except for INTERIOR of bathroom) with gypsum board mudded and taped. Install all electrical outlets per Drawings and ceramic lampholders at all light fixture locations.

01 03 50 - Contract Modification Procedures

The Owner, Architect, or Contractor may request changes, alterations, additions and/or deletions from the work included in the contract documents. If such changes would affect the dollar amount or completion time of the contract, the Architect shall prepare plans and specifications of the change and the Contractor shall prepare a detailed cost proposal of labor, material, and overhead for the change. The change order must be approved by the Owner prior to the star of the work on the change. These conditions are the same for extras and/or credits. The contractor will not be reimbursed for unauthorized extra work.

All requests for substitutions of or “as equal” products, materials, or methods from that listed in the specifications must be submitted to the Architect in writing. Products, materials, or methods may not be substituted without prior approval.

The Architect may issue written field instruction which change or interpret the work in progress where there is no cost/time change and these instructions are a part of the Contract Documents.

01 04 00 - Project Management and Coordination

- **Insurance** – Contractor must maintain the following during the course of construction until final acceptance by the owner and shall insure the value of the new structures. 1. Builders risk insurance, 2. Comprehensive Employer’s and General Liability Insurance, 3. Certificate of the Worker’s Compensation Insurance, and 4. Automobile Liability Insurance. See sample agreement between Owner/Contractor for levels required. The Scott County CDA shall be named as an “additional insured” party on insurance policies. Before commencing work, Contractor shall furnish Owner with required certificates showing required insurance is in force.

- **Performance and Payment Bonds** - Contractor shall provide Owner with both a performance bond and payment bond in the amount of 100% of the contract price prior to construction.

- **Use of Premises –** During the entire construction period, the Contractor shall have the exclusive use of the premises for construction operations, including full use of the site. Existing property on or adjacent to the work site, which is damaged in the course of completion of the Work, will be returned to original condition. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and lawful orders of authorities having jurisdiction for the purpose of ensuring the safety and security of persons and the project work site.

Each contractor shall provide and maintain proper shoring and bracing for existing underground utilities, sewer, and new/existing/adjacent building foundations encountered during excavation work to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the new work, or can be properly backfilled up completion of the Work.

- **City of Shakopee Work Hours Ordinance** - It is unlawful for any person to engage in or permit construction activities involving the use of any kind of electric, diesel, or gas-powered machine or other power equipment except between the hours of 7:00 a.m. and 10:00 p.m., on any weekday or between the hours of 9:00 a.m. and 9:00 p.m., on any weekend or holiday. Upon timely application being made and the necessity therefor being established, the Council may suspend the operation of this division (C) for a specific purpose at a specific location and for a specific length of time by Council action and by giving public notice of the nature and limits of such suspension.

- **Sub-Contractor Coordination –** The General Contractor shall ensure the proper coordination with all Sub-Contractors necessary for the completion of the Work.

  All **Mechanical** work shall be provided on a design/build basis by the General Contractor. The mechanical contractors shall submit HVAC layouts and product literature for review by the Architect. Mechanical contractors shall not alter the design or intended use indicated by the project plans and specifications. Mechanical work outlined in the contract documents is to be regarded as minimum standards and material for the Work.

  The General Contractor shall ensure the proper coordination with Sub-contractors regarding the Plumbing and Electrical work. All **Plumbing and Electrical** work shall be provided on a design/build basis by the General Contractor while taking into account product specifications within the Construction Documents. Related work outlined in the contract documents is to be regarded as minimum standards and material for the Work.

  Each contractor or sub-contractor shall be responsible for cutting and patching of all holes and openings through walls, partitions, floors, ceilings and roofs necessary for the installation of their work. If the location of a hole is through a joist, beam or column, refer to Structural Notes to instruct how to proceed. Cutting will be done carefully to minimize repair and patching shall be done in a manner to match adjacent surfaces.

- **Certification Requirements –** The project will need to meet 2023-24 MN Overlay to the 2020 Enterprise Green Communities Criteria and achieve whole house certification under Energy Star Version 3.1. The Rater Field Checklist requires that a blower door test be conducted to confirm anticipated HERS rating is met. It is imperative that all insulation, vapor barrier installation, caulking/sealing installation be completed in a thorough/detailed manner to pass this blower door test. The Contractor is required to make adjustments to the construction until the home passes the required testing threshold.

  General contractor is to work as a partner with Owner, Architect, and Energy Rater to attain these goals. Final inspection with Energy Rater must be done at completion of Work prior to City inspection for Certificate of Occupancy.

- **Pre-construction Meeting** – Meeting to be held before the start of construction and to include General Contractor, major Sub-contractors (including M/E/P), Architect, and Owner.

- **Progress Meetings** - The General Contractor shall schedule and administer meetings throughout progress of the Work as directed by the Owner.
  - *Review work completed and in progress, submittals, RFIs, updated schedule, etc.*
  - Weekly meetings with the Architect/Owner in attendance (or at a frequency otherwise deemed appropriate by Contractor and Architect due to current status of construction).

- **Waste Management –** All cardboard, metal, and construction wood waste shall be recycled individually. Alternately, total construction waste recycling should target a rate of **75% recovery**. No construction debris shall be closed inside any wall assembly.

01 05 00 – Field Engineering

- **Surveying –** The following surveys are required:
  1. Site to be surveyed and staked for placement of buildings on lot.
  2. Survey indicating top of foundation and building setbacks prior to foundation backfill approval.
  3. Record survey at completion prior to issuance of a Certificate of Occupancy.

01 06 00 - Regulatory Requirements and Quality Control

- **Codes -** Comply with the latest adopted version of codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities, which bear on performance of work. This Contractor is responsible for notifying the Architect and/or Owner of any noted discrepancies between the plans/specifications and published code requirements. Proceeding with the work without first clarifying these questions will constitute the Contractor's acceptance of completing the work to the highest degree required and confirming to codes. The Contractor shall not use errors or omissions in the drawings, where the intent of the documents is clear, to preform less than the standard work or comply with code. All contractors shall strictly adhere to all governing codes on safety, including the OSHA Act. Supply workers with VOC protection as needed.

- **Permits, Fees, Licenses** - Contractor responsible for securing and payment of permits, fees and licenses necessary for completion of Work, including WAC/SAC fees as required. An obstruction permit is required anytime construction work is performed in the public right-of-way. Copies of all permits shall be provided to the Owner or authorized representative prior to beginning any work.

- **Inspections** - Contractor responsible for coordinating all required inspections, including with third-party energy rater and Structural Engineer. Architect shall be notified of inspections and results at regular site meetings. At the completion of construction, the Contractor shall obtain all inspection department sign-offs, including a Certificate of Occupancy before receiving final payment.

- **Uncovering and Correction of the Work** – The Contractor shall promptly correct all work rejected by the Architect as defective or not conforming to the Contract Documents. If work is covered that must first have been observed by the Architect or third-party energy rater, the Contractor shall uncover the work for this observation and replace at no additional expense to the Owner.

01 10 00 – Project Procedures

- **Measurements/ Quantities** - The Contractor shall check and verify all dimensions and conditions before proceeding with construction. Do not scale drawings. Noted dimensions take precedence over scale. The General Contractor and Sub-contractors shall report to the owner any conditions that prevent the proper execution of their work. Any quantities called out shall be verified by Contractor.

- **Workmanship** - All work shall be performed in a professional and safe manner according to OSHA safety standards. Workmanship shall conform to the highest standards of quality in each trade and shall include all items of fabrication, construction and installation. All work shall be completed in accordance with plans, specifications and manufacturers recommendations.

01 30 00 – Submittals

- **Submittals** – *See also Appendix G. for list of Submittals required*. Subcontractors and materials suppliers shall submit complete shop drawings, manufacturer's data, and installation instructions for all products and/or systems as required and/or as requested by the Architect. Where there is a

choice of color, pattern, or texture for a material, the subcontractor or supplier shall submit samples for approval prior to installation

Product information, data and samples shall be submitted to the General Contractor for review and approval. Approved shop drawings shall be forwarded to the Architect for approval representing general conformance to design concept only and does not modify the intent of the contract documents.

The General Contractor is responsible for all materials, field measurements, numbers and amounts of items of construction criteria related to the conformance of these shop drawings to the requirements of the Contract Documents.

The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of shop drawings unless the contractor has specifically informed the Architect of any deviation in writing at the time of submission. The Contractor shall not be relieved of responsibility for errors or omissions in the shop drawings, product data, or samples by the Architect's approval of the shop drawings.

01 50 00 – Construction Facilities and Temporary Controls

- **Temporary Facilities –** The Contractor shall provide and pay for any temporary facilities, field office, enclosures, fences, barriers, and storage as required in the performance of the Work.

- **Utilities –** All connections and extensions required to provide temporary utilities, shall be made by the Contractor at the Contractor's expense. Connect to existing power service without disrupting local service requirements. Contractor shall provide and pay for any temporary heating, cooling, electrical power, water, toilets, etc. required for the completion of the Work.

- **Site Condition -** Construction site to be in a clean and orderly condition and secure. The General Contractor is responsible for all site maintenance during construction, which includes snow removal and lawn work. During construction, contractor must prevent soils from being deposited onto adjacent properties, rights-of-way, and public storm drainage.

- **Site Security –** Provide reasonable security to all first-floor window and door openings.

01 60 00 - Product Installation and Storage

- **Material Storage -** Material stored on site shall be protected from damage by moisture, wind, sun, abuse or any other harmful effects. Materials wetted during the construction process shall be allowed to dry before enclosing in building assembly.

- **Installed Construction -** Contractor to protect all installed construction. Contractor shall replace any items that are defective or become damaged.

01 77 00 - Closeout Procedures/ Warranty

- **Cleaning -** At the conclusion of construction, provide a complete and thorough cleaning of the building. Replace equipment filters. Clean out HVAC ducting. Clean exterior; remove debris from site. Remove all waste and surplus materials.

- **Ventilation -** During the period between finishing and occupancy, ventilate the building with outside air at the highest rate the ventilation system can produce (minimum of 48 hours).

- **Warranty, Operating, and Maintenance Information** – Warranty manuals are to be kept on site for the future homeowners. Contractor to also provide Owner with copies of all product and/or system guarantees and manufacturer's operating or maintenance instructions for all materials and systems. Contractor shall instruct Owner on proper operating and maintenance procedures for all equipment installed under the HVAC contract.

Construction Warranty - The Contractor hereby guarantees to the Owner that all of the Work shall be done in a competent, workman-like manner and that such Work shall be and remain free of defects in workmanship and materials, including paint, for a period of two (2) years from the Completion Date, with plumbing, electrical, heating, air conditioning and venting work guaranteed for two (2) years and structural work guaranteed for ten (10) years. The Contractor warrants that all materials and equipment furnished in connection with the Work will be new, unless otherwise specified, and be of good quality and free from faults and defects. The Contractor shall assign to the Owner (if assignable) or enforce for the benefit of the Owner (if not assignable) any guarantees provided by manufacturers or sellers of materials or equipment that are to be incorporated into the Work. Further any manufacturer's warranties for equipment and materials that extend beyond the above stated time limits shall continue to apply. The Owner's acceptance of the Work shall not be deemed to be a waiver of any of the Owner rights under this paragraph. In addition, the Contractor agrees that all statutory warranty provisions of Minnesota Statute Chapter 327A apply to this Contract

Division 2 – Sitework

Reference As-Built Survey dated May 1, 2026 for current established grading.

All site work must proceed in a manner which minimizes disturbance to the Owner and adjacent property owners and within the property limits or construction limits as noted. Any damage on the project property or to adjacent property caused by site work, demolition, or excavation, will be replaced by the contractor at no additional cost to the Owner.

02 20 00 – Earthwork

- **Excavation -** Contractor shall excavate to depths as required for construction as shown on drawings. Remove all unsuitable fill at building excavation and replace with oversized, compacted, controlled fill as necessary. All water shall be removed from foundation excavation prior to the placing of concrete.

  The General Contractor shall investigate sub-surface conditions, before and during grading of site, for filled excavations or buried structures such as existing foundations. If any such structure is found and sub-surface conditions vary from plans or specifications, soils engineer and structural engineer shall be consulted immediately prior to the placing of any foundation.

  Sub-base directly under concrete slabs on grade shall be a minimum of four inches of compacted granular material.

- **Grading -** Carefully remove loam and topsoil to be incorporated in the finished work and store separate from the other excavated material. Backfilling shall be clean on-site soil, placed in 12" layers and compacted. Provide any additional fill necessary to accomplish finish grades shown on the plans. Provide 6" minimum topsoil at areas of excavation.

  Establish finish elevations at indicated on the plans. Keep exterior finished grade a minimum of 6" below top of foundation (except as noted otherwise). Provide swales with positive outfall, and slope grade away from building to allow water to drain away from the foundation (slope away from the structure 6" in 10'-0" minimum, typical unless noted otherwise on plans).

02 50 50 – Granular Base

- Granular base under concrete slabs and paving to meet following requirements: 5% pass #200 sieve, 60-80% pass a #4 sieve and 100% pass a 2" mesh. Thoroughly compact to a smooth hard base.

02 51 00 – Asphalt Paving

- **Driveway** - Thoroughly grade and prepare the sub-grade. Parking area material shall be 8" of compacted Class 5 base material and two courses of 2" thick MNDot spec 2360 SPWEA340C bituminous surface course per Geotechnical Report. Install a liquid asphalt prime coat, pavement reinforcing fabric, a tack coat, finish coat and seal coat.

Finished paving shall drain properly toward road at maximum slope indicated on drawings.

02 52 00 – Concrete Paving

- **Walks** - Provide new 4" thick, 4,000 psi, air-entrained concrete walks as shown on plans. Set on compacted granular base a minimum of 6" deep. Use 6x6 10/10 WWF the length of the walk. Light broom finish. Provide control joints at 6' o.c. maximum and expansion joints shall be installed as in standard concrete. Walks must slope a minimum of ¼" per foot away from building.

- **Repair of Public Walk -** Remove and replace any raised or damaged sections of the City Sidewalk along the public street front if damage due to construction related work.

02 60 00 – Utility Piping Materials

Exact location and depth of existing utilities must be verified by the Contractor in the field and it is the responsibility of the Contractor to protect and maintain the services of any utility lines encountered in the progress of the Work. Any sidewalk or curb/gutter that is disturbed during the Work is to be repaired per City of Shakopee requirements.

- **Water Distribution –** Provide separate 1" water line to dwelling unit with meter per plan. *See Moraine Addition Water and Sewer Plan for utility locations.*
- **Gas Distribution Systems** – Provide gas line to dwelling unit with exterior meter. *See Appendix C for existing gas line service design.*
- **Broadband Ready Internet Access** – Provide underground conduit from edge of property (street access) to location with in Mechanical Room for router location. Comcast broadband service has been brought to the site in a joint trench with CenterPoint gas and SPUC power. Contact Comcast Project Manager: Joseph Bouley 612-990-1882.

02 71 20 - Foundation Drainage Piping

- Install a minimum 4" slotted drainpipe around exterior and interior of basement footings, imbedded in loose fill gravel, minimum 12" deep. Wrap drainpipe with geo-technical fabric to prevent silt buildup and slope to and terminate in a collection sump basket with sump pump. Provide a minimum 1/4" metal, fiberglass, or heavy-duty molded durable plastic cover for sump basket and bolt down. Provide an outlet and install sump pump. Provide battery back-up for sump. Size appropriately for building size.

02 73 00 – Sanitary Sewage

Connect dwelling unit to sanitary sewer. *See Moraine Addition Construction Plans (sheet 14) for utility locations.*

02 78 00 – Power and Communications

Install necessary utility services, such as electricity and support structures for power and communications. Coordinate requirements, including interior location of electrical panel board, with local utility providers. Electrical connection to be below ground, connecting to existing transformers provided in previous site development work.

02 90 00 – Landscaping

- **Soil Preparation and Materials –**
    - General Contractor to inspect and approve grading before any landscape material is placed. Provide a slope of 6" in 10'-0" away from house for proper drainage.
    - Provide 6" black dirt and ground hardwood bark mulch free of dyes, minimum 3" deep over black fabric weed barrier at planting areas shown on drawing. Included to a 30" diameter around trees. Include black plastic edging at all landscaped areas.
    - See site plan for plant material locations.

- **Warranty –** A one-year warranty to be included on all plant materials.

- **Planting -** Provide all plants, materials, and labor required to install the landscaping as shown on the site plan. All plants shall be kept in healthy, growing condition until Certificate of Occupancy is received. Sufficient watering is the responsibility of the General Contractor. Replace dead or dying plants where necessary. ***See selection locations and quantities on each Site Plan.***

  - **Trees** *(see site plan for locations): backfill with 'planting soil'*
    - Red Maple *(Acer rubrum)*, *min. 2" caliper*
    - Serviceberry 'Autumn Brilliance' (*Amelandchier grandiflora)*, *min. 2" caliper*
    - Sugar Maple *(Acer saccharum)*, *min. 2" caliper*
    - Hackberry (*Celtis occidentalis)*, *min. 2" caliper*
    - Honey Locust *(Gleditsia triacanthos), min. 2" caliper*
    - Swamp White Oak *(Quercus bicolor), min. 2" caliper*
    - American Mountain Ash (*Sorbus americana), min. 2" caliper*
    - Elm (disease resistant hybrid), min. 2" caliper
    - River Birch *(Betula nigra),* min. 2" caliper
    - Black Maple *(Acer nigrum*), min. 2" caliper
    - Basswood *(Tilia americana*), min. 2" caliper
    - Balsam poplar (Populus balsamifera), min. 2" caliper

  - **Shrubs** *(see site plan for locations):* All to be in *min. 2-gallon pots, backfill with 'planting soil'*
    - Hydrangea, Smooth 'Annabelle'
    - Aronia, Black Chokeberry, 'Iroquois Beauty'
    - Physocarpus, Ninebark 'Angel'
    - Spiraea, Japanese Spirea 'Goldmound'
    - Cornus, Gray Dogwood "Muskingum'
    - Aronia, Black Chokeberry, 'Ground Hug'
    - Viburnum, American Cranberrybush 'Bailey Compact'
    - Cornus, Red Twig Dogwood 'Arctic Fire'
    - Aronia, Black Chokeberry 'Autumn Magic'
    - Ribes, Alpine Currant 'Green Mound'
    - Cornus, Gray Dogwood 'Muskingum'
    - Cornus, Siberian Dogwood 'First Editions, Neon Burst'

  - **Plants** *(see site plan for locations):* All to be in *min. 1-gallon pots, backfill with 'planting soil'*
    - Sedum, Orpine Stonecrop 'Autumn Charm'
    - Sedum, Stonecrop, Rock 'N Grow 'Midnight Velvet'

  - **Sod:** Lay sod at entire front yards per individual site plans. Minimum 60% Kentucky Blue Grass, strongly rooted and free of weeds. Uniform thickness with ½" to ¾" soil. Loosen the surface prior to placing sod. Each piece of sod laid shall be fitted and tamped into place. Contractor is responsible for sufficient watering until certificate of occupancy has been issued.

  - **Seed:** After vegetation removal and any necessary regrading, aerate and topdress with topsoil (use what is available on development site first), rake and seed side and rear yards per individual site plans, minimum 60% Kentucky Blue Grass. Include erosion control biodegradable mat on significant slopes. Contractor responsible for sufficient watering until certificate of occupancy has been issued.

Division 3 - Concrete

03 00 00 - Concrete

***See Structural Notes for concrete mix requirements and strengths**. If there is any discrepancy between these specifications and structural drawings/notes, the structural drawings/notes shall prevail.* Provide all labor, materials, and equipment necessary for the completion of the concrete called for on the plans. Concrete shall be laid when the air temperature ranges between a minimum of 40 degrees and a maximum of 90 degrees Fahrenheit. Provide necessary insulating blankets to ensure concrete cures when temperatures indicate a barrier is needed.

03 10 00 – Formwork

All formwork to shape, lines, and dimensions complying with ACI 301-84 and ACI 347-78 and as shown on drawings. The Contractor is responsible for the design, engineering and construction of all formwork. Provide all openings, offsets, recesses, chamfers, etc. as required. All formwork must be clean and dry before pour, removing all scraps and debris. *Verify all items to be imbedded in concrete are in place prior to pour.*

03 20 00 – Concrete Reinforcement

See Structural Notes for material requirements and standards, sizing, installation, and locations regarding reinforcing steel in concretes footings, slabs, walls and foundation.
Tie as required to avoid displacement during pouring. Provide and install all bolts, anchors and fastening devices as shown and as required to support the work in a standard approved manner.

03 30 00 – Cast-in-Place Concrete

See Structural Notes for footing size, concrete strength, and reinforcing requirements. Convey and place concrete by methods avoiding segregation and loss of materials, agitate as necessary to eliminate voids. After forms are removed from exposed concrete work, fill all holes and visible pits and smooth surface.

- **Footings and Foundation Walls** –
  - Provide continuous concrete footings and poured concrete foundation walls per Structural Notes and plans.
  - Provide pier footings for deck at rear yard and front entries per Structural Notes and plans.

- **Slab on grade** - Slab shall be 4” thick; see Structural Notes for reinforcing. Place slabs over a 10-mil vapor barrier on top 2” rigid insulation (at interior slabs, not garage or porch) over 4” of well-compacted granular fill. Slope minimum 1/8” per foot at Garage slab for drainage. *Remove all unsuitable loose fill prior to placing engineered fill if required. (See also Section 07 19 00 - Vapor Retarders)*

- **Front Porch entry slabs –** *PHASE 3 per construction documents.* Slab shall be 4” thick; see Structural Notes for reinforcing. Place over 4” of well-compacted granular fill.

- **Expansion and Control Joints** –
  - Install joints at spacing as directed in Structural Notes.
  - Install control joints per industry standard.
  - Install ½” asphalt impregnated expansion filler in all intersection of concrete and asphalt driveway. Seal exposed joints with appropriate sealant.
  - Provide 1/2” thick rigid insulation where interior floor slabs meet foundation wall.

03 35 00 - Concrete Finishing

- **Interior Slabs** - Provide smooth steel trowel finish for all interior slab areas; grind down high spots and level floor in prep for LVP finish.
- **Exterior Slabs and Steps** - Provide broom finish texture.
- **Garage Slab -** Provide smooth steel trowel finish. Patch all voids and depressions exceeding 3/8 inch in any direction. Provide positive drainage and taper lip at garage/overhead door.

Division 4 - Masonry

(See also Section 06 43 00 - Wood Stairs and Railings for aluminum railings)

04 23 00 - Glass Block

Install un-vented, 3" glass block windows in basement as noted in construction documents. Contractor to coordinate rough opening measurements with typical window sizes. Wavy blocks. Install with silicon sealant and spacer strips. Sills must have a positive slope outward. Contractor to verify all measurements. *PHASE 3 per construction documents.*

04 73 00 – Manufactured Stone Veneer

Install cement based manufactured stone veneer laid with mortar joints. Mix mortar per manufacturer's instructions. Include all required accessories including corrosion resistant high back J-weeps, weather resistant barrier (type 'D' building paper), stucco stop channels at locations indicated by manufacturer, wire lath, top sill pieces, etc. Install per manufacturer's instructions. See Drawings for location. (Boulder Creek Stone Products or approved equal. See style and color selection in Appendix A.) *PHASE 3 per construction documents.*

Division 5 – Metals

05 05 23 - Metal Fastenings

See Structural Notes for all fastener requirements used in structural framing.

- **Anchors/Ties/Hangars/Reinforcing** – Provide all nails, screws, bolts, nuts, lag bolts, anchors, ties, hangers, braces, corner brackets, etc. necessary to secure and support the Work. Size, configuration, and anchoring methods selected to match structural conditions and requirements in Documents, manufacturers' recommendation, and standard industry practice.
- **Galvanized Steel Lath** – Install 2.5-3.4 lb. sq/yd corrosion resistant lath at locations with manufactured stone veneer. Lap and fasten per manufacturer's instructions.

Division 6 - Wood, Plastics, and Composites

Engineered wood products and sheathing products shall not include any urea formaldehyde-based binders.

06 10 00 - Rough Carpentry

- **Lumber** - #2 SPF Lumber shall be kiln dried and free from imperfections which might impair its strength or durability. Pressure treated lumber shall be used where any lumber shall come into contract with concrete, masonry block or within 8" of soil.

- **Reinforcing** – Studs and joists cut to install plumbing and/or wiring shall be reinforced by adding metal or wood structural reinforcing to maintain structural integrity. Holes bored shall not be larger than 1/3 the depth and not closer than 2" to the top or bottom of the joist.

- **Floor Framing -** *See Structural Drawings and Notes for specific wood species, floor framing sizing, cross bridging and fastening requirements.*
  - **First Floor/Ceiling framing:** 2x10 floor joists and rim board. See Structural Notes for exact locations and spacing of members.
  - **Second Floor/Ceiling framing:** Engineered, open web floor trusses and rim truss joists. See Structural Notes for exact locations and sizing of members.

- **Wall Framing -** *See Structural Drawings and Notes for specific wall framing, header sizing, blocking and fastening requirements.*
  - **Exterior walls/Sill** - Install single 2" x 6" solid pressure treated sill plate, sill gasket below. 2"x 6" wood framing studs, see Structural Notes for spacing/location.
  - **Openings –** *See Structural Notes for header locations and sizing and Structural Notes for additional notes.*

- **Typical Interior Walls** - 2"x 4" studs at 16" o.c. *Exceptions at plumbing walls or as otherwise called out on Architectural plans where 2"x6" framing is required.* Use treated sill plates where in contact with concrete slab.

Provide **draftstopping** per IRC 501.12. Fire blocking should be installed in concealed spaces of stud walls and partitions.

1. vertically at ceiling/floor levels
2. horizontally at intervals not exceeding 10 ft.
3. at all interconnects between concealed vertical and horizontal spaces.
4. Including at spaces between stair stringers @ top and bottom of runs. Enclosed spaces under stairs shall comply with IRC 302.7.

- **Roof Trusses** - Manufactured roof trusses to be designed by a Professional Engineer registered in the State of MN per Building Code requirements**.** Provide shop drawings of trusses to Architect/Owner and Building Department for review/approval. It shall be the responsibility of the manufacturer to obtain Building Department approval of calculations and shop drawings prior to fabrication. *See Structural Notes for specific wood species, bridging, and fastener requirements. **Note: Trusses to be designed to support future solar panels (additional 6 lb/sf dead load).*

- **Deck Framing and Finish -** *See Structural Drawings and Notes for specific sizing and fastening requirements. See also Section 06 73 00 - Composite Decking and Railings.*
  - **Posts** – Install 6"x6" solid cedar-toned pressure treated posts below decking using Simpson post bases.
  - **Floor and Stair Framing –** Install treated floor joists per Drawings. Stair stringers shall be constructed of treated 2x12s.

06 11 80 – Sheathing

Note: Sheathing materials shall not include any urea formaldehyde-based binders.

- **Roof Decking** - *See Structural Notes for specific decking and fastener requirements.* Provide and install 15/32" OSB, APA rated sheathing, Exposure 1.

- **Exterior Wall Sheathing – *(@ House and otherwise noted*)** - *See Structural Notes for specific wall sheathing and fastener requirements.* Provide and install exterior 1 1/2" insulated sheathing with integrated water-resistive barrier. Tape all seams per manufacturer's instructions to assure continuity of the air barrier. *(ZIP-R6 System or approved equal.)*

- **Exterior Wall Sheathing – *(@ Garage*)** - *See Structural Notes for specific wall sheathing and fastener requirements.* Provide and install exterior 7/16" OSB sheathing with integrated water-resistive barrier. Tape all seams per manufacturer's instructions to assure continuity of the air barrier. *(ZIP System or approved equal.)*

- **Subflooring** - *See Structural Drawings and Notes for specific subfloor and fastener requirements.* Provide and install ¾" OSB, tongue and groove APA rated panels, formaldehyde-free, glued and nailed per structural notes.

06 20 00 – Finish Carpentry

All architectural trim and woodwork shall be No. 1 grade material suitable for appropriate finishes. Scribe and cut work to fit adjoining work. Secure finished work with fine finishing nails, countersunk and filled. Cope all returns and miter all corners. Bevel all edges. No butt joints allowed

06 22 00 – Millwork

Install paint-grade millwork, square edge style throughout the house; primed MDF. Countersink all nails, putty holes, paint. (*See also Section 09 90 00 – Painting*.)

- **Base Moulding:** 3.25"
- **Window and Door Casing:** 2.25" wide casing plus jambs to fit receiver channels at windows

06 43 00 - Wood Stairs and Railings

Interior Stairs

- **Stair Construction** – ***See Structural Drawings for detailed framing layout.*** Heights of treads, lengths of risers and overall width of stairs shall comply with applicable building codes. See Architectural Drawings for rise and run. Headroom requires a minimum of 6'-8", measured from the front edge of the tread to a line parallel to the stair run. Stair treads and risers shall be constructed of 3/4" thick APA rated OSB; structural stair stringers shall be constructed of 2x12s. Glue and nail stair assembly together.

- **Skirt Board:** Install 1"x12" primed, finger-jointed skirt board. Continue base trim around landings. Countersink all nails, putty holes, paint.

- **Half Wall Cap**: Install primed and painted 2x wood cap at stair half wall. Trim below to ease transition to sheetrock.

- **Stair Railing:** Supply and install a continuous oak handrail with returns on staircase to code. Circular cross section with diameter between 1¼ and 2". Mount 34-36" above tread nosings, provide blocking at brackets. Provide returns to wall at top and bottom of stair. Stained oak, *color selected by Owner/Architect.*

06 60 00 - Composite Fabrications

Install cultured marble vanity tops with integral sinks at all bathrooms. Include backsplash at back, not sides. Caulk to wall or adjacent cabinet. See plans for layout. Color: Selected by Owner/Architect. (*See also related work in Section 12 30 00 – Manufactured Casework)*

06 73 00 - Composite Decking and Railings

- **Decking, Stairs, and Trim -** Install 1 x 5.25" composite decking with hidden fasteners at landing and stair treads and risers. Install matching composite fascia boards at sides of stairs and deck. (TimberTech Premier Collection or approved equal.) See Appendix A for color selection.
- **Railing -** Install powder-coated, customizable, aluminum guardrail, stair rails, and 2"x2" posts. (Westbury Tuscany Aluminum Railing or approve equal.) See Appendix A for color selection.

Division 7 - Thermal and Moisture Protection

07 10 00 – Waterproofing

- **Foundation:** Install low VOC, sprayable, cold fluid-applied waterproofing to exterior of basement foundation walls per manufacturer's instructions including minimum thickness. Wrap over top of foundation and over tope of footing. Product must be compatible with foundation insulation. (Tremco Tuff-N-Dri, GMX Ultra-Shield WB, Tremco Watchdog H3 or approved equal.)

- **Exterior Walls**:
  - See Section 06 11 80 – Sheathing; water resistant barrier integral with sheathing.
  - Grade 'D' building paper (2 layers) at locations with manufactured stone veneer

- **Roof -** Install Ice and Dam Shield, Water Guard Ice Barrier or equal. Provide to 6'-0" back from interior face of exterior wall. Fasten roofing materials with roofing nails, NO STAPLES. Also use ice barrier minimum 12" up side of wall at roof/wall condition.

07 19 00 - Vapor Retarders

All joints and penetrations in walls, floors, and roofs shall be made watertight using approved methods and materials.

- **Slab Foundations -** Install a minimum (10-mil) polyethylene vapor barrier/soil gas retarder at all interior slabs, directly underneath concrete. Wrap up foundation wall above slab and seal to sill plate. Lap joints not less than 6 inches and tape and seal in accordance with manufacturers

guidelines.

- **Exterior Walls/Ceiling below Attic** - Install "smart", variable-permeability vapor retarder on the warm side of all exterior walls and underside of roof trusses. Fold down from ceiling and seal to top plate. (MemBrain OR Pro Clima DB+ OR approved equal.) *See also Section 07 92 00 - Joint Sealants regarding any penetrations in barrier.*

07 20 00 – Insulation

NOTE: Arrange for inspection with Home Energy Rater prior to installing gypsum board. Must pass Grade 1 inspection requirements.

- **Concrete slab** – Install 2" XPS insulation (R-10) below vapor retarder and 1/2" as a break between slab and foundation where called for in the Drawings.

- **Foundation Wall** – Install 3" (min. R-15) XPS rigid insulation to the exterior of the foundation walls. Install 6-mil polyethylene slip sheet below grade to promote drainage. Protect exposed insulation with polymer-modified foundation insulation coating cement. (Owens Corning Foamular NGX 250 or other HFC free insul.)

  Protect exposed insulation with either of the following; follow manufacturer's instructions:
  1. Polymer-modified foundation insulation coating cement; paint finished surface. (Akona or approve equal.) *OR*
  2. Trowel on acrylic foundation coating (Styro Industries Tuff II or approved equal) *Color to be selected by Architect.*

- **Rim Joists**: Closed cell Sprayed foam min R-20 sprayed foam

- **Exterior Walls –** Install 5 ½" high density fiberglass batt insulation (R-21). Install foam (designed for insulating around doors/ windows) at any voids between framing openings and jambs. *Must pass Grade 1 inspection requirements.*

- **Interior Walls -** Install 3 1/2" sound attenuation batt insulation in all plumbing walls.

- **Roof** – Attic insulation shall be blown-in cellulose with an R-value of 60. (Assumed depth 14" – verify with manufacturer.) Provide attic insulation markers and attic information card and maintain R-value at truss heel. Install insulation/wind barrier providing 2" air space between trusses and sea to prevent air infiltration through insulation from eave.

07 28 00 – Underlayments

On all roof surfaces install 30 # asphalt impregnated rooting felt. Overlap felt a minimum of 4" vertically and 12" horizontally. Continue felt 6" up all vertical surfaces and 4" over gutter and valley metal.

07 31 00 - Asphalt Shingles

- Provide 30-year Composite/Asphalt architectural shingles over one layer of 30# felt. Install according to manufacturer's guidelines. *(GAF Timberline HDZ or approved equal.)* Install ridge vents; see construction documents for location. (GAF Cobra or approved equal.) *Color -See Appendix A.*

07 46 00 – Siding and Trim

Note: Engineered wood products shall not include any urea formaldehyde-based binders. See also Section 09 91 00 – Painting.

- **Siding -** Install factory pre-finished engineered composite siding in accordance with manufacturers guidelines. Siding shall be straight and flat against building. Prime/paint all cut edges and caulk at corner and trim joints. Provide all necessary starter strips, wedges, corner detailing, etc. required by manufacturer and as stated in construction documents. Pre-primed,

field painted, two coats. ***See Appendix A for color selections and Drawings for material locations.***

Contractor is responsible for inspection of the siding material before securing to home and that they will handle all material returns for defective and or blemished materials

- **Horizontal siding–** Pre-finished 38 Series Cedar Texture 8" lap (7" reveal), engineered composite siding, LP Smartside or approved equal.
- **Shake siding –** Pre-finished 38 Series Cedar Texture Shakes, engineered composite siding, LP Smartside or approved equal.
- **Panel siding –** Pre-finished, smooth finish, engineered composite siding, LP Smartside or approved equal.
- **Cedar Texture Nickel gap siding –** Pre-finished engineered composite siding, LP Smartside or approved equal.
- **Starter board –** Install a rot resistant starter board when near grade. (Diamond Kote or approved equal.)

- **Trim and Fascia -** All window and door trim and fascia board to be factory pre-finished, engineered wood trim, cedar texture. LP Smartside 440 Series or equal, pre-finished. Prime/paint all cut edges and caulk at corner and trim joints. *Colors to be selected by Owner/Architect*.

07 60 00 - Flashing/Counterflashing and Sheet Metal

Install appropriate flashing at all joints of walls, vent pipes and other connection points to prevent the infiltration of water. Flashing shall be galvanized, corrosion resistant sheet metal. Keep flashing concealed except where exposed on vertical surfaces or counter flashing. 20 guauge. Provide for thermal expansion of all metal flashing exceeding 15' running length.

- **Unvented Soffit -** Install unvented aluminum soffit material, minimum .024 gauge at underside of trusses at porch ceilings. (Rollex, Alcoa or approved equal.) *Color to be selected by Owner/Architect.*
- **Vented Soffit -** Install aluminum soffit, 16" center vent, minimum .024 gauge. Must meet venting requirements. (Rollex, Alcoa or approved equal.) *Color to be selected by Owner/Architect.*
- **Roof** – Provide valley flashing where required. Install metal drip edge at perimeter of roof where there is an overhang. Color to match closely with shingle color.
- **Sill Flashing** – Provide pre-finished aluminum 'z' flashing above sill cap at manufactured stone veneer and at top of foundation insulation. Color as selected by Architect from manufacturer's standard colors.
- **Windows/Doors/Horizontal trim bands** - Include drip edge at head. *(See also Section 07 65 00 – Flexible Flashing.)*
- **Exterior Walls:** Flash/counterflash using 4" wide x 4" high x 10' long galvanized step flashing between wall siding and roof surfaces. Also use ice barrier minimum 12" up side of wall at this condition. Install cap flashing above horizontal trim boards.

07 65 00 – Flexible Flashing

Pre-flash window opening using flexible, self-adhering flashing at sill, jambs, and head. Follow manufacturer's instructions. *(Zip System Stretch Tape, Dupont FlexWrap or approved equal compatible with insulated sheathing.)* Also flash window into opening. *(Zip System Flashing Tape, Dupont StraightFlash or approved equal.)*

07 71 23 - Manufactured Gutters and Downspouts

- Install 5" box type, .032 gauge painted, seamless aluminum gutters, with 3"x4" downspouts and extensions complete with all connections and accessories necessary. Attach every 2'-6" o.c. with straps and/or fasteners. See drawings for downspout locations. *Color to be selected by Owner/Architect.*

07 72 00 - Roof Accessories

As shown on plans, provide a minimum of 144 square inches of free air ventilation for every 300 square feet of attic floor area as long as free area is split evenly between soffits and ridge/upper roof area. Do not block vents with insulation. Must meet venting requirements.

- **Soffit Vents** - *(See Section 07 46 00 Siding and Trim) Assume 6.48 sq. in. net free area per lineal foot.*
- **Ridge Vents –** *(See Section 07 31 00 - Asphalt Shingles) Assume 18 sq. in. net free area per lineal foot.*

07 92 00 - Joint Sealants

Use ONLY low/no VOC adhesives and/or sealants. *All adhesives will comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants will comply with regulation 8, Rule 15 of the Bay Area Air Quality Management District.*

- **Silicon based caulk** - at high expansion/compression areas, such as around tile, glass block, ceramic, plumbing fixtures, and around enamel tubs/showers.
- **Latex based caulk (clear)** - at interior non-rated door frames, interior trim, woodwork and other paintable surfaces. White, paintable.
- **Screens** - Provide rodent and corrosion proof screens (e.g., copper or stainless-steel mesh) for all exterior openings that cannot be fully sealed and caulked (e.g., vents).

The following is a list of typical items to be sealed, but not limited to:

a.) Seal around all windows and door units.
b.) All above grade sill plates sealed to foundation or subfloor (additionally place on gasket when on foundation.)
c.) Seal all vapor barriers as required and according to manufacturer's instructions.
d.) Seal new casework and countertops/vanity tops to wall and floors
d.) Seal toilet and tub to floor
e.). Seal tub/shower enclosure to wall
f.) Seal inside corner of two tile walls
g.) Caulk around all plumbing valves, sinks and faucets
h.) Seal ALL attic bypasses – i.e. all plumbing, electrical and mechanical penetrations and chases to be air sealed where they penetrate from the conditioned space to the unconditioned space
i.) ALL gypsum wall penetrations in exterior walls that are not strictly service space.
j) Seal all wall, floor, and joint penetrations and other gaps at exterior to prevent pest entry. Provide rodent and corrosion proof screens (e.g., copper or stainless-steel mesh) for all openings that cannot be fully sealed and caulked (e.g., vents)

Division 8 - Doors and Windows

08 00 00 - Openings

Flash windows and exterior doors with pan, side & head flashing. Air seal around outside of window and door units with low expansion foam insulation. Submit shop drawings for all window and door openings.

08 11 01 - Exterior Doors

All exterior doors (see plans for sizing) shall be solid core, insulated and swing inside with bronze anodized thresholds and appropriate door sweeps at exterior doors. Install weather-stripping around all doors – *Color selected by architect/owner*. Provide solid backing at latch area of entry doors. Door lites shall be tempered glass, no grilles.

- **Front Entry Door -** Provide and install Energy Star rated, pre-hung insulated steel doors with 6 lites at each entry. (Mastercraft 36"x80" Primed Steel Mission Lite (no grilles) Exterior Door System or approved equal.) Supply and install hardware/handle sets/deadbolts on all exterior doors with better quality, Schlage hardware. Paint both interior and exterior of door. (*Owner to*

approve products, style and color.) Key all exterior doors alike per separate units.

- **Garage/House Door –** Provide and install 3-panel 20 min. rated solid core MDF or honeycomb steel door min. 1.375" thick; weatherstrip and include door closer or self-closing hinges, pre-primed. Paint both interior and exterior of door. (Mastercraft 20-min Fire Door, Primed Steel 3-Panel Mission Prehung Exterior Door or approved equal.) *(Owner/Architect to select paint color.)*

- **Sliding Glass Patio Door –** Provide and install 72x80 sliding glass patio door with nailing flange; insulated, solid composite core frame, tempered and double-glazed, low-3 and argon gas filled glazed panels. Smooth, paintable finish. Include screen door. (Vector Envision or approved equal.)

08 11 63 - Metal Screen and Storm Doors and Metal Frames

- **Storm Doors –** Provide and install storm door at front entry. See Drawings for door swing direction. Aluminum frame, ¾ Lite with tempered glass and retractable screen. Provide all necessary hardware, Larson Royal Oak Screen Away Retractable Screen Midview Storm Door OR approved equal). See Drawings for sizing. See Appendix A for color selection and hardware finish per address.

08 14 00 - Interior Doors

- **Standard Interior Door -** Provide and install pre-hung, solid core 1-panel Shaker style MDF doors (see plans for sizing) with interior casing. Prime and topcoat (JELD-WEN or approved equal.) *Architect/Owner to approve final products and paint color.*

08 31 00 - Attic Access Door

- **Second floor Attic Access** - Install 22” w x 30” wood access doors where shown on construction documents. Trim opening with appropriate casing to match interior trim. Paint all to match ceiling. Weather strip edges and insulate back of panel with 8” rigid foam. Provide insulation dam across opening. Seal after final inspection.

- **Attic Access for Main Floor Bedroom** - Install 22” w x 30” wood access doors in garage ceiling where shown on construction documents. Uninsulated.

08 36 00 - Panel Doors

Install Overhead 16’-0” wide x 7’-0” high insulated (R6.5 min.), pre-finished 3-layer classic steel garage doors. Raised, short (or narrow) panel design with top row of panels to be tempered glazed. Door must have safety mechanism with safety sensors to code. Include vinyl weatherstripping and door sweep. Door must be W1 rated for 90 mph wind speed (PSF rating +12.4/-13.8). Install all track and hardware necessary. Provide electrical wiring and electric door opener – *(See also Section 11 14 00 – Residential Vehicle Service Equipment*). *(Color – See Appendix A.)*

08 50 00 – Windows

Egress: Bedroom windows shall comply with Code requirements for emergency escape with appropriate egress hardware. Minimum net clear opening shall be 5.7 sq.ft., minimum net clear width shall be 20”, minimum net clear height shall be 24” and sill height shall not exceed 44” above floor. Confirm with manufacturer that openings are compliant with all applicable building codes concerning egress, lighting and ventilation requirements.

Window construction/glazing requirements: Provide and install all new-construction windows with nailing flanges. Vinyl windows, insulated glass, low E and Argon filled. Include receiver channels for jamb material. Fiberglass mesh screens at all operable windows. (Vector Envision or Alside 1700 Series and New Construction Single-Hung/Awning/Casements or approved equal). Finish hardware shall include locksets at all exterior windows. Install as specified by manufacturer.

Install window fall protection/opening control devices at all single-hung windows on second floor

at which the sill is less than 24" from the finished floor.

***Hardware Finish and window color to be the same at both interior and exterior*. See Appendix A for color selection per address.**

- **Window Types: Single-hung, awning, casement and fixed per Window Schedule on Drawings.** See window schedule on Drawings for sizing. Contractor to verify ALL sizing and quantities.

U-Factor Rating Specificatons:

- All windows to have a U-factor less than or equal to 0.27 or that reaching the Equivalent Energy Performance while optimizing the SHGC per building orientation.

Window Installation

Install windows in accordance with manufacturer's instructions. Install windows to be weather-tight. Maintain alignment with adjacent work. Secure assembly to framed openings, plumb and square, without distortion. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating foam sealant. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

08 70 00 – Door Hardware

Provide and install all hardware, fasteners, and accessories necessary for a complete job. (Schlage or approved equal.) ***Owner/Architect to approve finish color.***

- **Hinges:** Three, full mortised butt hinges at each opening.
- **Exterior Doors:** Provide deadbolts and deadlocking latches
- **Interior Doors:** Provide lever hardware; privacy lock at all bedrooms and bath doors, passage hardware at all other doors.
- **Stops –** Wall mounted wherever possible; hinge stop where wall stop not feasible.

Division 9 - Finishes

09 29 00 - Gypsum Board

Gypsum wallboard shall not be installed until weather protection for installation is provided. All edges and ends of gypsum wallboard shall occur on the framing, members, except those edges and ends which are perpendicular to the framing members and comply with current IRC., State of Minnesota and Local codes. Install according to manufacturer's instruction and finish standards ASTM C 840 and GA 216.

Provide all material, fasteners, and accessories necessary for a complete job, including but not limited to board, tap, joint compound, corner trim, beads, control joints and metal accessories and apply in such a manner as not to fracture the face paper with the fastener head. At corners and angles, install metal corner. Apply three coats of mud at all tape joints, corner beads, nails, and screw penetrations and where a smooth surface is needed. Sand all joints and other areas to a smooth consistent surface.

- **Walls:** Sheath walls with 1/2" gypsum wallboard.
- **Bathrooms:** All drywall in bathrooms (except behind tub/shower surrounds) to be moisture resistant drywall – Georgia Pacific DensArmor Plus, or approved equal.
- **Ceilings:** Apply a single layer of ½" no-sag gypsum wallboard across the supports.
- **Cementitious Underlayment -** Install 1/2" fiberglass reinforced cement composition boards such as DurockR or HardieBacker™ in areas of tub and shower surrounds. On walls, all edges of backer boards must be supported by full face 2' framing secured to the structure. Do NOT install vapor barrier behind.

09 65 00 – Resilient Flooring

Luxury Vinyl Plank – Install floating luxury vinyl plank/tile where indicated on Appendix A - Finish Schedule.

Product MUST be acclimated for a minimum of 48 hours prior to installation at temperature and humidity levels typical of normal residential use. Follow manufacturer's directions regarding testing for moisture levels prior to installation. Along walls and permanent objects, install base moulding above to conceal expansion area.

Product to be approximately 7-9"x48" planks with min. 20-22 MIL wear layer with sound underlayment included. Product must be considered waterproof upon installation. Provide a limited lifetime residential manufacturer's warranty. Product must be FloorScore certified or similar certification. Include trim accessories at changes in floor finish. *(See Appendix A - Finish Schedule for product location. LVP1 (wood look) and LVP 2 (tile look) – COREtec Pro Classics or approved equal.)*

09 68 00 – Carpet

Provide/install stretched-in carpet where indicated on plans and Finish Schedule. Provide fiber cushion underlay. Polyester, textured cut pile, stain-resistant. Minimum 25 oz weight for all locations. Install Hollywood style at stair nosings. Carpet, adhesive and cushion **must meet Green Label Plus standards** for indoor air quality OR be NSF 140 certified. Include lifetime general warranty and 15-year defect, abrasive wear, texture retention and fade resistance warranty. (*See Appendix A - Finish Schedule for location. Mohawk Everstrand Residential Carpet or approved equal – Architect to select color from samples.*)

09 90 00 - Painting

All paints and primers used shall comply with Green Seal G-11 Environmental Standards for low VOC limits.

- **Exterior Finishes -** Wood surfaces shall be sanded smooth before finish is applied. Putty areas with a wood-based filler where nails or other defects appear in the surface. (*Architect/Owner to make color selections.)*
    - **Pre-finished Engineered Siding and Trim**: Prime/paint all cut edges. Paint with two coats of acrylic latex coatings

- **Interior Walls -** Walls shall be clean, dry, and free of defects such as cracks or unfinished joints prior to installation of wall finishes. All nail heads shall be set below the surface and finished smooth. Interior walls and ceilings shall receive a primer coat and two finish coats of paint. All walls and bath ceilings to have a smooth finish; all other ceilings to have a knockdown finish. Paint walls inside of cabinets and under sinks. Paint closets same as adjacent room. *(Owner/Architect to make color selections.)*

  Primer: low odor, low VOC
  Ceilings (except Baths): low odor, low VOC interior flat, latex
  Bath walls and ceilings: low odor, low VOC, interior matte finish, latex (Sherwin Williams Emerald Matte)
  All other walls: low odor, low VOC interior matte finish, latex (Sherwin Williams Emerald Matte)

- **Interior Wood Finish -** Wood surfaces shall be sanded smooth before finish is applied. Putty areas with a wood-based filler where nails or other defects appear in the surface. Prime wood surfaces including faces, edges and ends before installation. Millwork may be factory primed where called to be painted. After installation, touch up priming as needed and apply at least two coats of finish. Surfaces shall be sanded before each finish layer is applied. *(Architect to make color selections.)*

  Base trim, window and door casing, stair guardrail/balusters, and doors: low odor, low VOC interior satin latex enamel
  Interior handrails: stain

Division 10 – Specialties

10 55 00 - Postal Specialties

- **Mailbox:** Install large capacity, galvanized steel post mount mailbox, black for each dwelling unit– see Drawings for location. Install grouped in three or four mounted on 6x6 cedar post and bracing with metal cap typical per city requirements. (Architectural Mailboxes Elite Black or approved equal.)

- **Address Numbers**: Provide 4" flush mount metal address numbers at front of house per elevations (Everbilt 4 in. Aged Bronze Flush Mount Numbers).

10 70 00 – Exterior Protection for Openings

See Drawings for locations as they are not the same at all homes.

- **Standard Window Wells** – Install corrugated metal, white finish, standard window well; provide weed barrier and 6” gravel at base of wells.

- **Egress Window Well –** Install corrugated metal egress window well, white finish, casement style. Place 6” of gravel over weed barrier in the base; top of gravel to be less than 44” from grade where possible. Include egress ladder where depth is greater than 44” as noted on Drawings.

10 82 50 - Bath Accessories

Contractor shall provide and install accessories as listed below and located as indicated in interior elevations per Drawings. Provide blocking behind each accessory. Product selection as listed below (or approved equal). Contractor to verify all quantities.

- One towel ring in each Bath 1 and 2 (Franklin Brass Maxted in Brushed Nickel or approved equal.)
- One 24” towel bar in Bath 1 (Franklin Brass Maxted in Brushed Nickel or approved equal.)
- Three robe/towel hooks in Bath 2, heavy-duty, Brushed Nickel finish.
- One toilet paper holders in each Bath 1 and 2 (Franklin Brass Maxted in Brushed Nickel or approved equal.)
- Tension Curtain rods in ¾ and full baths – “never rust” aluminum, satin nickel finish.

10 83 00 – Bathroom Mirrors

- **Wall Mirror:** Install mirrors in all Baths. Install with silicon sealant and spacer strips per manufacturers recommendations. Frameless 1/4" plate glass. Pencil edge. Sizes per Drawing.

10 90 00 - Wardrobe and Closet Specialties

Provide blocking for all shelf supports. Hang plumb, true and square.

- **Closet Accessories:**
  - Install 12” deep metal free-slide shelf and rod at entry and bedroom closets as shown on plans. Provide supports every 3’-6” maximum on center (OC). One additional melamine shelf where noted in bedroom.
  - Five (5) adjustable metal free-slide shelves with tight mesh tops in Hall closet and Linen Closet. See Drawings for depth.
  - One full length, 12” deep wire shelf mounted over Washer/Dryer.

- **Entry and Bath 2:**
  - Double coat hook, 20 lb. capacity, satin nickel. Qty.- 11. Coordinate size/mounting location with shelf above at Entry.

Division 11 - Equipment

11 14 00 - Residential Vehicle Service Equipment

Provide and install chain-driven, ½ HP garage door opener. Include remote control, locking system, manual emergency release, light and safety sensor.

11 45 00 - Residential Appliances

Install Energy Star rated electric appliances as shown on construction documents, including all venting and supply requirements per manufacturers recommendations. See electrical specifications for wiring information. *Submit all selections for approval.*

Appliance Schedule

No	Appliance	Size	Energy Star Rating	Color
1	Range (electric, glass cooktop)	30"	Yes	Stainless steel
2	Microwave w/ integrated Vent Hood **	over the range	Not available for microwaves	Stainless steel
3	Refrigerator (LG Model # LRTLS2403S or approved equal.)	33" width, 23-24 cu. ft.	Yes	Stainless steel
4	Dishwasher **include stainless steel overflow pan beneath*	24"	Yes	Stainless steel
5	Clothes Washer – top loading	4.3+ cu. ft.	Yes	white
6	Dryer (electric)	7.0 cu. ft.	Yes	white

**Exterior vented range hood to exhaust at an intermittent rate of 100 cfm, per ASHRAE 62.2-2010. To also include work light.

Division 12 00 00. Furnishings

12 30 00 – Manufactured Casework

All composite wood products must be certified compliant with California 93120; if not, all exposed edges and sides must be sealed with low-VOC sealants. Formaldehyde-free construction preferred.

*****Submit shop drawings for review prior to ordering cabinets.*****

Install pre-fabricated cabinetry. Sink bases and vanities upgraded to full plywood construction, all others standard ½" particle board construction. I-beam constructed frame, standard overlay door with veneered center panel, solid wood slab drawer fronts with dovetail drawer construction and soft-close, undermount glides at drawers and soft-close hinges at doors. Upgrade glides to heavy-duty glides at two large, deep drawers in each kitchen with a minimum of 100 lb capacity. Include toe kick, base shoe (stained OR painted to match the cabinet it is on), finished laminate end panels, wall scribes and fillers as needed. Dimensions of base cabinets shall be: 24" deep x 34" high. Dimensions of overhead cabinets shall be: 12" deep x 42" high unless noted otherwise. Provide concealed hinges and cabinet hardware as specified below. Include shaker crown trim. Dimensions of vanity cabinets shall be: 21" deep x 34.5" high. (Manufacturer: Smart Cabinetry, Signature line or approved equal.)

See wood species and finishes per cabinet location below.

- **Kitchen Base, Upper and Pantry, Cabinets:** Wood: Maple. Door style: Squire. Finish: Painted. *Include sink base mat.*
- **Kitchen Island Cabinets:** Wood: Maple. Door style: Squire. Finish: Stained.
- **Bath Vanities:** Wood: Maple. Door style: Squire. Finish: Painted. *Include sink base mat.* *(See also Section 06 60 00 - Composite Fabrications for vanity tops.)*

- **Entry Bench Cabinets:** Wood: Maple. Door style: Squire. Finish: Stained. Provide stained wood bench top to match.
- **Hall 2 Cabinets:** Wood: Maple. Door style: Squire. Finish: Painted. Provide painted wood top to match.

Cabinet hardware: As specified below *or approved equal.* Verify count with cabinet count.

- **Kitchen/Bath Drawer and Door Pulls:** Liberty Step Edge 4" Center-to-center, Satin Nickel Model # P18949C-SN-C.

12 36 00 – Countertops

Install custom-ordered, non-porous and stain resistant, seamless solid surface countertops with GREENGUARD Gold Certification. Provide minimum 4" backsplash between counter and wall. (Wilsonart Solid Surface, Corian, or approved equal - Architect/Owner to select color/pattern.)

Division 22 00 00. Plumbing

These specifications are meant as an outline only. Any engineering or drawings required for this work are the responsibility of the contractor. All state and local codes shall be met.

22 05 00 – Design-Build General Conditions

The Contractor shall be responsible for defining the performance and design criteria for portions of the Project that are being delivered by means of a design-build delivery method. The Contractor shall be responsible for any act of omissions related to the design and construction of design-build components and systems. The Architect shall not be responsible for the adequacy or completeness of the design-build services, and the Architect shall be entitled to reasonably rely on information provided by the design-build engineers with respect to the size, clearance, and support requirements of the design-build components. Review by the Architect of design-build components and systems is limited to basic integration into the Project and its aesthetics.

22 10 00 – Plumbing Piping

Provide and install all piping, soil, vents, drains, sewage removal and hot/cold water supply systems to connect with appropriate water and sewage systems. Provide and install appropriate insulation around piping. All permits and inspections are to be obtained by contractor as required by local building codes and the Uniform Plumbing Code. No water, soil, or waste pipe shall be installed or permitted outside of a building or in an exterior wall, unless where necessary, adequate provision is made to protect such pipe from freezing. Piping subject to undue corrosion, erosion, or mechanical damage shall be protected in an approved manner.

1. Perform a water leak test and remediate leaks discovered.
2. Insulate all interior drain/waste piping with batt insulation for sound attenuation.
3. Provide and install gas line to furnace locations only.
4. Clean out floor drains at completion of construction.
5. Include water line to refrigerator locations.

- **Sewer and Waste Piping -** Drainage system and traps shall be Schedule 40 PVC pipe. All connections shall have PVC cement and assembled tight for no leakage. Connection to public sewer system shall comply with all local requirements. Pitch shall be a minimum 1/8" per foot for soil lines larger than 3" diameter and a minimum of 1/4" per foot for soil lines 3" diameter or less.

- **Water Pipes -** Connect from public water line below frost line to the meter and to building per code. At interior, use clear PEX tubing plumbing supply lines to each plumbing fixture as required (Zurn or approved equal). Use copper stub-ins and polished chrome adjustable brass P-traps with wall escutcheons at all exposed locations. All copper is to be soldered (no compression fittings) & all PVC fittings glued. Insulate exposed hot and cold-water mains with closed cell polyethylene slip-on pipe insulation, sized to fit the pipe's diameter. Seal seams with either 5 mil Pipe Insulation sealing tape or Closure Clips designed for pipe insulation placed every 4 inches. Seal all butt joints between sections of pipe with 5 mil Pipe Insulation sealing tape. Neatly miter all angled junctions.

Provide main shut-off valve in *mechanical room.* Provide shut-off valves at sinks, toilets, water heater and other fixtures as required. Test all pipes under pressure per building code requirements.

- **Waste Drainage -** Install sewage clean-out at the end of each horizontal drainage run and every 100 feet per building code requirements. Vents shall be installed throughout plumbing connections and connected with the vertical stacks and vented through the roof.

22 31 00 – Domestic Water Softening Equipment

Provide and install water softener; size appropriately for household size and conditions of local water supply.

22 33 10 – Domestic Water Heaters

Install 80-gallon hybrid high efficiency electric heat pump water heater. Energy Star rated, auto shut off valve and leak detection. 6-year warranty. Install with catch pans and drains piped to the exterior drainage system. Follow manufacturer recommendations and building code requirements for installation and use. Water heater must be set level. Include thermostatic mixing valve at main supply; set water heater temp to 140 degrees F and set delivered water temp to 120 degrees F. (AO Smith FPTU-50 Voltex Hyrid Electric Heat Pump Water Heater with 3.35 UEF OR approved equal.)

22 40 00 - Plumbing Fixture Schedule

Provide necessary piping, water and drains for plumbing fixtures as shown on the construction documents and listed herein. Include supply valve, supply line, wax ring, bolts and flange at all toilets. At sinks, include all associated plumbing including pop up drain assembly. Provide and install escutcheon plate at wall where piping penetrates it. Include drain assembly at shower and tub diverter spout/ pop up drain assembly at tub.

Fixtures and Fittings - Provide and install plumbing fixtures as listed below *OR approved equal.* General Contractor to verify all Quantities. (*Architect/Owner to approve all selections*.) ***Note fixture flow rates to meet Green Communities and rebate requirements as specified. All fixtures should have WaterSense label. Fixtures typical at each unit. Contractor to verify counts.***

Location	Fixture/ Fittings Description	Model #
Kitchen	Sink, 32” single basin, undermount, SS with drain basket, single hole, 18-gauge satin finish, rounded corners	MSI, Model # SCO-18-BWL-3218 or approved equal.
Kitchen	Fixture, single handle, integrated sprayer, chrome **1.5 gallon per min or better**, include basket strainer	Moen Adler One-Handle Pull-Down High Arc Spot Resist™ Stainless Kitchen Faucet Model # 87233SRS or approved equal
Bath 1, 2	toilet w/ toilet seat; dual flush, **1.6/1.1 gal per flush**, include new supply valve, supply line, wax ring, bolts and closet flange if required.	Delta Foundations 2-piece 1.1 or 1.6 GPF Dual Flush Elongated Toilet in White Model # C43913D-WH or approved equal
Bath 1, 2	Fixture *(cultured marble vanity top included in Section 06 60 00 - Composite Fabrications),* two handle faucet, **1.2 gallon per min or better** and all associated plumbing including pop up drain assembly, escutcheon plate at wall where piping penetrates it.	MOEN Adler 4 in. Centerset 2-Handle Bathroom Faucet in Chrome Model # 84603 or approved equal
Bath 2	Porcelain-Enameled steel tub and fixture, White, 14” depth, 30” x 60”	American Standard Princeton PRO or approved equal

Bath 2	single handle control shower head, chrome, **1.5 GPM or better** with pressure balancing mixing valve. Include tub diverter spout and pop-up drain assembly.	MOEN Adler Single-Handle 4-Spray Tub and Shower Faucet with Valve in Chrome Model # 82603 or approved equal, **NOTE:** swap out shower head with Niagara Conservation Sava 1-Spray 4.5 in. Single Wall Mount 1.5 GPM Fixed Shower Head in Chrome or approved equal.
Bath 2	multi-piece, acrylic tub surround, White – 60" x 30" x 60"; must be compatible with tub surround	American Standard Princeton PRO Alcove bathtub wall surround (3-piece) Model # 3961BWT60.020 or approved eq.
Bath 1	reinforced acrylic shower base with integral tile flanges and anti-slip floor, center drain, white, see Drawings for sizing, single threshold	American Standard Ovation Curve 48 in. L x 30 in. W Alcove Shower Pan Base with Center Drain in Arctic White, Model # B8015A-ST3.011 or approved equal
Bath 1	single handle control shower head, chrome, **1.5 GPM or better** with pressure balancing mixing valve.	Moen Adler 4-Spray Single Handle Shower Faucet 1.75 GPM in Chrome (Valve Included) Model # 82604 or approved equal, **NOTE:** swap out shower head with Niagara Conservation Sava 1-Spray 4.5 in. Single Wall Mount 1.5 GPM Fixed Shower Hea
Bath 1	multi-piece, acrylic shower surround, White, 48" x 72"	American Standard Ovation Curve 48 in. w x 72 in. h alcove subway tile shower walls in Arctic White, Model # 2961SWT48.011or approved equal
Laundry	Washing machine outlet box	PVC wall box with shut-off valves, shock absorbers and drain connection
Laundry	Overflow pan with drain	Stainless steel
Exterior	Two hose bibs (see elevations for locations)	frost proof, self-draining
Mech Room	floor drain	metal

Division 23 00 00. Heating, Venting, and Air Conditioning (HVAC)

23 05 00 – Common Work Results

These specifications are meant as an outline only. Any engineering or drawings required for this work are the responsibility of the contractor. All state and local codes shall be met. Provide operating and instruction manuals for all equipment.

1. **HVAC Energy Star Design Report must be submitted to home energy rater prior to construction**. *(See Appendix D or page 2 of specifications.)*
2. **HVAC Commissioning Checklist must be submitted to home energy rater at completion of project.** *(See page 2 of specifications.)*

At completion, the blower door test should reach a max air change of 2.0 ACH50. *NOTE: This is an increase from the code requirement of 3.0 ACH50. See also 07 92 00 - Joint Sealants for details on air sealing.*

23 09 00 - Instrumentation and Control for HVAC

Install Digital control systems. Install hardwired, Energy Star label, programmable thermostat. *See also Section 16 30 00 - Raceway and Boxes for Electrical Systems)*

23 30 00 - Air Handling

Layouts for vents and diffusers shall be based per construction documents, designed by HVAC contractor with input from Architect regarding routing locations. Ducting **MAY NOT** use building cavities as part of air supply or return system. All bath fan ducting that is in unheated space shall be insulated to min R8. All flex duct pulled tight-no pinches - **rigid duct preferred**. Insulate all ductwork in unconditioned space (attics = R-30 min, walls = R10 min.) **- preferred that all ductwork be in conditioned space or interior walls.** Minimize length of duct runs. Supply duct tack-offs spaced minimum 6"apart. All ductwork must be sealed with mastic.

Seal all ducts and air handlers to prevent contamination during construction. Ducts must be protected until construction (including floor finishing) is completed (protect returns, intakes & air handling equipment). ***Clean out ducting at completion of construction.***

** *It is recommended to test the total duct leakage test at the time of the insulation inspection. In order to do this test during rough-in, the following must be installed: the furnace/air handler, all ductwork, airtight caps/blocks at all termination points, and ERV system.* ***Maximum duct leakage allowed is 2.0 CFM/100 sq. ft. CFA.***

- **Bath Exhaust** - Install Energy Star rated 110 cfm, <1 sone bath fan with humidistat and delayed off switch and vented to the exterior at each bathroom. Set at 50 cfm setting and 80% humidity setting. Seal around fan where it connects to the ceiling. (PanasonicWhisperFit DC Fan with Humidity Sensors Delay Timer (model #FC-0511VFC1) and Pick-A-Flow Speed Selector 50, 80 or 110 CFM or approved equal.) NOTE*: Install signal wires to manual override switch at wall to turn on separate from humidity sensor; load/service switch at unit remains on at all times for humidity sensor to work.* All bath fan ducting that is in unheated space shall be insulated to min R8.

- **Kitchen Exhaust** – Provide ducting for over-the-range microwave exhaust. *Vent to exterior. (See Section 11 45 00 - Residential Appliances)*

- **Dryer Ventilation -** Install clothes dryer vent; direct vent to exterior - 4" round rigid metal duct equipped with a full flow vent hood with damper. Minimize duct run.

- **Passive Radon System** - Install passive radon mitigation system. 4" diameter, schedule 40 PVC 'T' pipe into 4" aggregate below concrete slab and 10-mil soil gas retarder. Extend 'T' pipe through the roof to 12" above roof. Include electrical outlet, tied to the common space meter, in attic for future fan system to be tied to system as needed.

23 54 00 - Fuel-Fired Furnace

Install high efficiency, dual stage, 95% AFUE or greater, direct-vent, sealed combustion natural gas furnace with variable speed ECM motor, size in accordance with the Air Conditioning Contractors of America Manual, Parts J and S for all living spaces. Install on 2" concrete pad. New furnace to be vented with PVC piping per manufacturer's specifications. Condensation drains into drain system, not under slab. Include new shut-off valve. ***Coordinate duct layout with Architect.***

The furnace filter to be at least MERV 8 or better and have a readily accessible access panel with a gasket or comparable sealing mechanism that fits snugly against the exposed edge of the filter when closed to prevent bypass.

23 60 00 - Air-conditioning Unit

Cooling unit shall meet Energy Star requirements (> or equal to 15.2 SEER). Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts J and S accounting for future attic build-out. Air conditioner refrigerant is HCFC alternative. The system will contain a pad for the condenser, power disconnects, condensate drains, air distribution ducts, diffusers and thermostats. Central unit for air conditioning or ventilation shall be arranged so that airflow is as direct as possible.

23 72 00 – Energy Recovery Units – Whole House Ventilation System

Install balanced ventilation system using energy recovery ventilator with continuous ventilation meeting fresh air requirements of ASHRAE 62.2-2010. Include MERV 8 filter. Energy star rated, HVI cold weather certified, with automatic frost protection. Include motorized damper for fresh air intake. Minimum SRE 67%. (Broan or approved equal.)

Intake and exhaust ducts from energy recovery units to be R-8 insulated flex duct. Incorporate distribution through main HVAC ducted system

Division 26 00 00. Electrical

26 00 00 – Electrical System Design-Build

The Contractor shall be responsible for defining the performance and design criteria for portions of the Project that are being delivered by means of a design-build delivery method. The Contractor shall be responsible for any act of omissions related to the design and construction of design-build components and systems. The Architect shall not be responsible for the adequacy or completeness of the design-build services, and the Architect shall be entitled to reasonably rely on information provided by the design-build engineers with respect to the size, clearance, and support requirements of the design-build components. Review by the Architect of design-build components and systems is limited to basic integration into the Project and its aesthetics.

These specifications are meant as an outline only**. Any engineering or drawings required for this work are the responsibility of the contractor. All state and local codes shall be met.** Electrical contractor is responsible for verifying the system size, service size, proper over-current protection, load balance, and all other requirements to comply with the current National Electrical Code, Uniform Building Code, and all local requirements. System to include connection to and cost of power company interface and connection.

26 05 00 - Common Work Results

1. From electrical meter box, install above ground wiring to building. Electrical service shall be rated at 200 amps within each unit.
2. It is the intention that all electrical runs will be concealed unless otherwise noted. No exposed conduit runs in occupied spaces will be accepted without prior approval.
3. All fixtures must be installed securely with the flanges flush with finished surfaces. Fixtures must not move when touched. Provide and blocking, backing, spacers, washers, anchors necessary to secure fixtures in place.
4. All equipment installed outdoors and exposed to weather shall be weather proof.
5. All penetrations through an exterior wall air barrier be sealed. Sealing of the opening applies to all penetrations including the service entrance, conduit, cables, panels, recessed luminaires and electrical boxes.

26 05 19 - Conductors and Cables

Provide and install necessary circuits and breakers for appliances as stated in manufacturer's recommendations per applicable building code requirements. Install GFI circuits in all wet areas, baths, kitchens, garage, and exterior outlets. *Refrigerator should **NOT** be on a circuit controlled by a GFI.*

Refer to applicable building code requirements for appropriate gauge wires for all appliances, furnace, air conditioning unit, sump pump, etc. Provide separate 30-amp circuits for laundry and heat pump water heater and (2) 20-amp small appliance circuits at Kitchen. Provide separate furnace circuit. Verify circuit requirements for ERV and Air Source Heat Pump System.

26 05 33 - Raceway and Boxes for Electrical Systems

All electrical wiring shall be nonmetallic (Romex) wiring. Do not install in plenums. Any wiring that is not enclosed in walls such as in the mechanical room or at the exterior shall be installed in metal conduit. Provide flashing and pitch pockets, making watertight joints where conduits pass through roof or

waterproofing membranes. Route all exposed conduits parallel or perpendicular to building lines. All fittings shall be UL approved. Exterior outlets must also be weatherproof.

Service to roof for future solar PV system: Electrical design to accommodate future PV system. Refer to DOE ZERH PV-ready checklist for additional information.

- Install a 1" metal conduit for the DC wire run from the designated array location (locate in attic) to the future inverter location in Mech Room (cap and label both ends as RERH component).
- Install a 1" metal conduit from designated inverter location to electrical service panel (cap and label both ends as RERH component).
- Provide a labeled slot for a 70-amp dual pole circuit breaker in each electrical service panel for use by a future PV system.

Thermostats: Provide hardwiring for programmable thermostat.

26 24 16 - Panelboards

200-amp electrical service panel to be installed in mechanical room as indicated on plans.

Provide typewritten directory of circuits mounted in box. Use factory assembled panelboards with amp rating units indicated. Provide spare units and blank spaces as indicated. 40 circuit breaker capacity. Install arc fault breakers per code. Install panelboard cover/door.

26 28 16 – Outlets and Switches

Install white receptacles, switches and cover plates as per construction documents and finish schedules. For exterior receptacles install gray cover plates. When two or more switches or receptacles are located together, gang with one common faceplate. If they cannot be ganged, install with a minimum distance between units. Install all receptacles at 14" on center (OC) above finished floor (AFF), unless otherwise noted. At counters, locate receptacles at 44" on center (OC), above finished floor (AFF). Install switches at 48" on center (OC) above finished floor (AFF). Locate light switch cover plates 6" from frame of door or corner of wall. Switches shall be: Toggle type.

A receptacle outlet shall be installed in any usable wall space 2 feet or more in width. In kitchen and dining areas a receptacles outlet shall be installed at each counter space wider than 12 inches. Receptacles in kitchen and bathroom shall be installed above work top unless otherwise noted on plans. Provide 240-volt outlet for laundry, kitchen range, and water heater locations.

1. **Attic Fan Outlet:** Provide outlet in attic for future fan to activate passive radon system.
2. **Garage:** Provide outlet in garage for garage door opener. Locate ceiling hook-up 1 foot from opener and push button at door. Provide additional GFI outlets at each wall.
3. **Bath 1 and 2:** At bath fans, install signal wires to manual override switch at wall to turn on separate from humidity sensor; load/service switch at unit remains on at all times for humidity sensor to work.
4. **Exterior:** Include a minimum of two exterior outlets; one at Front Entry and one at Rear walkout area.

26 50 00 - Lighting

ALL Light fixtures to use LED lamps a color rating of 2700-3000K unless noted otherwise.

Provide and install necessary circuits and wiring for light fixtures as listed in Appendix B. All lighting shall be switched as noted on construction documents. For exact locations of fixtures, see Construction Documents and Lighting Schedules (Appendix B). *All quantities shown on drawings shall be verified by the contractor.*

26 60 00 - Smoke Detection Sensors

- **Smoke alarm/CO alarm:** Install at least one hardwired and interconnected smoke alarm/carbon monoxide detector in every floor of dwelling unit and within 10 ft. or each sleeping area.
- **Smoke alarms:** Provide and install hardwired and interconnected smoke alarms in all sleeping rooms. Mount the smoke alarms on ceilings or high on walls. Don't install smoke alarms near

windows, outside doors, or ducts where drafts might interfere with their operation. Do not paint, apply finish or obstruct smoke alarms.

26 70 00 – Communications

Provide necessary receptacle requirements and wiring for additional items as listed below. Locate as shown on construction documents.

- **Technology networking** - Locate router connection in Mechanical Room, install one ethernet connection in Living Room
- **Doorbell –** Install at front entry door.

APPENDIX A. - Finish Schedules

Product and Color Selections for Interior/Exterior

(Sherwin Williams paint colors)

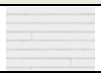
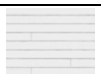
INTERIOR (All units)				
Room	**Walls**	**Floors**	**Product Sample**	**Additional info**
Entry	SW 7029 Agreeable Gray	LVP 1	Wood look	**ALL TRIM & DOORS:** SW 7008 Alabaster. **CEILINGS:** All ceilings to have smooth finish; flat paint SW 7566 Westhighland White. **KITCHEN:** Provide Owner with kitchen cabinet finish options to select final color. Countertop will be selected in conjunction with cabinet selection. **Flooring:** Provide Owner with color options within flooring material selection meeting spec qualifications.
Living	SW 7029 Agreeable Gray	LVP 1		
Kitchen/Dining	SW 7029 Agreeable Gray	LVP 1		
Den	SW 7029 Agreeable Gray	LVP 1		
Bath 1	SW 7029 Agreeable Gray	LVP 2	Stone/tile look	
Bedroom 1/Office *(only at 8742, 8737, 8730, 8706)*	SW 7029 Agreeable Gray	carpet		
Main Stairs	SW 7029 Agreeable Gray	Carpet		
Hall	SW 7029 Agreeable Gray	carpet		
Bedroom 2, 3, 4 *(1, 2, 3 @ 8672, 8684, 8718)*	SW 7029 Agreeable Gray	carpet		
Bath 2	SW 7029 Agreeable Gray	LVP 2		
Laundry	SW 7029 Agreeable Gray	LVP 2		
Mechanical/Storage	Unfinished concrete	concrete		
Basement Stairs	SW 7029 Agreeable Gray	Carpet at 8742, *(See Alternate #1 at remainder of units)*		
Bath 3 *(only @ 8742)*	SW 7029 Agreeable Gray	LVP 2		
Hall 2 *(only @ 8742)*	SW 7029 Agreeable Gray	LVP 1		
Bedroom 5 (only @ 8742)	SW 7029 Agreeable Gray	LVP 1		
Family Room *(only @ 8742)*	SW 7029 Agreeable Gray	LVP 1		
Hall 2 and Bath 3 *(all others besides 8742)*	Unfinished *(see Alternate #2 for sheetrock finish, unpainted)*	concrete		
Future Bedroom 5 *(@ 8737, 8730, 8706)*	Unfinished *(see Alternate #2 for sheetrock finish, unpainted)*	concrete		
Future Family Room *(@ all others besides 8742)*	Unfinished *(see Alternate #2 for sheetrock finish, unpainted)*	concrete		

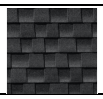
EXTERIOR – 8672 Moraine Dr. (LOT 1)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Tundra Gray	
Smooth panel siding at Entry	LP Smartside, Expert Finish	Quarry Gray	
Trim – Corner trim, Gable trim and Horizontal Trim Band,	LP Smartside, Expert Finish	Tundra Gray	
Trim –Window and Door Casing, Front Porch beam and post trim	LP Smartside, Expert Finish	Quarry Gray	
Stone Veneer	Boulder Creek Stone	Southeastern Ledgestone, Barrington with light gray sill	
Porch ceiling panel	Aluminum soffit	Light gray to match Quarry Gray trim	
Windows		White	
Metal Storm Door		Brown, aged bronze handle	
Roofing Shingles	GAF Timberline HDZ	Weathered Wood	
Soffits/Fascia	aluminum	to match Quarry Gray trim as closely as possible	
Gutters/Downspouts	aluminum	to match Quarry Gray trim as closely as possible	
Front Entry Door	Painted (exterior side only)	SW 6069 French Roast	
Garage Doors		White	
Foundation Coating		Tan?	
Decking	composite	Dark Teak	
Railing (no railing)			

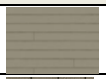
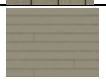
EXTERIOR – 8684 Moraine Dr. (LOT 2)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Prairie Clay	
Smooth panel siding at Entry	LP Smartside, Expert Finish	Sand Dunes	
Shake Siding	LP Smartside, Expert Finish	Sand Dunes	
Trim –Corner trim, Window and Door Casing, Front Porch beam and post trim, gable trim, and Horizontal Trim Band	LP Smartside, Expert Finish	Sand Dunes	
Porch ceiling panel	Aluminum soffit	Off-White/Cream	
Stone Veneer	Boulder Creek Stone	Ohio Rubble, Oklahoma Creme with light gray sill	
Windows	Vector Envision	almond	
Metal Storm Door		Sandstone w/ brushed nickel handle	
Roofing Shingles	GAF Timberline HDZ	Weathered Wood	
Soffits/Fascia	aluminum	Off-White/Cream	
Gutters/Downspouts	aluminum	Off-White/Cream	
Front Entry Door	Painted (exterior side only)	SW 2846 Roycroft Bronze Green	
Garage Doors		White (*possibly provide samples to Architect for alternate colors – sandtone?)*	
Foundation Coating		Tan?	
Decking	Composite	Dark teak	
Railing (no railing)			

EXTERIOR – 8706 Moraine Dr. (LOT 3)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Midnight Shadow	
Shake Siding	LP Smartside, Expert Finish	Cavern Steel	
Trim – Corner trim	LP Smartside, Expert Finish	Midnight Shadow	
Trim - Window and Door Casing, Front door side panel/trim, Front Porch beam and post trim, gable trim and Horizontal Trim Band	LP Smartside, Expert Finish	Quarry Gray	
Porch ceiling panel	Aluminum soffit	Light gray	
Windows		White	
Metal Storm Door		White w/ brushed nickel handle	
Roofing Shingles	GAF Timberline HDZ	Williamsburg Slate	
Soffits/Fascia	aluminum	Light gray	
Gutters/Downspouts	aluminum	Light gray	
Front Entry Door	Painted (exterior side only)	SW 7594 CarriageDoor	
Garage Doors		white	
Foundation Coating		Dark gray	
Decking	Composite	Maritime Gray	
Railing (no railing)			

EXTERIOR – 8718 Moraine Dr. (LOT 4)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Garden Sage	
Shake Siding	LP Smartside, Expert Finish	Garden Sage	
Trim – Corner trim, Gable trim and Horizontal Trim Band	LP Smartside, Expert Finish	Garden Sage	
Trim –Window and Door Casing, Front door side panel/trim, Front Porch beam and post trim	LP Smartside, Expert Finish	Sand Dunes	
Porch ceiling panel	Aluminum soffit	Off-White/Cream	
Windows	Vector Envision	almond	
Metal Storm Door		Sandtone with aged bronze handle	
Roofing Shingles	GAF Timberline HDZ	Mission Brown	
Soffits/Fascia	aluminum	Off-White/Cream	
Gutters/Downspouts	aluminum	Off-White/Cream	
Front Entry Door	Painted (exterior side only)	SW 6069 French Roast	
Garage Doors		Bronze	
Foundation Coating		Dark gray	
Decking	Composite	Dark teak	
Railing (front porch and rear deck)	aluminum	bronze	

EXTERIOR – 8730 Moraine Dr. (LOT 5)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Snowscape White	
Shake Siding	LP Smartside, Expert Finish		
Trim – Corner trim, Gable trim and Horizontal Trim Band	LP Smartside, Expert Finish	Snowscape White	
Trim –Window and Door Casing, Front door side panel/trim, Front Porch beam and post trim	LP Smartside, Expert Finish	Quarry Gray	
Porch ceiling panel	Aluminum soffit	White	
Windows		White	
Metal Storm Door		White w/ brushed nickel handle	
Roofing Shingles	GAF Timberline HDZ	Birchwood	
Soffits/Fascia	aluminum	white	
Gutters/Downspouts	aluminum	white	
Front Entry Door	Painted (exterior side only)	SW 2819 Downing Slate	
Garage Doors		white	white
Foundation Coating		light gray	
Decking	Composite	Maritime Gray	
Railing (front porch and rear deck)	Aluminum	white	

EXTERIOR – 8742 Moraine Dr. (LOT 6)			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Summit Blue	
Shake Siding	LP Smartside, Expert Finish	Snowscape White	
Trim – Corner trim, Gable trim and Horizontal Trim Band	LP Smartside, Expert Finish	Summit Blue	
Trim –Window and Door Casing, Front door side panel/trim, Front Porch beam and post trim	LP Smartside, Expert Finish	Snowscape White	
Porch ceiling panel	Aluminum soffit	White	
Windows	Vector Envision	White	
Metal Storm Door		White w/ brushed nickel handle	
Roofing Shingles	GAF Timberline HDZ	Charcoal	
Soffits/Fascia	aluminum	white	
Gutters/Downspouts	aluminum	white	
Front Entry Door	Painted (exterior side only)	SW 7005 Pure White	
Garage Doors		White	
Foundation Coating		dark gray	
Decking	Composite	Maritime Gray	
Railing (front porch and rear deck)	Aluminum	white	

EXTERIOR – 8737 Moraine Dr. (LOT 7			
Location	**Product**	**Color**	**Product Sample**
Horizontal Siding	LP Smartside, Expert Finish	Terra Brown	
Nickel Gap Vertical Siding	LP Smartside, Expert Finish	Timberland Suede	
Trim – Corner trim, Gable trim and Horizontal Trim Band,	LP Smartside, Expert Finish	Terra Brown	
Trim –Window and Door Casing, Front door side panel/trim, Front Porch beam and post trim	LP Smartside, Expert Finish	Sand Dunes	
Porch ceiling panel	Aluminum soffit	Off-White/Cream	
Windows	Vector Envision	almond	
Metal Storm Door		Sandtone with brass handle	
Roofing Shingles	GAF Timberline HDZ	Copper Canyon	
Soffits/Fascia	aluminum	Off-White/Cream	
Gutters/Downspouts	aluminum	Off-White/Cream	
Front Entry Door	Painted (exterior side only)	SW 2803 Rockwood Terra Cotta	
Garage Doors		almond	
Foundation Coating		Dark tan	
Decking	Composite	Dark teak	
Railing (front porch and rear deck)	aluminum	bronze	

APPENDIX B. - Lighting Schedule

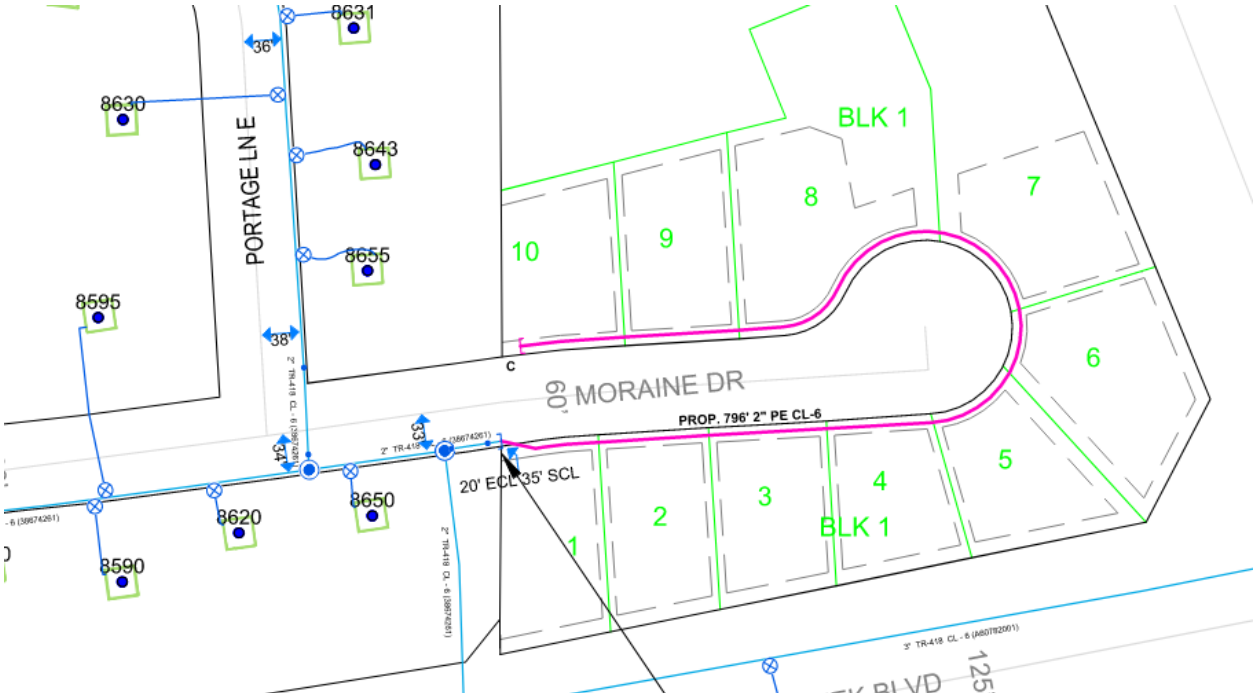
Fixtures - Provide and install electrical fixtures as listed below OR approved equal. (Chart continues on following page.) *Architect/Owner to approve any substitutions.* ***ALL Light fixtures to use LED lamps with a color rating of 2700-3000K.***

Verify all quantities with the Drawings.

Location	Type	Description	Model #	Visual Example
EXTERIOR				
Front Entry, Each side of Garage Door, Rear Deck	Wall mount	Black, outdoor, dusk to dawn feature (qty. 4)	Westinghouse Clarissa Textured Black Outdoor Wall Lantern Sconce Model # 6361100	
BASEMENT				
Mech/Storage	Ceiling mount	White, ceramic lampholder, hardwired, no pull chain (verify qty with plans)		
Unfinished Basement: all spaces	Ceiling mount	White, ceramic lampholder, hardwired, no pull chain (verify qty with plans)		
	Alternate #2: Semi-finished Basement	*All ceiling fixtures to use white, ceramic lampholders, however additional fixtures should be installed in Family Room – verify layout with Architect. No finished walls at interior of Bath 3 and therefore no wall mounted light fixture.*		
Finished Basement: Hall 2, Family Room, Bath 3, Hall Closet	Ceiling mount	Ceiling Flush mount, LED, white, 3000K light setting, backlit, damp location rated (qty. 13)	HALO HLCE 6 in. LED Surface Mount Disk Light 70-Watt Equivalent 900lm, 3000K **(OR Similar approved equal.)**	
Finished Basement: Bath 3	wall fixture	Center over sink, brushed nickel, mount downward. Use 3000K LED (qty. 1)	Design House Oslo 2-Light Satin Nickel Vanity Light Model #556142	
Finished Basement: Bedroom 5	Flush mount ceiling	Brushed nickel finish, 2 light (qty. 1)	Kichler Ceiling Space 13.25" 2-Light Brushed Nickel Traditional Flush Mount Ceiling light with Etched Glass Model # 8112NI	
FIRST FLOOR and SECOND FLOOR				
Garage	Ceiling mount	White, ceramic lampholder, hardwired, no pull chain (qty. 2)		

Entry (at front door/base of stair), Hall (top of stair)	Ceiling mount	Brushed Nickel finish (qty. 2)	Mera 8.3” 1-Light Brushed Nickel Industrial Semi-Flush Mount with clear glass shade Model #HCF-15M6-NI-BNHD-1	
Living Area	Semi-Flush mount ceiling	Brushed nickel finish, 3-light min. (qty. 1)	Kichler Shilene 18”, 3-Light Brushed Nickel Semi-Flush Mount Light Model # 43692NI	
Dining	Chandelier	Satin Nickel (qty. 1)	Design Hous Olso 5-Light Satin Nickel Chandelier Model # 567198	
Kitchen, Bath 1 and 2, Entry (by coat storage and between Bath 1/Bedroom 4), Upper landing of Basement Stair, Laundry and Hall outside of Laundry		Ceiling Flush mount, LED, white, 3000K light setting, backlit, damp location rated (qty. 15)	HALO HLCE 6 in. LED Surface Mount Disk Light 70-Watt Equivalent 900lm, 3000K **(OR Similar approved equal.)**	
Kitchen (over island only)	pendant	Nickel finish, white and clear glass (qty.2)	Design House Olso 1-Light Mini Satin Nickel Pendant Model #567214	
Den/TV	Semi-Flush mount ceiling	Brushed nickel finish, 2 light (qty. 1)	Progress Lighting Inspire Collection 13” 2-Light Brushed Nickel Semi-Flush Mount Light with Linen Drum Shade Model #P350129-009	
Bath 1, 2	wall fixture	Center over sink, brushed nickel, mount downward. Use 3000K LED (qty. 2)	Design House Oslo 2-Light Satin Nickel Vanity Light Model #556142	
Bedrooms 1, 2, 3, 4	Flush mount ceiling	Brushed nickel finish, 2 light (qty. 4)	Kichler Ceiling Space 13.25” 2-Light Brushed Nickel Traditional Flush Mount Ceiling light with Etched Glass Model # 8112NI	

APPENDIX C. – Existing Gas Line Service Design



A 2” plastic gas line has been installed to service the site.

Contact information for questions reqarding gas service to site:

Ben Jacobsen
Sales Consultant | New Market Development MN Div.
O: 507.387.1948
C: 507.272.2435
CenterPointEnergy.com

APPENDIX D. – Submittal Requirement List

The following list includes items that require review by the Architect prior to ordering/installation. Any other item that differs from the specified product or is to be substituted as an "equal" shall be reviewed by the Architect. Additional information regarding model or serial numbers may be required for rebate purposes.

Division 4:
04 73 00 - Manufactured stone veneer if changing from specified product and color selection

Division 6:
06 10 00 - Roof truss shop drawings for review
06 60 00 - Cultured marble selections if different than what was specified
06 73 00 - Composite decking material if changing from specified product and color selection

Division 7:
07 31 00 - Roofing selections if changing from specified product and color selections
07 71 23 - Gutters and Downspouts – provide color selection *(8675 will differ from the spec)*

Division 8:
*Any doors that differ from the specified items shall be submitted for review.
08 50 00 - Window shop drawings shall be submitted for review prior to ordering
08 70 00 – Door hardware finish options shall be submitted for review

Division 9:
09 65 00 – LVP selections within specified meeting specs; product and color selections
09 68 00 – Carpeting; present Architect with color samples within product line meeting specs

Division 11:
11 45 00 – Residential appliance product info sheets for review
** Also provide documentation showing model and serial numbers for all appliances for rebate purposes.

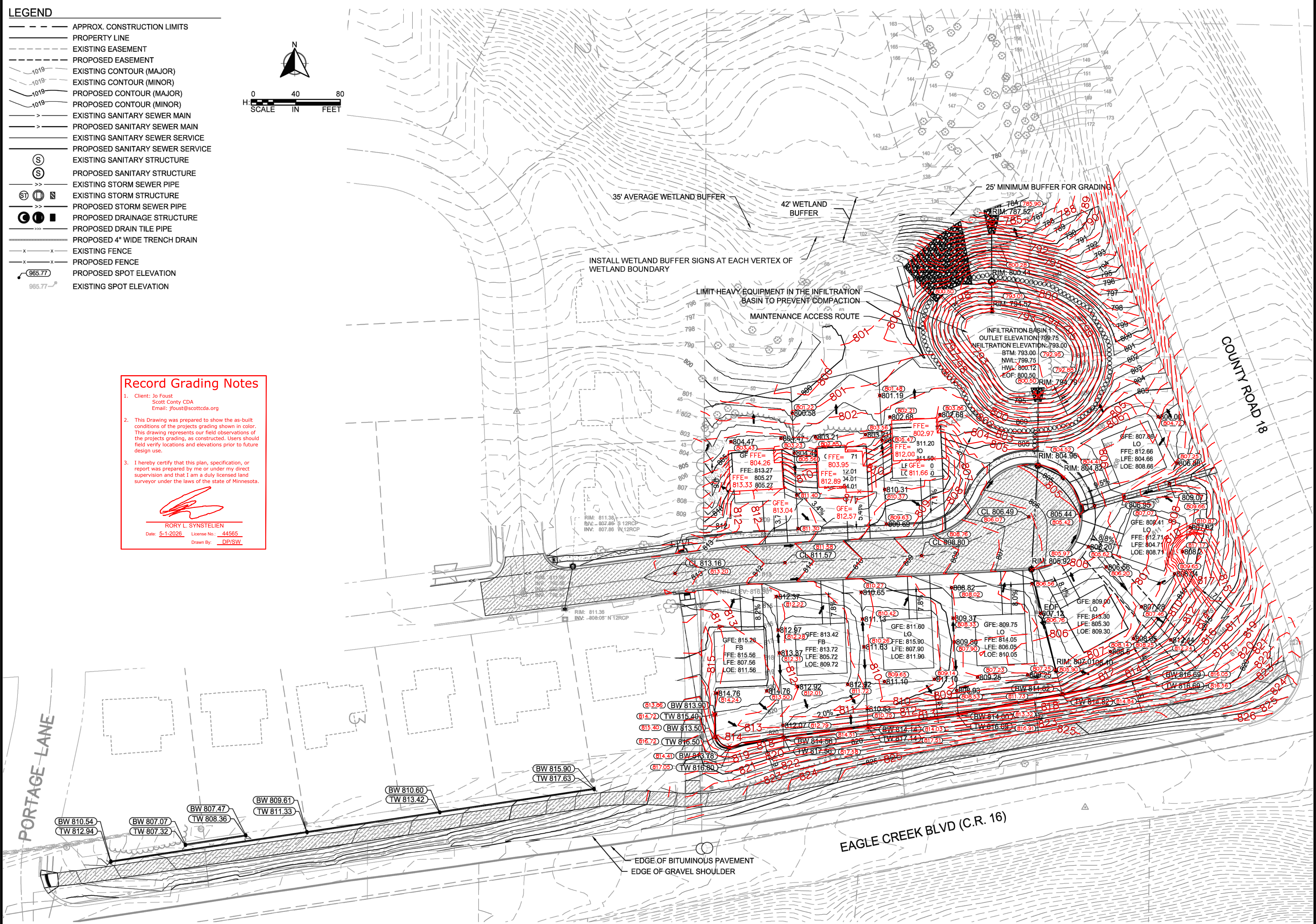
Division 12:
12 30 00 – Submit all casework shop drawings for review prior to ordering
12 36 00 – Countertops; submit color sample selection for Architect to select from within product lines specified
**Samples shall be provided to the Owner/Architect at the same time for coordination.*

Division 15:
15 44 00 – Provide submittals for any fixture differing from specified fixture schedule
15 85 00 – Discuss layout for ducting with Architect prior to beginning of Work
**Cut sheets for all HVAC equipment and water heaters with serial and model numbers for each piece of equipment to be used by Energy Rater and for rebate purposes.*

Division 16:
16 50 00 – Provide submittals for any light fixture differing from Lighting Schedule *(Substitutions may be required if products are discontinued.)*

LEGEND

— — —	APPROX. CONSTRUCTION LIMITS
———	PROPERTY LINE
- - - -	EXISTING EASEMENT
– – – –	PROPOSED EASEMENT
1019	EXISTING CONTOUR (MAJOR)
1019	EXISTING CONTOUR (MINOR)
1019	PROPOSED CONTOUR (MAJOR)
1019	PROPOSED CONTOUR (MINOR)
—— > ——	EXISTING SANITARY SEWER MAIN
—— > ——	PROPOSED SANITARY SEWER MAIN
	EXISTING SANITARY SEWER SERVICE
	PROPOSED SANITARY SEWER SERVICE
S	EXISTING SANITARY STRUCTURE
S	PROPOSED SANITARY STRUCTURE
—— >> ——	EXISTING STORM SEWER PIPE
ST	EXISTING STORM STRUCTURE
—— >> ——	PROPOSED STORM SEWER PIPE
	PROPOSED DRAINAGE STRUCTURE
	PROPOSED DRAIN TILE PIPE
	PROPOSED 4" WIDE TRENCH DRAIN
—x—x—	EXISTING FENCE
—x—x—	PROPOSED FENCE
965.77	PROPOSED SPOT ELEVATION
965.77	EXISTING SPOT ELEVATION



Record Grading Notes

1. Client: Jo Foust
   Scott Conty CDA
   Email: jfoust@scottcda.org
2. This Drawing was prepared to show the as-built conditions of the projects grading shown in color. This drawing represents our field observations of the projects grading, as constructed. Users should field verify locations and elevations prior to future design use.
3. I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed land surveyor under the laws of the state of Minnesota.

RORY L. SYNSTELIEN

Date: 5-1-2026 License No.: 44565

Drawn By: DP/SW

wsb

SCALE: AS SHOWN

DESIGN BY: SJH

PLAN BY: SJH

CHECK BY: JGS

REVISIONS

NO.	DATE	DESCRIPTION
1	7/31/23	CONST.
2	8/08/23	CONST.
3	8/18/23	CONST.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Jerry G. Schimmel

DATE: 8-18-2023 LIC. NO: 57117

GRADING & DRAINAGE

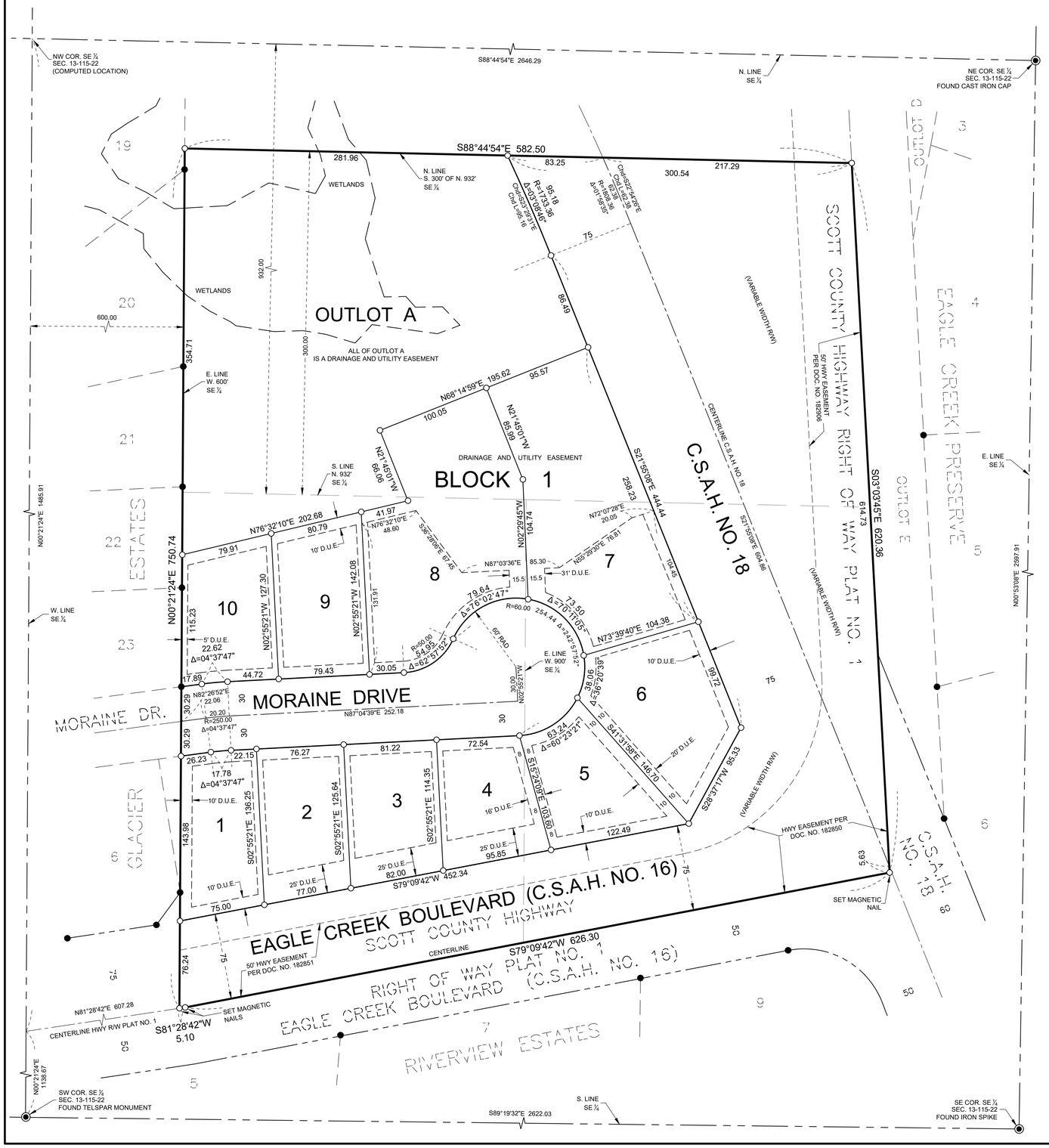
SCOTT COUNTY CDA
PROJECT - SHAKOPEE, MINNESOTA

WSB PROJECT NO. 019780-000

SHEET 7

K:\019780-000\Cad\Plan\019780-000-CP-GRAD-PLAN.dwg 8/21/2023 4:31:38 PM

MORAINE ADDITION



019760

KNOW ALL PERSONS BY THESE PRESENTS: That Scott County, a body politic and corporate under the laws of the State of Minnesota, owner of the following described property:

That part of the Southeast Quarter of Section 13, Township 115, Range 22, Scott County, Minnesota, lying northerly of the center line of County Road No. 16 and Westerly of the center line of County Road No. 89, excepting the North 932.00 feet thereof and also excepting the West 900.00 feet thereof (as measured at right angles)

ALSO

The South 300.00 feet of the North 932.00 feet, excepting the West 600 feet thereof (as measured at right angles) of that part of the Southeast Quarter of Section 13, Township 115, Range 22, lying westerly of the centerline of County Road No. 89.

ALSO

The East 300.00 feet of the West 900.00 feet, excepting the North 932.00 feet thereof (as measured at right angles) of that part of the Southeast Quarter of Section 13, Township 115, Range 22, lying northerly of the centerline of County Road No. 16, all according to the United States Government Survey thereof and situate in Scott County, Minnesota.

Has caused the same to be surveyed and platted as MORAINE ADDITION and does hereby donate and dedicate to the public for public use, the public ways and also dedicate the drainage and utility easements as created by this plat.

In witness whereof, said Scott County, a body politic and corporate under the laws of the State of Minnesota, has caused these presents to be signed by its proper officer this _____day of _____, 202__.

SIGNED: Scott County

_____ _____
Lezlie Vermillion, County Administrator Thomas J. Wolf, County Board Chair

STATE OF _____
COUNTY OF _____

This instrument was acknowledged before me on this _____ day of _____, 202__, by Lezlie Vermillion, County Administrator and Thomas J. Wolf, County Board Chair, Scott County, a body politic and corporate under the laws of the State of Minnesota.

_____ _____
Notary Public, _____ County, Minnesota Notary Printed Name

My commission expires _____

SURVEYOR'S CERTIFICATE

I, Jeffrey J. Rolfson, do hereby certify that this plat was prepared by me or under my direct supervision; that I am a duly Licensed Land Surveyor in the State of Minnesota; that this plat is a correct representation of the boundary survey; that all mathematical data and labels are correctly designated on this plat; that all monuments depicted on this plat have been, or will be correctly set within one year; that all water boundaries and wet lands, as defined in Minnesota Statutes, Section 505.01, Subd. 3, as of the date of this certificate are shown and labeled on this plat; and all public ways are shown and labeled on this plat.

Dated this _____ day of _____, 202__.

_____
Jeffrey J. Rolfson, Licensed Land Surveyor
Minnesota License No. 49003

STATE OF MINNESOTA
COUNTY OF _____

This instrument was acknowledged before me on _____ by Jeffrey J. Rolfson, Licensed Land Surveyor.

_____ _____
Notary Public, _____ County, Minnesota Notary Printed Name

My commission expires _____

CITY OF SHAKOPEE

I hereby certify that I have examined this plat of MORAINE ADDITION, and do hereby recommend this plat for approval as to form, this _____ day of _____, 202__.

_____
City Attorney, Shakopee, MN

We do hereby certify that on this _____ day of _____, 202__, the City Council of the City of Shakopee, Minnesota approved this plat by resolution and is in compliance with the provisions of Minnesota Statutes Section 505.03, Subdivision 2.

SIGNED:_____ its Mayor Attest:_____ its clerk

SCOTT COUNTY SURVEYOR

I hereby certify that in accordance with Minnesota Statutes, Section 389.09, Subd. 1, as amended, this plat has been reviewed and approved this _____ day of _____, 202__.

_____
Scott County Surveyor

SCOTT COUNTY AUDITOR/TREASURER

I hereby certify that the current and delinquent taxes on the lands described within are paid and the transfer is entered this _____ day of _____, 202__.

_____
Deputy

SCOTT COUNTY RECORDER

I hereby certify that this plat was filed in this office this _____ day of _____, 202__, at _____ o'clock ___M., as Document No._____.

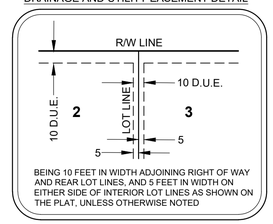
_____
Scott County Recorder

N

0 50 100
SCALE IN FEET

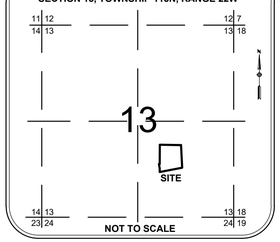
BASIS OF BEARING SYSTEM :
ALL BEARINGS ARE IN RELATIONSHIP WITH THE WEST LINE OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 115 NORTH, RANGE 22 WEST, WHICH IS ASSUMED TO BE N00°21'24"E.

DRAINAGE AND UTILITY EASEMENT DETAIL



BEING 10 FEET IN WIDTH ADJOINING RIGHT OF WAY AND REAR LOT LINES, AND 5 FEET IN WIDTH ON EITHER SIDE OF INTERIOR LOT LINES AS SHOWN ON THE PLAT, UNLESS OTHERWISE NOTED

PROPERTY LOCATION MAP
SECTION 13, TOWNSHIP 115N, RANGE 22W



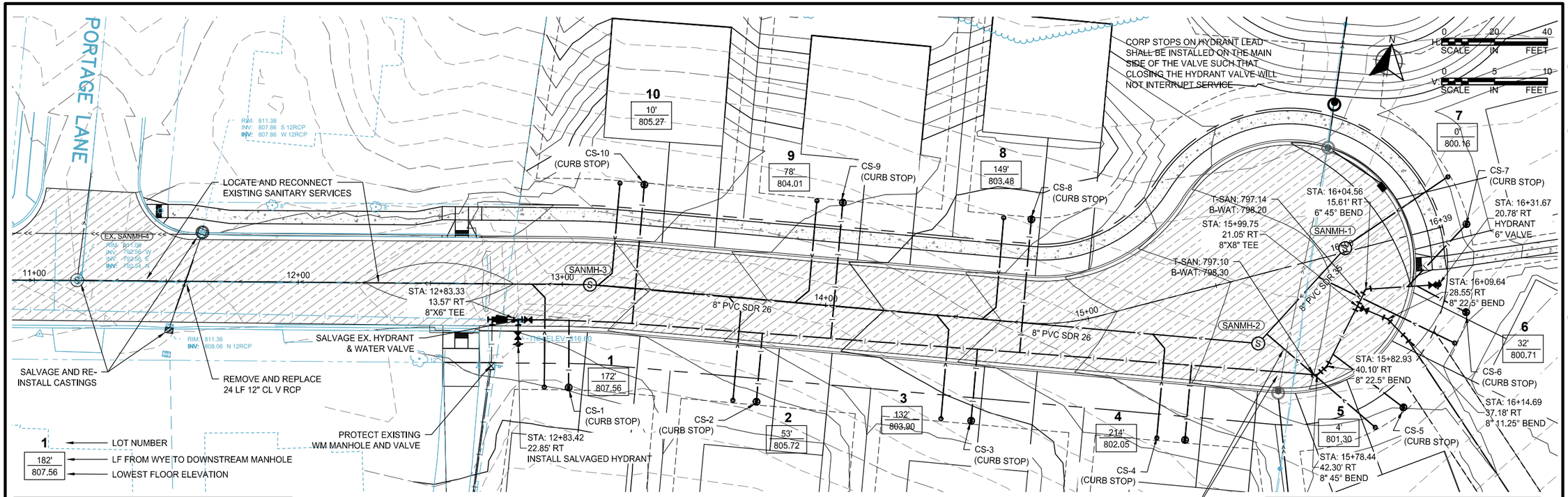
NOTE:

ALL MONUMENTS SHOWN THUS: ○
ARE SET 3/8" BY 14" CAPPED IRON REBAR WITH LICENSE NO. 49003 WHICH WILL BE SET WITHIN 1 YEAR AFTER RECORDING OF THIS PLAT.

ALL MONUMENTS SHOWN THUS: ●
ARE FOUND 5/8" IRON PIPES UNLESS OTHERWISE NOTED.

D.U.E. = DRAINAGE AND UTILITY EASEMENT

3701 40th Avenue NW
Rochester, MN 55901
wsb
507-218-3745
www.wsbeng.com



MORAINE COURT - 60' RIGHT-OF-WAY

INSULATE ABOVE WATERMAIN, WATERMAIN SERVICES, SANITARY SERVICES WITH 2" THICK 4'X8' SHEET OF CLOSED CELL POLYSTYRENE FOAM CENTERED ON STORM MAIN

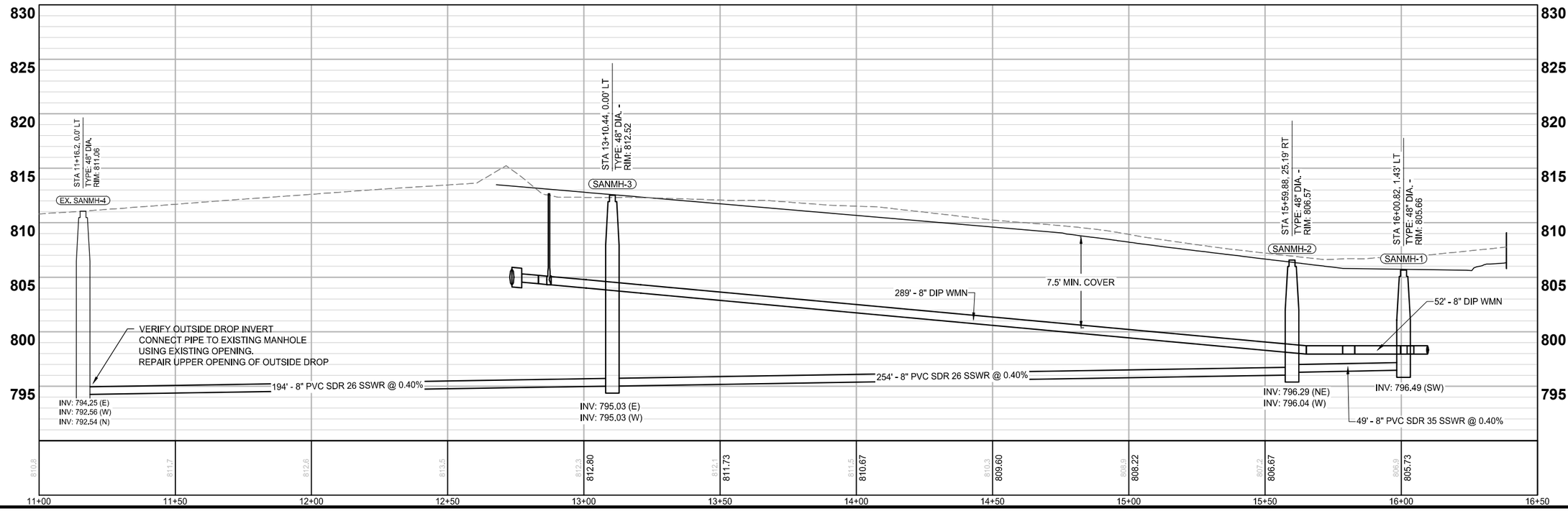
APPROVED FOR ONE YEAR FROM THIS DATE

SHAKOPEE PUBLIC UTILITIES COMMISSION — DATE

All materials and construction methods shall comply with Shakopee Public Utilities per water policy manual dtd. August 04, 2014.

RECORD PLANS ACCEPTED

SHAKOPEE PUBLIC UTILITIES COMMISSION — DATE



K:\019780-000\Cad\Plan\019780-000-CP-STRT-UTIL-PLAN.dwg, 8/23/2023 4:43:06 PM

wsb

SCALE:	DESIGN BY:
AS SHOWN	SJH
PLAN BY:	CHECK BY:
SJH	JGS

REVISIONS

NO.	DATE	DESCRIPTION
1	7/31/23	CONST.
2	8/08/23	CONST.
3	8/18/23	CONST.
4	8/23/23	CONST.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Jason J. Schimmel — LIC. NO: 57117

DATE: 8-18-2023

SANITARY SEWER AND WATERMAIN PLAN AND PROFILE

SCOTT COUNTY CDA
PROJECT - SHAKOPEE, MINNESOTA

WSB PROJECT NO. 019780-000

SHEET 14

GEOTECHNICAL REPORT

EAGLE CREEK AND CSAH 18 HOUSING DEVELOPMENT

SCOTT COUNTY | SHAKOPEE, MINNESOTA

May 9, 2023

Prepared for:
Scott County
600 County Trail East
Jordan, MN 55352

WSB PROJECT NO. 019780-000

GEOTECHNICAL REPORT

EAGLE CREEK AND CSAH 18
HOUSING DEVELOPMENT

FOR
SCOTT COUNTY

May 9, 2023

CERTIFICATION

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

Mark W. Osborn, PE

Date: May 9, 2023 Lic. No. 41362

May 8, 2023

Mr. Craig Jenson
Scott County
600 Country Trail East
Jordan, MN 55352

Re: Geotechnical Report
Eagle Creek Blvd & CSAH 18
Housing Development
Scott County, Minnesota
WSB Project No.: 019780-000

We have conducted a geotechnical subsurface exploration program for the above referenced project. This report contains our soil boring logs, an evaluation of the conditions encountered in the borings and our recommendations for suitable foundation type, allowable soil bearing pressure for footing design, pavements, infiltration rates, and other geotechnical related design and construction considerations.

If you have questions concerning this report or our recommendations, or for construction material testing for this project, please call us at 952.737.4660.

Sincerely,

WSB

Mark Osborn, PE
Senior Geotechnical Engineer

Attachment:
Geotechnical Report

MWO/tw

540 GATEWAY BLVD | BURNSVILLE, MN | 55337 | 952.737.4660 | WSBENG.COM

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Project Location

The site is located at the northwest corner of the intersection of Eagle Creek Blvd and County Highway 18 in Shakopee, Minnesota. The approximate soil boring locations can be found on the Soil Boring Exhibit in ***Appendix A***.

1.2 Project Description

It is proposed to construct 12 single-family residential housing lots, a bituminous surfaced cul-de-sac roadway, and an infiltration stormwater pond.

Structural loads for the single family homes were not provided, but we estimate that they could be in the range of three to five kips per lineal foot along the bearing walls of the building, with column loads on the order of 75 kips.

WSB has developed foundation recommendations for this project in consideration of the proposed layout, loadings, and structural configurations as understood at this time. When the designer develops additional information about final design structural loadings, building configuration, or other significant factors, the recommendations presented herein may no longer apply. WSB should be made aware of the revised or additional information in order to evaluate the recommendations for continued applicability.

1.3 Purpose and Project Scope of Services

Scott County authorized this scope of service. In order to assist the design team in preparing plans and specifications, we have developed recommendations for designing foundations, retaining walls, slabs and pavements. As such, we have completed a subsurface exploration program and prepared a geotechnical report for the referenced site. This stated purpose was a significant factor in determining the scope and level of service provided. Should the purpose of the report change the report immediately ceases to be valid and use of it without WSB's prior review and written authorization should be at the user's sole risk.

Our authorized scope of work has been limited to:

1. Clearing underground utilities utilizing Gopher State One Call.
2. Mobilization / demobilization of a truck mounted drill rig.
3. Drilling 4 standard penetration borings to about 20 foot depths.
4. Sealing the borings per Minnesota Department of Health procedures.
5. Perform soil classification and analysis.
6. Review of available project information and geologic data.
7. Providing this geotechnical report containing:
    a. Summary of our findings.
    b. Discussion of subsurface soil and groundwater conditions and how they may affect the proposed foundations, pavements, and infiltration.
    c. Estimated allowable bearing capacity of the soils.
    d. Estimated R-value of the soils.
    e. Recommended pavement section.
    f. A discussion of soils for use as structural fill and site fill.

2. PROCEDURES

2.1 Boring Layout and Soil Sampling Procedures

WSB completed 4 standard penetration soil borings at the project site. Scott County recommended the boring depths and selected the desired locations. Our field crew staked the borings using the supplied site plan. The borings were located with a handheld GPS device for horizontal locations. The approximate boring locations are shown on the Soil Boring Exhibit in ***Appendix A*** which is an aerial photo. The ground surface elevations at the borings were estimated by using LIDAR data with 2 foot contours. These maps should be accurate to within +/- one foot (1') provided ground surface modifications at this site have not been completed since LIDAR data was obtained.

We completed the borings on March 28, 2023 with a truck-mounted CME-55 drill rig operated by a two-person crew. The drill crew advanced the borings using continuous hollow stem augers. The drilling information is provided on the boring logs.

Generally, the drill crew sampled the soil in advance of the auger tip at two and one-half (2 ½) foot intervals to a depth of 15 feet and then at five (5) foot intervals thereafter to the termination depth of the boring. The soil samples were obtained using a split-barrel sampler which was driven into the ground during standard penetration tests in accordance with ASTM D 1586, Standard Method of Penetration Test and Split-Barrel Sampling of Soils. The materials encountered were described on field logs and representative samples were containerized and transported to our laboratory for further observation and testing.

The samples were visually observed to estimate the distribution of grain sizes, plasticity, consistency, moisture condition, color, presence of lenses and seams, and apparent geologic origin. We classified the soils according to type using the Unified Soil Classification System (USCS). A chart describing the USCS is included in ***Appendix A***.

2.2 Groundwater Measurements and Borehole Abandonment

The drill crew observed the borings for free groundwater while drilling and after completion of the borings. These observations and measurements are noted on the boring logs. The crew then backfilled the borings to comply with Minnesota Department of Health regulations.

2.3 Boring Log Procedures and Qualifications

The subsurface conditions encountered by the borings are illustrated on the Logs of Test Borings in ***Appendix A***. Similar soils were grouped into the strata shown on the boring logs, and the appropriate estimated USCS classification symbols were also added. The depths and thickness of the subsurface strata indicated on the boring logs were estimated from the drilling results.

The transition between materials (horizontal and vertical) is approximate and is usually far more gradual than shown. Information on actual subsurface conditions exists only at the specific locations indicated and is relevant only to the time exploration was performed. Subsurface conditions and groundwater levels at other locations may differ from conditions found at the indicated locations. The nature and extent of these conditions would not become evident until exposed by construction excavation. These stratification lines were used for our analytical purposes and due to the aforementioned limitations, should not be used as a basis of design or construction cost estimates.

3. EXPLORATION RESULTS

3.1 Site and Geology

The site was partially snow covered at the time of drilling. Borings were completed around the existing trees in the lightly wood area, through greenspace areas. Based on Google Earth, the site is currently undeveloped.

Boring elevations ranged from about 800 to 816 feet, and indicate the site slopes down to the north away from Eagle Creek Blvd.

Geologic origins can be difficult to determine solely from boring samples. We referenced online geologic data of the area and used our experience to help determine geologic origin of the soils, however only a detailed geologic exploration would accurately determine the geologic history of the site.

The Scott County Geologic Atlas indicates the surficial geology of the area is mostly alluvial deposits consisting of beds of silt, silty clay, fine grained sands, and gravel. Organics may be encountered within the deposits.

3.2 Subsurface Soil and Groundwater Conditions

The boring profile generally consisted of topsoil overlying alluvial deposits.

Organics

The borings encountered about 8 to 11 inches of topsoil consisted of clayey and silty sands in the borings. These soils were generally dark brown in color and wet.

Alluvium

The predominant soils encountered in the borings were sands, sands with silt, silty sands, and clayey sands. These soils were generally brown to reddish brown in color and moist.

We also noted fine alluvial silt deposits in boring B-3 at a depth of about 5 ½ to 9 ½ feet below grade. These deposits were brown in color and saturated at the time of drilling.

3.3 Strength Characteristics

The penetration resistance N-values of the materials encountered were recorded during drilling and are indicated as blows per foot (BPF). Those values provide an indication of soil strength characteristics and are located on the boring log sheets. Also, visual-manual classification techniques and apparent moisture contents were also utilized to make an engineering judgment of the consistency of the materials.

Table 1 presents a summary of the penetration resistances (N-value which are indicated by Blows Per Foot BPF) in the soils for the borings completed and remarks regarding the material strengths of the soils.

Table 1: Penetration Resistances

Soil Type	Classification	Penetration Resistances	Remarks
Coarse Alluvium	SP, SP-SM, SM, SC	5 to 50+ BPF	Loose to very dense
Fine Alluvium	ML	4 BPF	Very loose

The preceding is a generalized description of soil conditions at this site. Variations from the generalized profile exist and should be assessed from the boring logs, the normal geologic character of the deposits, and the soils uncovered during site excavation.

3.4 Groundwater Conditions

WSB took groundwater level readings in the exploratory borings, reviewed the data obtained, and discussed its interpretation of the data in the text of the report. Note that groundwater levels may fluctuate due to seasonal variations (e.g. precipitation, snowmelt and rainfall) and/or other factors not evident at the time of measurement.

No groundwater was encountered during the drilling process. The bore holes were only left open a short period of time, and groundwater levels may not have stabilized.

4. ENGINEERING ANALYSIS AND RECOMMENDATIONS

4.1 Discussion

Organic soils and vegetated root zones are not suitable for structural support, and should be removed from the building, roadway, and engineered fill areas.

Based on the results of our borings, the alluvial deposited soils generally appear capable of supporting the structures. However, some of the silt soils are locally wet and loose. Wet silt soils in combination with construction traffic may become unstable and require partial removal.

Generally, the soils in the upper 4 feet of the subgrade influence pavement performance the most. The soils within the pavement subgrade consist of clays and silts, which are frost susceptible soils. Consideration should be given to partially subcutting these soils and replacing with a non-frost susceptible granular fill to reduce the potential frost heave below the pavement section.

Silt soils are not recommended for direct support of pavements for the aforementioned frost reasons but also because they are sensitive to moisture changes, easily disturbed by construction traffic, and difficult to compact. Where silt soils are present at the top of grading grade we recommend a partial subcut and replacement with an engineered fill.

4.2 Building Area Preparation

We recommend removal of the organics from the construction area. Loose/loosened sands either at bottom of footing or slab subgrade elevations should be surface compacted with a large vibratory roller having a drum diameter of at least five feet (5') and a static dead weight of at least ten (10) tons prior to placement of engineered fill and backfill or concrete.

Excavations for removal of unsuitable soil may be deeper than indicated in our boring locations noted above, and depths will vary between the boring locations.

We recommend subcut of wet, loose or very loose, silt soils from immediately below the foundations. We recommend subcut of a minimum of 1 foot below the base of wall footings and below column footings to a depth of half (1/2) the width of the column footings. The sub-excavations should be oversized by at least one foot (1') beyond the edge of footings for each foot of depth below the bottom of footing elevations (1-horizontal to 1-vertical lateral oversizing). Because the depth and lateral extent of the sub-excavations will vary away from our borings, we recommend a qualified engineering technician working under the direction of a registered professional geotechnical engineer observe and test the excavation bases during construction.

Based on the borings, it appears that the on-site soil can generally be reused as structural backfill provided it is moisture conditioned and can be compacted to project specifications. However, silt soils will be difficult to place and compact especially when wet. We recommend the silt fills be used in landscaped or greenspace areas and not below foundations or pavements.

The site should be graded to prevent water from ponding on silt soils and potentially softening them. Furthermore, it should be noted that it has been our experience that fine-grained, relatively clean, sands and silts such as those encountered on this site will likely not provide adequate support to construction traffic. As such, we recommend consideration be given to using six inches (6") of crushed aggregates to stabilize construction roads, entrances and staging areas.

4.3 Foundation Recommendations

We recommend that the building in this development be supported on conventional spread footings bearing on naturally occurring alluvial sands or on engineered fill.

Based on the borings, it is our opinion the footings throughout may be designed for a net allowable soil bearing pressure not to exceed 2,000 pounds per square foot (psf).

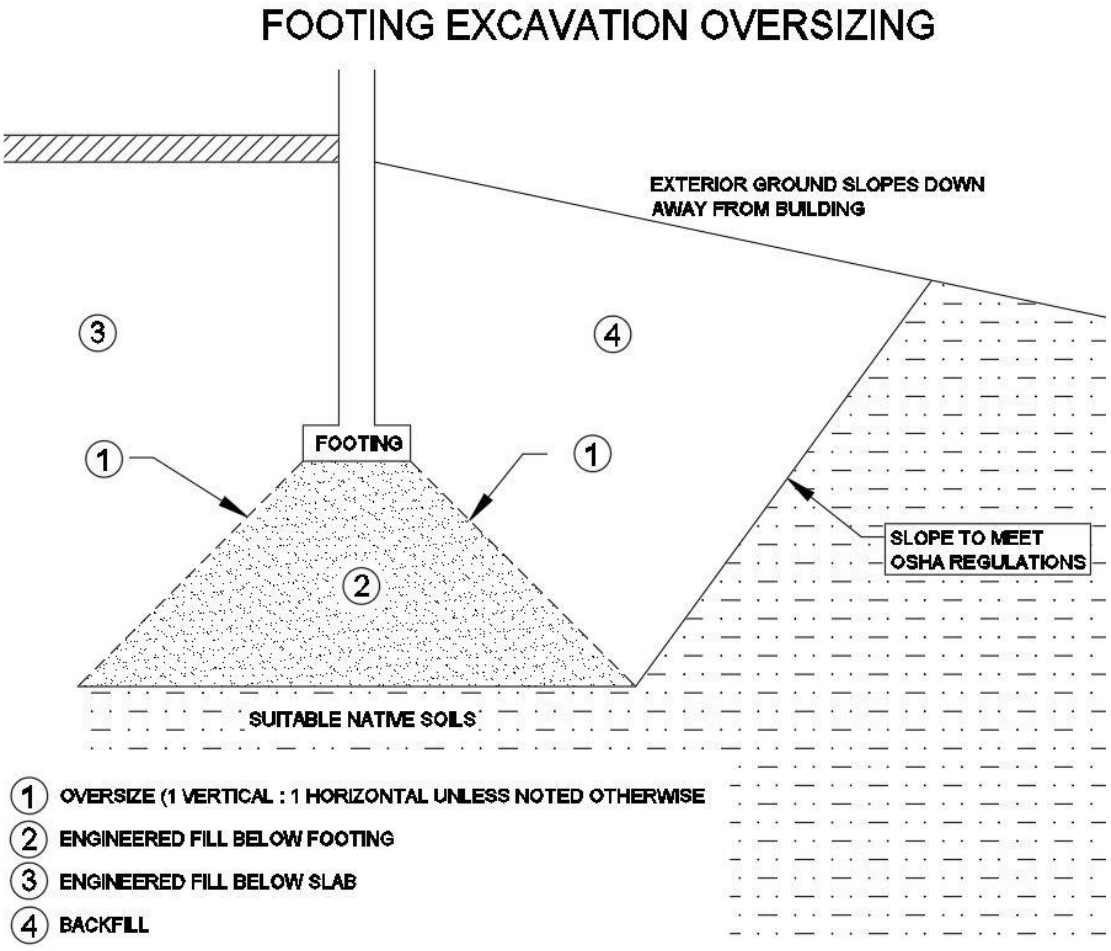
The allowable foundation bearing pressures apply to dead loads with design live load conditions. The design bearing pressure may be increased by one-third when considering transient loads which include wind or seismic conditions.

Frost protection should follow Minnesota Administrative Rules 1305.1809.

The factor of safety against shear or bearing capacity failure for this footing design would be three (3) or greater. If the site is prepared as recommended, we estimate that total and differential settlements (across a 30-foot span) corresponding to our assumed structural loads would be less than one inch (1") and one-half inch (1/2"), respectively, provided the bearing soils are not frozen or disturbed at the time of construction.

Figure 1 below indicates a graphical representation of a typical footing excavation oversizing.

FIGURE 1



4.4 At Grade Floor Slab

Floor slabs loads are expected to be low for residential homes. In cut areas where the floor slab will be placed upon sandy soils, a sand cushion for levelling should be sufficient. In areas where fills are placed to raise the site, we recommend placement of a minimum of six inches (6") of sand below the slab to

provide additional support. The sand should consist of a granular fill with less than fifty percent (50%) passing the #40 sieve and less than ten percent (10%) passing the #200 sieve.

Based on the above recommendations, it is our opinion that the modulus of subgrade reaction for sands below the floor slab will be about 200 pounds per square inch per inch (psi/in). Silt soils would have a subgrade reaction of about 50 pounds per square inch per inch (psi/in).

If portions of the new floor slabs are to have a non-breathable covering, such as vinyl tile or linoleum, or if there is to be a room with wood flooring, we recommend that a vapor barrier be installed below those portions of the slab. If a vapor barrier is used, it should be installed in accordance with the recommendations given in the ACI Manual of Concrete Practice, Part 2, Section 302.3.2.3.

4.5 Backfill and Fill Selection and Compaction

The on-site non-organic soils may be reused as backfill and fill provided they are moisture conditioned and can be compacted to their specified densities. Wet soils that are excavated would need to be dried before reuse as an engineered fill. We recommend use of a minimum of 2 feet of clean coarse sand with less than 50 percent passing the #40 sieve and less than 5 percent passing the #200 sieve when backfilling the bottom of a wet excavation.

Gravel or cobbles larger than 2 inches in diameter should not be placed within 2 feet of grading grade or utilities. We recommend that clayey soils be moisture conditioned to within +/-2 percent of the optimum moisture content as determined from their standard Proctor tests (ASTM D-698). Granular fills should be moisture conditioned to between -4% and +2% of the optimum moisture content. Fill should be spread in lifts of 6 inches, depending on the size and type of compaction equipment used.

Table 2 provides the recommended compaction levels.

Table 2: Recommended Level of Compaction for Backfill and Fill

Area	Percent of Standard Proctor Maximum Dry Density
Foundations: 2,000 psf	100
Pavement: Within 3 feet of bottom of aggregate base and any area where total depth of fill exceeds 10 feet	100
Pavement: Greater than 3 feet below aggregate base	95
Utility Trench and Utility Structure Backfill	100
Landscaping (non-structural)	90

4.6 Pavement Area

Once the site has been prepared as recommended, we anticipate the prepared subgrade soils will consist mostly of sands, sands with silt, silty sands and clayey sands. Based on the MnDOT Flexible Pavement Guide from 2020, the R-values of the subgrade soils would range between 20 and 70. We used a design R-value of 30 for the pavements.

No traffic data was available for the roadway. As it is a closed cul-de-sac design, we anticipate light traffic loads and weekly garbage truck or delivery traffic.

Based on MnDOT's FlexPave excel design utilizing granular equivalent charts, we recommend the pavement section indicated below in Table 3.

Table 3: Recommended Flexible Pavement Section

Section	Thickness (inches)	Granular Equivalent
Bituminous Course, MnDOT 2360 SPWEA340C	2	4.5
Bituminous Course, MnDOT 2360 SPWEA340C	2	4.5
Aggregate Base, MnDOT 3138 (Class 5)	8	8
TOTAL	-	17

Aggregate base placement for pavement support should meet the gradation and quality requirements for Class 5 per MnDOT specification 3138. Aggregate base material should be compacted to 100 percent of its standard Proctor maximum dry density.

Within several years after initial paving, some thermal shrinkage cracks will develop. We recommend routine maintenance be performed to improve pavement performance and increase pavement life. Pavement should be sealed with a liquid bitumen sealer to retard water intrusion into the base course and subgrade. Localized patch failures may also develop where trucks or buses turn on the pavement. When these occur, they should be cut out and patch repaired.

The pavement sections above provide options to meet the ESAL requirements. Other pavement design options would be acceptable as well as long as they meet the minimum requirements for bituminous thickness, aggregate base thickness, and can meet the ESAL requirements.

4.7 Infiltration

We completed laboratory and field testing to determine estimated infiltration rates of the soils for the stormwater pond. Our results are included below:

Field Testing:

We ran a field infiltration rate test by placing a 2 inch plastic tubing down the drill hole and using falling head methodology to measure the water levels within the tubing over a period of about 2 hours.

Our field test indicated an infiltration rate of about 10 inches/hour. This method does not include a safety factor that would reduce this result for design purposes.

Laboratory Testing:

We took soil samples during site drilling and completed a gradation to determine grain size. Using these grain size results we used multiple infiltration formulas to estimate infiltration rate.

Kozeny-Carmen Equation:	0.51 inches/hour	newer formula with additional data points
Hazen Equation:	0.11 inches/hour	older simplistic formula

Online Research:

The Minnesota Stormwater Manual indicates estimated infiltration rates of soils based on the USCS Classification. We have presented the estimated rates below.

Sand SP:	0.8 inches per hour	may be above infiltration levels at Boring B-1
Silty Sand SM:	0.45 inches per hour	predominant soils at B-1

Discussion:

As can be noted by the wide variety of results above, estimated infiltration rates for design can be difficult to determine. Based on the field, laboratory, and online research results above it is our opinion that infiltration rates of a minimum of 0.5 should be suitable, and that they could be much higher. We highly recommend double ring infiltration testing of the infiltration pond to ensure it does not exceed the

Minnesota Stormwater Manual recommendations of 8.3 inches/hour and to determine the final, in place infiltration rates.

4.8 Utilities

Invert elevations for the watermain and sanitary sewer are anticipated to be between 8 and 12 feet below grade. Based on the borings, the subgrade soils for the utilities will consist chiefly of sands, sands with silt, silty sands, clayey sands, and some silts. The sandy soils are suited for support of the utilities, however we anticipate that 1-2 feet of granular fills will be required within the silt soils.

Underground utilities are expected to be installed by backhoes completing the excavations and placing fills. Soil compactors should be used to compact the fill in even lifts to the specified densities.

4.9 Construction Considerations

Good surface drainage should be maintained throughout the work so that the site is not vulnerable to ponding during or after a rainfall. If water enters the excavations, it should be promptly removed prior to further construction activities. Under no circumstances should fill or concrete be placed into standing water.

Soil corrections at this site for foundations and pavement subgrades may not be continuous. We recommend tapering the fills back to native soils at a ten to one (10:1) slope.

It is important to review the fill limits and total depth of fill when placing structures upon compacted materials and when filling the excavation. The location of the footings should allow for at least a one to one (1:1) slope from the bottom of the footing to the outside limits of the engineered fill.

It is important to check this at the time of construction that during filling, unsuitable soils do not encroach within the one to one (1:1) slope limits and extending downward and outward from future footings.

4.10 Construction Safety

All excavations should comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P "Excavations and Trenches". This document states that excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the job specifications.

The responsibility to provide safe working conditions on this site, for earthwork, building construction, or any associated operations is solely that of the contractor. This responsibility is not borne in any manner by WSB.

4.11 Cold Weather Construction

It is our understanding that construction is unlikely to occur during the winter months. However, if the construction does continue into the winter months we recommend the following guidelines.

Roadbeds should not be constructed during periods when the material freezes while being placed and compacted, nor should material be placed on soil that is frozen to a depth greater than 4 inches. When the soils are frozen to a depth exceeding 4 inches, at a time when weather conditions are such that construction could be continued without the material freezing as it is being placed and compacted, the contractor may be permitted to excavate the frozen soil and proceed with the construction for so long as the weather will permit. The frozen soils should be pulverized or replaced with other suitable soils. Only unfrozen fill should be used.

Placement of fill and/or foundation concrete should not be permitted on frozen soil, and the bearing soils under footings or under the floor slab should not be allowed to freeze after concrete is placed, because excessive post-construction settlement could occur as the frozen soils thaw.

4.12 Field Observation and Testing

The soil conditions illustrated on the Logs of Test Borings in ***Appendix A*** are indicative of the conditions only at the boring locations. For this reason, we recommend that excavations at this site be observed by a soil engineer or technician prior to fill or backfill placement or construction of foundation elements to determine if the soils are capable of supporting the fill backfill and/or foundation loads. These observations are recommended to judge if the unsuitable materials have been removed from within the planned construction area and an appropriate degree of lateral oversize has been provided.

WSB also recommends a representative number of field density tests be taken in engineered fill and backfill placed to aid in judging its suitability. Fill placement and compaction should be monitored and tested to determine that the resulting fill and backfill conforms to specified density, strength or compressibility requirements. We recommend at least one compaction test for every 2,000 square feet of building area at vertical intervals not exceeding two (2) feet, and one compaction test for every 150 feet of utility trench at a vertical interval of two (2) feet. Prior to use, proposed fill and backfill material should be submitted to the WSB laboratory for testing to verify compliance with recommendations and project specifications.

Dynamic Cone Penetrometer (DCP) tests can be completed in the aggregate base in lieu of density testing. We recommend following MnDOT Specification 2211.3.D.2.c.

WSB would be pleased to provide the advised field observation, monitoring and testing services during construction.

4.13 Plan Review and Remarks

The observations, recommendations and conclusions described in this report are based primarily on information provided to WSB, obtained from our subsurface exploration, our experience, several assumptions and the scopes of service developed for this project and are for the sole use of our client. We recommend that WSB be retained to perform a review of final design drawing and specifications to evaluate that the geotechnical engineering report has not been misinterpreted. Should there be changes in the design or location of the structures related to this project or if there are uncertainties in the report we should be notified. We would be pleased to review project changes and modify the recommendations in this report or provide clarification in writing.

The entire report should be kept together; for example, boring logs should not be removed and placed in the specifications separately.

The boring logs and related information included in this report are indicators of the subsurface conditions only at the specific locations indicated on the Soil Boring Exhibit and times noted on the Logs of Test Boring sheets in ***Appendix A***. The subsurface conditions, including groundwater levels, at other locations on the site may differ significantly from conditions that existed at the time of sampling and at the boring locations.

The test borings were completed by WSB solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.

WSB has not performed observations, investigations, explorations, studies or testing that are not specifically listed in the scope of service. WSB should not be liable for failing to discover any condition whose discovery required the performance of services not authorized by the Agreement.

5. STANDARD OF CARE

The recommendations and opinions contained in this report are based on our professional judgment. The soil testing and geotechnical engineering services performed for this project have been performed with the level of skill and diligence ordinarily exercised by reputable members of the same profession under similar circumstances, at the same time and in the same or a similar locale. No warranty, either expressed or implied, is made.

APPENDIX A

Soil Borings Exhibit
Logs of Test Borings
Symbols and Terminology on Test Boring Log
Notice to Report Users Boring Log Information
Unified Soil Classification Sheet (USCS)

Wetland

B-1

Proposed Stormwater Pond

B-2

B-3

B-4

1

2

3

4

5

6

7

8

9

10

11

12

CO. HIGHWAY 18

EAGLE CREEK BLVD.
CO. RD. 16

LOG OF TEST BORING

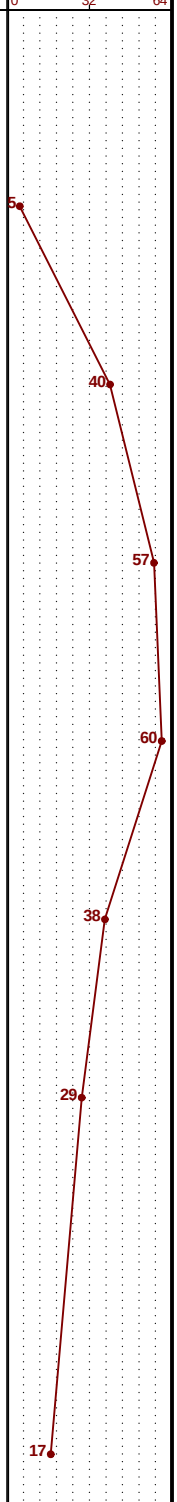
PROJECT NAME: Scott County Housing Trust
CLIENT/WSB #: 019780-000

PROJECT LOCATION: Scott County, MN
SURFACE ELEVATION: 800 ft

BORING NUMBER B-1

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE TYPE	SAMPLE No.	N	MC %	%Fines
		10" TOPSOIL: Clayey Sand, dark brown, wet	OL	Topsoil							
1	799	SAND, fine to medium grained, brown, wet, loose	SP	Coarse Alluvium			AU	1			
2	798										
3	797						SB	2	5		
4	796						HSA				
5	795	SILTY SAND, fine to medium grained, reddish brown, moist to wet, very dense to medium dense	SM				SB	3	40	4	46
6	794						HSA				
7	793										
8	792						SB	4	57		
9	791						HSA				
10	790						SB	5	60		
11	789						HSA				
12	788										
13	787						SB	6	38		32
14	786						HSA				
15	785						SB	7	29		
16	784										
17	783						HSA				
18	782										
19	781										
20	780						SB	8	17		
21	779	End of Boring 21.0 ft.									

N-Value Plot



WATER LEVEL MEASUREMENTS

START: 4/04/2023 END: 4/04/2023

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
4/04/2023	2:00 pm	21	19.5	6	None		3.25" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: A. Wacek
Notes:

LOG OF TEST BORING

PROJECT NAME: Scott County Housing Trust
CLIENT/WSB #: 019780-000
PROJECT LOCATION: Scott County, MN
SURFACE ELEVATION: 810 ft

BORING NUMBER B-2
PAGE 1 OF 1

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE TYPE	SAMPLE No.	N	MC %	%Fines	N-Value Plot
		11" TOPSOIL: Clayey Sand, dark brown, wet	OL	Topsoil								
1	809	SAND, fine to medium grained, dark brown, moist, loose	SP	Coarse Alluvium			AU	1				
2	808											
3	807						SB	2	8			8
4	806						HSA					
		SAND, fine to medium grained, brown, moist, medium dense	SP									
5	805						SB	3	11			11
6	804						HSA					
7	803	SAND, fine to medium grained, brown, moist, medium dense	SP									
8	802						SB	4	11			11
9	801						HSA					
10	800						SB	5	10			10
11	799	CLAYEY SAND, fine to medium grained, reddish brown, wet, loose	SC							14	48	
12	798						HSA					
		SILTY SAND WITH CLAY, fine to medium grained, reddish brown, wet, medium dense to very dense	SM				SB	6	22	10		22
13	797											
14	796						HSA					
15	795	- [Cobbles at 15 feet]					SB	7	50/5			
16	794											
17	793						HSA					
18	792											
19	791											
20	790						SB	8	30			30
21	789	End of Boring 21.0 ft.										

N-Value Plot: 0 17 34

WATER LEVEL MEASUREMENTS

START: 4/05/2023 END: 4/05/2023

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
4/05/2023	10:00 am	21	19.5	7.5	None		3.25" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: A. Wacek
Notes:

LOG OF TEST BORING

PROJECT NAME: Scott County Housing Trust
CLIENT/WSB #: 019780-000

PROJECT LOCATION: Scott County, MN
SURFACE ELEVATION: 808 ft

BORING NUMBER B-3
PAGE 1 OF 1

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE TYPE	SAMPLE No.	N	MC %	%Fines	N-Value Plot
		11" TOPSOIL: Silty Sand, dark brown, wet	OL	Topsoil								
1	807	SILTY SAND, slightly organic, dark brown, moist, loose [Organic Content = 3.0%]	SM	Coarse Alluvium			AU	1				
2	806						SB	2	10			10
3	805	CLAYEY SAND, fine to medium grained, brown, wet, loose	SC							13	43	
4	804						HSA					
5	803						SB	3	7			7
6	802	SILT, brown, saturated, soft to very soft [LL = 28, PI = 4]	ML	Fine Alluvium			HSA					
7	801											
8	800						SB	4	4	30		4
9	799						HSA					
10	798	SILTY SAND WITH LITTLE GRAVEL, fine to medium grained, reddish brown, wet, medium dense to very dense	SM	Coarse Alluvium			SB	5	13	12		13
11	797						HSA					
12	796											
13	795						SB	6	38			38
14	794						HSA					
15	793						SB	7	58			58
16	792											
17	791						HSA					
18	790											
19	789											
20	788						SB	8	50/4			
21	787	End of Boring 21.0 ft.										

N-Value Plot: 0 31 62

WATER LEVEL MEASUREMENTS

START: 4/05/2023 END: 4/05/2023

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
4/05/2023	12:00 pm	21	19.5	3.5	None		3.25" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: P. Solie
Notes:

GEOTECHNICAL N-PLOT - WSB.GDT - 4/27/23 11:06 - K:\019780-000\GEOTECH-CMT\GEOTECH\SCOTT COUNTY HOUSING TRUST - BORING LOG.GPJ

LOG OF TEST BORING

PROJECT NAME: Scott County Housing Trust
CLIENT/WSB #: 019780-000

PROJECT LOCATION: Scott County, MN
SURFACE ELEVATION: 816 ft

BORING NUMBER B-4
PAGE 1 OF 1

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE TYPE	SAMPLE No.	N	MC %	%Fines	N-Value Plot
		8" TOPSOIL: Clayey Sand, dark brown, wet	OL	Topsoil								
1	815	SAND WITH SILT, fine to coarse grained, brown, wet, loose	SP-SM	Coarse Alluvium			AU	1				
2	814											
3	813						SB	2	9		11	9
4	812						HSA					
5	811						SB	3	9			9
6	810						HSA					
7	809						SB	4	7			7
8	808						HSA					
9	807	SAND, fine to coarse grained, brown, moist, loose	SP				SB	5	9			9
10	806						HSA			10		
11	805	SAND WITH SILT, fine to medium grained, dark brown, moist, loose	SP-SM				SB	6	8			8
12	804						HSA					
13	803						SB	7	8			8
14	802	SAND, fine to medium grained, brown, moist, loose	SP									
15	801											
16	800	SAND WITH SILT, fine to medium grained, reddish brown, moist, dense	SP-SM									
17	799											
18	798						HSA			7		
19	797											
20	796						SB	8	47			47
21	795	End of Boring 21.0 ft.										

N-Value Plot: 0 25.5 51

WATER LEVEL MEASUREMENTS

START: 4/05/2023 END: 4/05/2023

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
4/05/2023	2:00 pm	21	19.5	7	None		3.25" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: P. Solie
Notes:

SYMBOLS AND TERMINOLOGY ON TEST BORING LOG

SYMBOLS

Drilling and Sampling

Symbol	Description
HSA	3 1/4" LD. Hollow Stem Auger
FA	Flight Auger
HA	Hand Auger
RC	Size A, B, or N rotary casing
CS	Continuous split barrel sampling
DM	Drilling Mud
JW	Jetting Water
SB	2" O.D. split barrel sampling
_L	2 1/2" or 3 1/2" OD split barrel liner sampler
_T	2" or 3" thin walled tube sample
W	Wash sample
B	Bag sample
P	Test Pit sample
_Q	BQ, NQ, or PQ wire line system
_X	AX, BX, or NX double tube barrel
N	Standard penetration test, blow per foot
CR	Core recovery, percent
WL	Water level
n/a	no measurement recorded

Laboratory Testing

Symbol	Description
MC	Moisture content, % (ASTM D2216)
DD	Dry Density, pcf
LL	Liquid Limit (ASTM D4318)
PL	Plastic Limit (ASTM D4318)
	- Inserts in last column
Qu	Unconfined compressive strength, psf (ASTM D2166)
Pq	Penetrometer Reading, tsf (ASTM D1558)
Ts	Torvane Reading, ts
G	Specific Gravity (ASTM D854)
SL	Shrinkage limits (ASTM D427)
OC	Organic Contenct (ASTM D2974)
SP	Swell Pressure, tsf (ASTM D4546)
PS	Percent swell under pressure (ASTM D4546)
FS	Free swell, % (ASTM D4546)
SS	Shrink swell, % (ASTM D4546)
pH	
SC	Sulfate content, parts/million or mg/l
CC	Chloride content, parts/million or mg/l
C	One dimensional consolidation (ASTM D2435)
Qc	Triaxial compression (ASTM D2850 and D4767)
DS	Direct Shear (ASTM D3080)
K	Coefficient of permeability, cm/sec (ASTM D2434)
P	Pinhole Test (ASTM D4647)
DH	Double hydrometer (ASTM D4221)
MA	Particle size analysis (ASTM D422)
R	Laboratory electreical resistivity, ohm-cm (ASTM G57)
VS	Field vane shear (ASTM D2573)
RQD	Rock quality designation, percent
IR	Infiltration Test (ASTM D3385)

TERMINOLOGY

Particle Sizes

Type	Size Range
Boulders	> 12"
Cobbles	3" - 12"
Coarse gravel	3/4" - 3"
Fine gravel	#4 sieve - 3/4"
Coarse sand	#4 sieve - #10 sieve
Medium sand	#10 sieve - #40 sieve
Fine sand	#40 sieve - #200 sieve
Silt	100% passing #200 sieve, and > 0.002mm
Clay	100% passing #200 sieve, and < 0.002mm

Soil Layering and Moisture

Term	Visual Observation
Lenses	Small pockets of different soils
Lamination	< 1/4" thick stratum
Layer	1/4" - 12" thick stratum
Stratified	Altering lenses of varying materials or colors
Varved	Altering laminations of clay, silt, fine sand, or colors
Dry	Powdery, no noticeable water
Moist	Damp, below saturation
Wet	MC above plastic limit
Waterbearing	Pervious soil below water table
Saturated	Cohesive soil with MC above liquit limit

Gravel Content

Coarse-Grained Soils

% Gravel	Description
2 - 15	A little gravel
16 - 30	With gravel
31 - 49	Gravelly

Fine-Grained Soils

% Gravel	Description
2 -5	Trace of gravel
5 -15	a little gravel
16 - 30	with gravel
31 - 49	Gravelly

Standard Pentration Resistance (N-value)

Cohesionless Soils

N-Value	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
>50	Very dense

Cohesive Soils

N-Value	Consistency
0 - 4	Very soft
5 - 8	Soft
9 - 15	Firm
16 - 30	Hard
>30	Very hard

NOTICE TO REPORT USERS BORING LOG INFORMATION

Subsurface Profiles

The subsurface stratification lines on the graphic representation of the test borings show an approximate boundary between soil types or rock. The transition between materials is approximate and is usually far more gradual than shown. Estimating excavation depths, soil volumes, and other computations relying on the subsurface strata may not be possible to any degree of accuracy.

Water Level

WSB & Associates, Inc. took groundwater level readings in the exploratory borings, reviewed the data obtained, and discussed its interpretation of the data in the text of this report. The groundwater level may fluctuate due to seasonal variations caused by precipitation, snowmelt, rainfalls, construction or remediation activities, and/or other factors not evident at the time of measurement.

The actual determination of the subsurface water level is an interpretive process. Subsurface water level may not be accurately depicted by the levels indicated on the boring logs. Normally, a subsurface exploration obtains general information regarding subsurface features for design purposes. An accurate determination of subsurface water levels is not possible with a typical scope of work. The use of the subsurface water level information provided for estimating purposes or other site review can present a moderate to high risk of error.

The following information is obtained in the field and noted under "Water Level Measurements" at the bottom of the log.

Sample Depth:	The lowest depth of soil sampling at the time a water level measurement is taken.
Casing Depth:	The depth to the bottom of the casing or hollow stem auger at the time of water level measurement.
Cave-in Depth:	The depth at which a measuring tape stops in the bore hole.
Water Level:	The point in the bore hole at which free-standing water is encountered by a measure device from the surface.

Obstruction Depths

Obstructions and/or obstruction depths may be noted on the boring logs. Obstruction indicates the sampling equipment encountered resistance to penetration. It must be realized that continuation of drilling, the use of other drilling equipment or further exploration may provide information other than that depicted on the logs. The correlation of obstruction depths on the log with construction features such as rock excavation, foundation depths, or buried debris cannot normally be determined with any degree of accuracy. For example, penetration of weathered rock by soil sampling equipment may not correlate with removal by certain types of construction equipment. Using this information for estimating purposes often results in a high degree of misinterpretation.

Accurately identifying the obstruction or estimating depths where hard rock is present over the site requires a scope of service beyond the normal geotechnical exploration program. The risk of using the information noted on the boring logs for estimating purposes must be understood.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

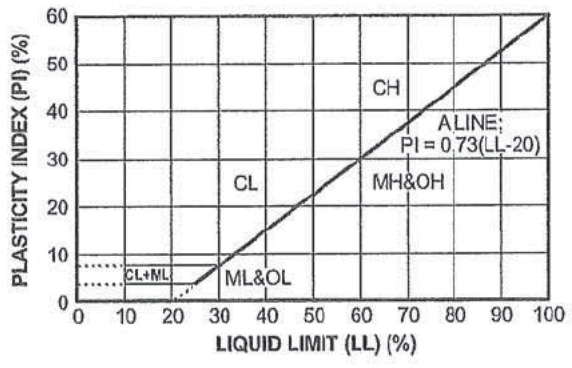
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



City of Shakopee

Forestry Specifications Manual

SHAKOPEE

Adopted by:

City Council, Regular Session, December 21, 2021

Introduction

Authority: Pursuant to authority granted under Shakopee City Code Section 151.112, Section 151.113, Section 130.15, Section 90.05 and Section 90.16, the following serves as the Forestry Specifications and Standards of Practice for the City of Shakopee, Minnesota, hereinafter referred to as the **Forestry Specifications Manual**.

Guideline: The guideline of the City of Shakopee's Tree Management Regulations is to regulate the planting, transplanting, maintenance, removal and protection of public trees and shrubs in the city in order to alleviate hazardous conditions which may result in injury to persons using the streets, sidewalks or other public property within the city. It is also a guideline to promote and enhance the beauty and general welfare of the city by protecting trees and shrubs from undesirable treatment, maintenance practice, planting and removal.

Function: The general responsibility of the Public Works Department is to maintain trees and shrubs located on all public properties, including, but not limited to, boulevards, right-of-way, medians, alleys, parks, and other public facilities and spaces. This involves all phases of Forestry work from planting through removal. These specifications are to serve as a standard for the planting and maintenance of all public trees by city employees and city contractors. However, contractors or private individuals may reference these specifications to perform forestry work. In abiding by and enforcing these specifications, the Public Works Department makes reasonable efforts towards the desired goal of maintaining a safe and aesthetically pleasing urban forest allowing it to provide the maximum benefit to the community. The Public Works Department must approve exceptions to these specifications. The Forestry Specifications Manual shall be adhered to at all times, but may be amended at any time that experience, new research, or laws indicate that improved methods or circumstances make it advisable.

Table of Contents

Tree Planting Standards

Size: All trees planted along the right-of-way and within public spaces must be of sufficient size to absorb the abuse and conditions common to trees planted in urban areas. The minimum allowable size for shade trees is 1 ¾" caliper and 1 ½" caliper for ornamental trees; however, larger or smaller sizes may be required to ensure survival for specific situations. Tree caliper shall be measured six inches above the ground to the nearest ¼".

Condition: Unless otherwise specified, all trees shall conform to the American Nursery and Landscape Association's *American Standard for Nursery Stock*, (Z60.1-2014 or as updated). Each tree chosen for planting shall be a high-quality, healthy tree with evidence of vigorous growth during the previous year. All trees shall have a comparatively straight, single trunk, well-developed leaders and crown, and the roots shall not only be characteristic of the species, cultivar or variety, but also exhibit evidence of proper nursery pruning practices. Ornamental trees may be multiple-stemmed if they can be pruned for adequate clearance. At the time of planting, all trees must have a full healthy crown, be free of mechanical injuries and display no other objectionable features that will affect the future form, health, and beauty of the tree.

Planting Methods:

Planting a Bare Root Tree

Bare root trees are usually available only in early spring. These trees are dug from nurseries in late fall, and all soil is removed from their roots. They are held in climate controlled coolers over winter and sold bare root in spring. Bare root trees typically have a 1 ½- to 2-inch trunk diameter.

While bare root trees can be very economical, they can be highly perishable and it is very important that the roots never be allowed to dry out. When planting many bare root trees (five to ten or more), they should be ordered from the nursery ahead of time and stored in the city's gravel bed (or similar) until they are planted. Bare root trees are usually available only for a short time in spring (usually at the end of April or beginning of May in this area) so there is little flexibility for planting which is available with containerized or balled and burlapped trees. See Figure 1 for details to plant a bare root tree.

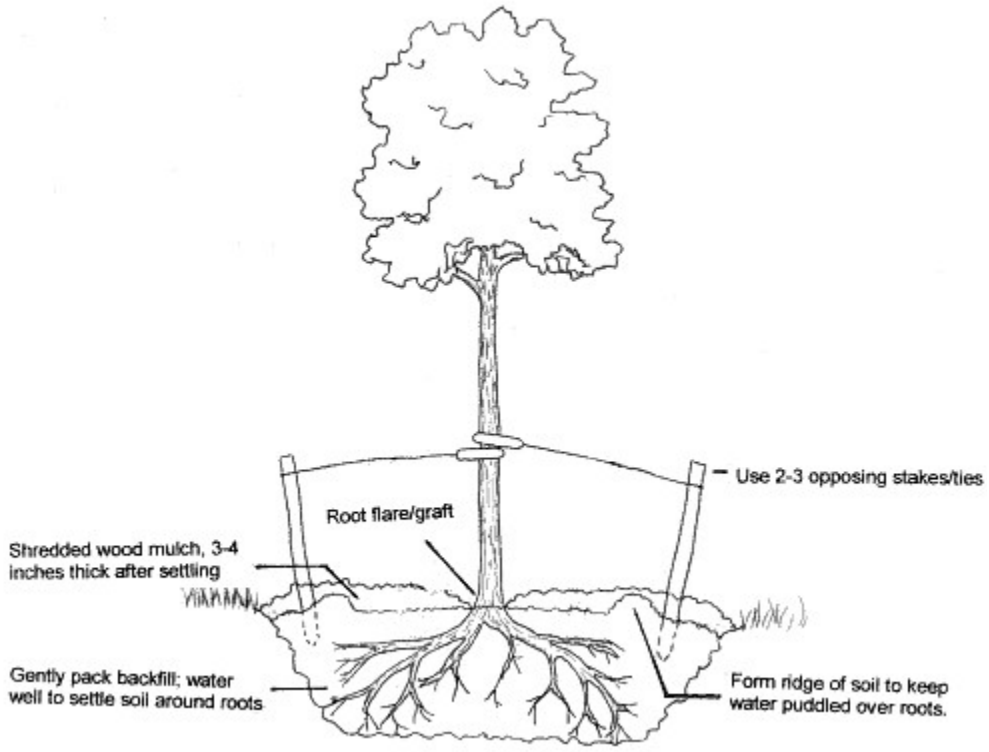


Figure 1. How to plant a bare root tree. Figure from the University of Minnesota Extension. See the city standard detail for planting trees for additional details.

Planting a Container-Grown Tree

Container-grown trees are sold in a variety of different sized pots. The pots may be plastic, paper maché, or wooden "bushel baskets." In some cases, the tree had been growing in the container since it was a seedling; in others, it was planted in the container as a bare root tree. These trees are available throughout the growing season, and can be held in the containers for quite some time, allowing for more flexibility in planting. See Figure 2 for details to plant a container-grown tree.

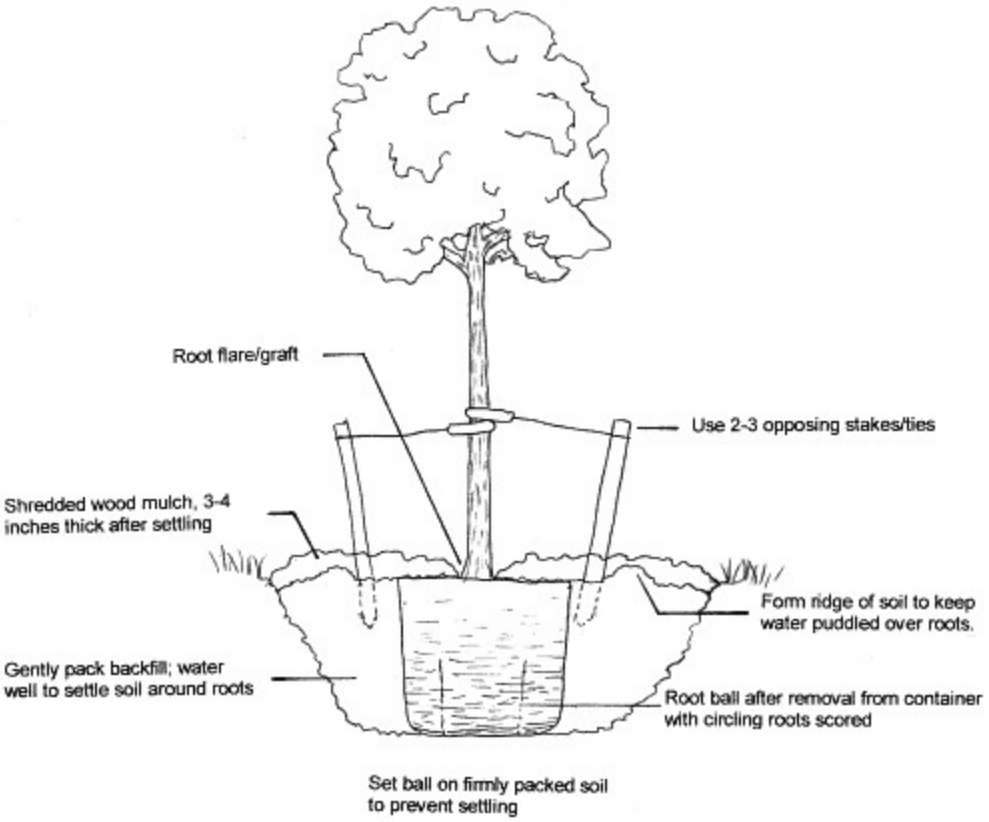


Figure 2. How to plant a container-grown tree. Note: Only use 2-3 opposing stakes/ties when needed. Figure from the University of Minnesota Extension. See city standard detail for planting trees for additional details.

Planting a Balled and Burlapped Tree

Balled and burlapped trees are trees that are dug with the soil around the roots (root ball) intact. That root ball is wrapped in burlap and enclosed in a wire basket which is tied around the trunk. Balled and burlapped trees cost more than bare root stock, but they are typically available throughout the growing season. Larger diameter trees are usually sold this way rather than as bare root or containerized. The root ball of a balled and burlapped trees can dry out very easily, so when choosing a tree, make sure that it is well mulched and does not look dry or otherwise stressed, be certain to keep the root ball moist until it is planted and, if possible, remove the burlap. See Figure 3 for details to plant a balled and burlapped tree.

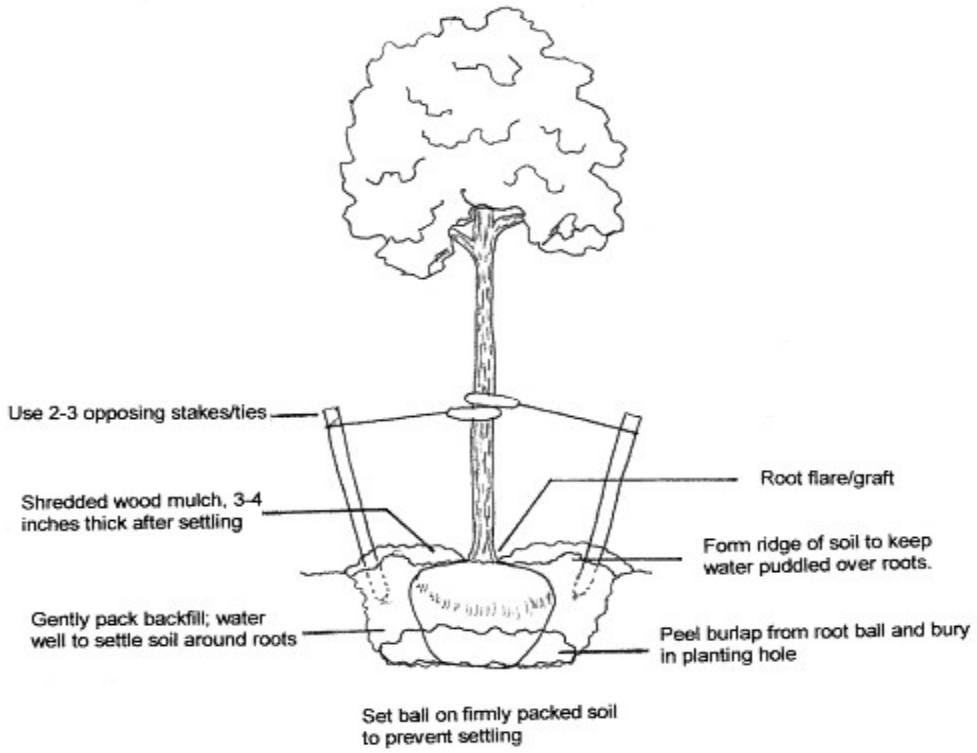


Figure 3. How to plant a B&B tree. Note: Only use 2-3 opposing stakes/ties when needed. Figure from the University of Minnesota Extension. See city standard detail for planting trees for additional details.

Location: All street trees shall be planted midway between the curb and sidewalk (or where the sidewalk would be if there is no sidewalk), unless in the opinion of the Public Works Department, there is sufficient reason to plant the trees off-center.

To allow for maintenance, minimize infrastructure damage and promote safety, trees shall be planted using the following guidelines. *The Public Works Department may make exceptions to these guidelines when circumstances warrant and public safety is not threatened.*

1. 50' from an approach corner
2. 35' from a non-approach corner
3. 20' from a street light
4. 10' from a driveway, utility pole, or fire hydrant
5. 10' from a Sanitary Sewer service, water main, or other underground utilities
6. 5' from a gas valve, water valve, or carriage walk
7. 3' from the curb

Easement Areas: Pursuant to Section 90.16 of the City Code, no trees, shrubs or bushes are allowed to be planted or located within a city easement area, right-of-way or sight triangle. In the event that the city grants permission to locate a tree, shrub or bush in its easement area or on its property, the following standards shall apply:

1. No tree shrub or bush shall be planted or allowed to be located in city-owned or managed property or within a city conservation easement area, sight triangle or right-of-way without first obtaining a permit from the city. The permit application in Appendix D is available at City Hall or on the city's website: www.ShakopeeMN.gov. The permit must be reviewed and approved by the City's Public Works Department.
2. Under no circumstances will the city issue a permit to plant or allow a tree, shrub or bush in any sidewalk or trail easement.
3. Under no circumstances will the city issue a permit to plant or allow a tree to be placed directly on top of a water, sewer or other utility service line. The city will not issue a permit to plant or allow any trees, shrubs, or bushes to be placed within two feet of the side and rear of any utility transformers, cabinets, or hydrants, or within eight feet of the front of any utility transformers, cabinets, or hydrants.
4. Under no circumstances will the city issue a permit to plant or allow a tree to be placed within a lot's front drainage and utility easements, street side easements of corner lots, or maintenance access easements. The city may permit trees to be placed within a lot's side and rear lot line easements if the easements do not contain any underground utilities and the tree does not obstruct drainage.

Sight Triangle: The city will not issue a permit to allow a tree, shrub or bush to be planted or located within a sight triangle, with the exception of low growing shrubs that are less than three feet high and trees that have branches that are able to be trimmed so that they are higher than nine feet from the ground.

Right-of-Way: The city will not allow trees to be planted in the city right-of-way without the approval of a Tree, Shrub and Bush Permit. Trees planted in the right-of-way without a permit will be removed.

Spacing: Future maintenance problems can be minimized by careful and thoughtful placement of trees. Spacing of trees is a function of local site conditions, the species or cultivar used, and their mature height, spread and form. A safe minimum spacing between trees is a distance equal to the width of the species at maturity. All Shakopee trees shall be planted a minimum 30 feet from another tree.

Recommended Street Trees: Appendix A contains the lists of tree species approved for planting in the city based upon their recommended planting sites. The list is subject to review to determine whether any species, cultivars or varieties should be added or removed from the list. The tree list is a recommendation but is subject to change based on availability of trees from suppliers.

Only small-growing trees shall be planted under overhead secondary or primary electrical distribution lines. Trees planted to the side of power lines shall be carefully selected for mature habit to minimize future conflicts.

Conditional Plantings: Conifers may be planted on city right-of-way provided the trunk is no closer than 14 feet to the back of the curb or 7 feet behind the existing public sidewalk. Also, it may not be closer than 35 feet from the non – approach corner of the intersection of two right-of-way lines and no closer than 20 feet to the edge of the nearest driveway.

Undesirable Street Trees: Unacceptable species or their varieties as listed in Appendix B shall not be planted on city property, except in special locations where, because of characteristics of adaptability or landscape effect, they can be used advantageously. Their lack of suitability is based upon objectionable growth habits, fruiting habits, form, susceptibility to serious diseases, propensity to incur storm damage, and other limitations. The limitations listed for each tree or species are the more serious problems encountered locally.

Maintenance of Newly Planted Trees

General: Newly planted trees, shrubs and other plants require special maintenance for one or two growing seasons following planting. All maintenance practices shall follow approved Forestry standards.

Watering: Watering bags should be utilized when available for newly planted trees that are planted by city employees. The recommended frequency of watering trees is one to two times per week in dry months for the first three years after planting. After three years, the need for watering is evaluated based on environmental conditions and monitoring.

Mulching: It is recommended that when planting a tree that mulch is applied around the base of the tree. Mulch is to be maintained until the tree is established which is typically 5 years. Mulch helps a tree retain moisture, control weeds, moderates soil temperature, and gives a nice appearance to the landscape. Most any organic material can be used as mulch, including

shredded wood or bark, wood chips, pine needles, cocoa beans hulls, straw, ground corncobs, or any other available organic matter.

To be effective, mulches should be applied so that when settled, the mulch is 3-4 inches deep. However, mulch should be pulled away from the trunk or stem of the tree. Mulch left against the tree's bark can cause moisture buildup which can rot the bark and cause severe injury to the tree. The "volcano" of mulch around a tree's trunk should be avoided, and instead a "donut" of mulch should be applied. If using organic mulches, do not use a landscape fabric or plastic.

Inorganic materials often used as mulch, such as landscape rocks, may also be used. However, rocks tend to absorb heat during the day and release it at night, which can be stressful for plants. Also, a landscape plastic or fabric under the rocks will be needed to control weeds, which is not needed when using organic mulch.

Pruning: No pruning should occur at the time of planting except to remove dead or broken branches. Unnecessary pruning at this time may reduce the amount of stored energy the plant holds and may stress the tree.

The city is divided into multiple pruning zones to rotate through city-wide pruning. Young trees (10 years or less) are pruned once every three years, and mature trees (greater than 10 years) are pruned once every six years.

Fertilization: Adequate quantities of the essential nutrient elements should be available after new root growth starts. Provision of good drainage and adequate soil moisture are far more important following planting than fertilization. Apply fertilizer sparingly and only to correct a specific deficiency. Since excessive fertilization can "burn" roots and stimulate crown growth faster than the roots can supply water, it is best to wait until the third year after planting to begin applications.

Staking: Bare root trees are staked with a minimum of two stakes to help stabilize trees while they establish. Container and balled and burlapped trees are not staked unless monitoring identifies a need to help stabilize while the tree establishes. If it is necessary to stake a tree after planting use only broad, soft strapping and leave some play for the tree to sway in the wind. Do not use wire surrounded by a garden hose as this may cause serious damage to the trunk. All staking material should be removed within two years unless deemed necessary for continued stability. Please also note that not all trees require staking to stabilize the trees. Contact your local forester or arborist for advice.

Wrapping: Tree guards should be utilized when available for the first three years of establishment of newly planted trees when they are planted in areas that would be prone to damage from mowing, snow and ice, rodents, and sun scald.

Planting Guidelines

General: The following standards shall apply to trees and shrubs in city owned property such as right-of-way and park and open space. In addition, the standards shall apply to private property trees during a state of emergency declared by the Mayor or City Council.

Restrictions to Planting Trees: The following are general restrictions to planting trees within the City of Shakopee:

1. Have underground utilities located.
2. Do not plant trees within city owned property such as park and open space without prior written approval. These trees will become the property of the city.
3. Do not plant trees within city owned right-of-way without prior written approval. These trees will become the property of the city and may be removed as determined by the city.
4. Do not plant trees within drainage and utility easements without prior written approval. Future city improvement projects may require the removal of these trees.
5. Do not plant trees within Conservation Easements without prior written approval from the city.
6. Trees are to be planted a minimum of 5 feet from all property lines. The city recommends planting trees 10 feet from all property lines.

Reconstructed and Widened Streets: When trees are removed in preparation for reconstruction or widening of any established street, new trees will be planted provided there is adequate space in the right-of-way to support tree growth. The expense of this planting shall be borne by the city and incorporated into the project. The Department of Public Works shall determine the amount, location and species of these trees.

New Subdivisions: In the development of new subdivisions or commercial property, removal and planting of trees must meet the requirements of City Code Sections 151.112 and 151.113.

Unimproved Streets: Trees shall not be planted in the right-of-way of unimproved streets or where no curb and gutter exists without approval from the Department of Public Works.

Pruning Standards

General: All pruning shall follow the USDA Forest Service's *How to Prune Trees* manual (see references) for the purpose of crown cleaning, crown thinning, crown raising, and structure development. Pruning shall improve the appearance of the trees and maintain the crown shape and symmetry typical of the species at its given size and age. Permission from the city is required before any pruning is done on city owned and maintained trees.

Pruning Cuts: All final cuts shall be "collar cuts" made sufficiently close to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub, so that closure can readily begin under normal conditions. The face of the "collar cut" or wound area shall be circular in form. "Flush" cuts to the main stem behind the branch collar and that leave oval exposed wounds shall not be made. Cuts shall be clean and made such that all wound sides are even edged and do not leave "dog ear" ridges on one side or another.

All limbs removed shall be cut in such a manner so as to prevent any ripping or tearing of the wood or bark on the parent or remaining stem. Large limbs shall be cut using the three-cut pruning method as shown in Figure 4. Limbs shall be brought to the ground as to prevent any damage to property, publicly or privately owned.

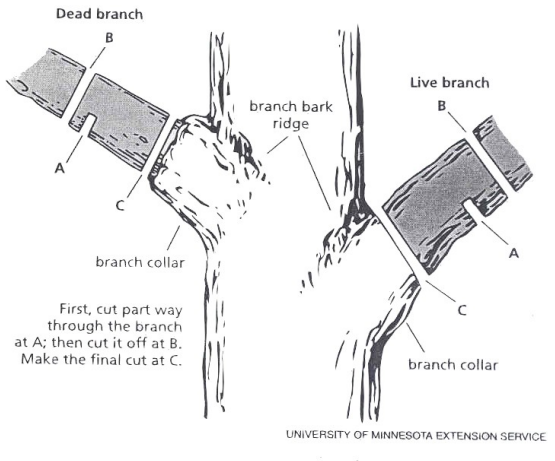


Figure 4 Proper Pruning Techniques – 3 Cut Method

Crown Cleaning: Crown cleaning should remove all dead, dying, diseased, crowded, weakly attached and low-vigor branches. Interior crowding and crossed or rubbing branches should be pruned where practical so as not to leave large holes in the general form of the tree. Trunk suckers and water sprouts, especially where they are present below the bottom 1/2 of the tree, should also be removed as part of crown cleaning. Suckers and sprouts that add to the shape of the tree above 14 feet may remain in mature trees that may not have an optimum crown or shape.

Crown Thinning: Crown thinning, primarily for hardwoods, is the selective removal of branches to increase light penetration and air movement throughout the crown of a tree. The intent is to maintain or develop a tree's structure and form. To avoid unnecessary stress and prevent excessive production of epicormic sprouts, no more than one-quarter of the living crown should be removed at a time. If it is necessary to remove more, it should be done over successive years.

Branches with strong U-shaped angles of attachment should be retained. Branches with narrow, V-shaped angles of attachment often form included bark and should be removed. Included bark forms when two branches grow at sharply acute angles to one another, producing a wedge of inward-rolled bark between them. Included bark prevents strong attachment of branches, often causing a crack at the point below where the branches meet. Co-dominant stems that are approximately the same size and arise from the same position often form included bark. Removing some of the lateral branches from a co-dominant stem can reduce its growth enough to allow the other stem to become dominant.

Lateral branches should be no more than one-half to three-quarters of the diameter of the stem at the point of attachment. Avoid producing "lion's tails," tufts of branches and foliage at the ends of branches, caused by removing all inner lateral branches and foliage. Lion's tails can result in sun-scalding, abundant epicormic sprouts, and weak branch structure and breakage. Branches that rub or cross another branch should be removed.

Conifers that have branches in whorls and pyramidal crowns rarely need crown thinning except to restore a dominant leader. Occasionally, the leader of a tree may be damaged and multiple branches may become co-dominant. Select the strongest leader and remove competing branches to prevent the development of co-dominant stems.

Crown Raising: Crown raising is the practice of removing branches from the bottom of the crown of a tree to provide clearance for pedestrians, vehicles, buildings, lines of site, or to develop a clear stem for timber production. Also, removing lower branches on white pines can prevent blister rust. For street trees the minimum clearance is often specified by municipal ordinance. After pruning, the ratio of the living crown to total tree height should be at least two-thirds (e.g., a 12 m tree should have living branches on at least the upper 8 m).

On young trees "temporary" branches may be retained along the stem to encourage taper and protect trees from vandalism and sun scald. Less vigorous shoots should be selected as temporary branches and should be about 10 to 15 cm apart along the stem. They should be pruned annually to slow their growth and should be removed eventually.

Crown Reduction: Crown reduction pruning is most often used when a tree has grown too large for its permitted space. This method, sometimes called drop crotch pruning, is preferred to topping because it results in a more natural appearance, increases the time before pruning is needed again, and minimizes stress (see drop crotch cuts in the next section).

Crown reduction pruning, a method of last resort, often results in large pruning wounds to stems that may lead to decay. This method should never be used on a tree with a pyramidal growth form. A better long term solution is to remove the tree and replace it with a tree that will not grow beyond the available space.

Clearance Pruning: Clearance of houses and buildings should be such that branches are a minimum of 15 feet from rooftops. Trees and other vegetation shall be pruned to maintain a clear line of sight when approaching all traffic control devices and intersections.

Tools: Proper tools such as hand pruners, pole saws, handsaws, and chain saws shall be used for each cut. The cutting edge of each tool shall be positioned to obtain a proper pruning cut so it will not cut, rip, or harm adjacent bark areas. At no time shall any person working in trees for pruning purposes, wear spurs or any other footwear, which, in the opinion of the Parks and Recreation Director or Public Works Director, may injure the tree being pruned.

Site Appearance and Clean Up: Pruned limbs and branches temporarily placed in the right-of-way area shall be placed in such a manner as to eliminate any obstruction to motor vehicles and pedestrians. Site cleanup shall include removal of small twigs, chips, leaves and limbs from the street, curb, right-of-way, sidewalk, private lawns and driveways with the appropriate tools for the job. The site shall be returned to the same state it existed in prior to the pruning work. Under no circumstances shall any materials be allowed to lie in the right-of-way overnight.

Topping: It is an unacceptable practice to top any public tree in the city and it is not recommended for any private tree. Topping is the indiscriminate cutting back of tree branches to stubs or lateral branches that are not large enough to assume the terminal role of growth. Property owners often feel that their trees have become too large for their property and feel the need to reduce the tree’s height. Topping, however, is not a viable method of height reduction and will make a tree more hazardous in the long term by encouraging excessive growth and extensive decay.

Topping trees for utility clearance purposes should not be the standard operating procedure. Pruning trees for line clearance is necessary and understandable. However, proper pruning cuts need to be made and only those limbs necessary for proper clearance should be

pruned. Trees located under utility lines that require excessive pruning or pruning needs beyond what is acceptable for proper pruning, should be considered for outright removal and replaced with a suitable tree species for under utility lines. Topping trees is not an acceptable method of pruning under any circumstances and should not be done to any tree or part of within city right-of-way, park, or open space.

Trees damaged by storms or other causes, or trees under utility lines or other obstructions where other pruning practices are not practical may be exempt from City Code Section 151.113 at the determination of the Director of Public Works, or SPUC Utilities Manager or delegate.

Pruning of Oaks: In an effort to minimize the spread of Oak Wilt (*Ceratocystis fagacearum*), Shakopee City Code Section 151.113 states that the pruning of Oak trees or collateral damage to Oak trees from adjacent tree removal shall be avoided from April 1st thru July 31st which is the most susceptible period of infection, except by written permission of city personnel. Trees damaged by storms or other causes during this time may be treated with a nontoxic wound dressing. Final pruning cuts should be made in dormant season to remove stub with wound dressing.

Treating Wounds: Tree sap, gums, and resins are the natural means by which trees combat invasion by pathogens. Although unsightly, sap flow from pruning wounds is not generally harmful; however, excessive "bleeding" can weaken trees.

When oaks or elms are wounded during a critical time of year (usually spring for oaks, or throughout the growing season for elms) -- either from storms, other unforeseen mechanical wounds, or from necessary branch removals -- some type of wound dressing should be applied to the wound. Do this immediately after the wound is created. In most other instances, wound dressings are unnecessary, and may even be detrimental. Wound dressings will not stop decay or cure infectious diseases. They may actually interfere with the protective benefits of tree gums and resins, and prevent wound surfaces from closing as quickly as they might under natural conditions. The only benefit of wound dressings is to prevent introduction of pathogens in the specific cases of Dutch elm disease and oak wilt.

Tree Removal Guidelines

General: There are many factors that contribute to transforming a tree from an asset to a liability. They include: disease, infestation, decay, and mechanical damage, which can cause a tree to be structurally unsound, and therefore unsafe. It is the guideline of the city to base tree removals on safety related criteria and liability. As specified in the City of Shakopee ordinances, the only persons who may authorize the planting or removal of a city tree is the Public Works Director or designee.

Any person who desires to remove any Tree on any parcel of land may be required to submit a Tree Preservation Plan to the city and must demonstrate that there are no feasible or prudent alternatives to removing any tree.

Control Areas: In accordance with state law, the City of Shakopee has designated the populated areas of the city as the areas where the diseased tree and shade tree pest program will be strictly enforced. The control area consists of the developed areas of the city including any scattered subdivisions.

In areas outside of the control areas, the diseased tree and shade tree pest program will be strictly enforced by the city only in those areas within ¼ mile of non-farm homesteads.

Public Trees: The city will remove trees located on public property which contain a shade tree disease or shade tree pest which cause the trees to die. The city will remove these trees as quickly as possible for trees that create hazards located on street boulevards and in city park areas. For trees that have died or fallen that do not create hazards in city open space areas will not be removed. Anyone finding a tree on public property which appears to be diseased or infested but which has not been marked for removal should report the tree to the city.

Private Trees: See City Code Section 130.15 for the removal of trees with a shade tree disease or shade tree pest from private property. See Appendix D for the Shade Tree Disease or Pest Inspection Form.

Reforestation: The city will, to the extent possible under the current budget and/or project plans, attempt to replace boulevard and park trees removed because of shade tree diseases or shade tree pests by planting new trees.

Stump Removal – Public Trees: The city or contractor hired by the city will remove stumps of public trees along right-of-way, parks, or other public open spaces. The city will not remove or grind out stumps for private trees, but rather this is the property owner's responsibility.

Shakopee Tree and Shrub Maintenance Standards

General: The following standards shall apply to trees and shrubs in city owned property such as right-of-way and park and open space. In addition, the standards shall apply to private property trees during a state of emergency declared by the Mayor or City Council.

Boulevard Trees and Public Lands: The City of Shakopee will maintain all boulevard trees and public trees so as to not cause a hazard by trimming branches, pruning, etc. Trees that create hazards are those that are blocking street signs, traffic control devices or street lighting or have low hanging branches that cause hazards to vehicles or trucks such as garbage trucks, snowplows, fire trucks, etc. The city will maintain and trim branches so that there is a minimum of a nine foot clearance over sidewalks and a fifteen foot clearance over streets and alleys.

Duties of Private Property Owners: Any trees and shrubs that are located on private property, but overhang public rights-of-way such as alleys, sidewalks, trails, or streets, shall be trimmed to the same standards above by the city or by the property owner as required by the city per City Code Section 90.05. In no case will the city trim private trees that are not overhanging onto right-of-way, park or other public property.

Storm Damage: Any public trees that are damaged by storms will be maintained by the city, including picking up any tree branches that were blown down. The city will, to the extent possible under the current budget, attempt to replace public trees removed because of storm damage.

Any private trees damaged or that have branches blown down due to a storm shall be maintained or disposed of by the property owner, unless the City Council or Mayor declares a state of emergency. In that case, the city will provide assistance in picking up and disposing of storm damaged trees and branches for a specific length of time as determined by the Public Works Director. In these instances, the following requirements should be adhered to:

a. The property owner should notify the city at least three days in advance of trees/branches needing pick up.

b. Large tree pieces must be cut to 6 feet in length or less.

c. Branches must be piled as follows:

    1. All stems at the same end.

    2. Stems pointing in the same direction as the flow of traffic.
    3. Laid on the ground parallel to the curb.

d. Trees and branches must be placed next to the curb, or edge of the street (not in the street and if possible, not on the sidewalk).

e. City crews will not enter private property to pick up trees or branches.

Unauthorized Removals: See City Code Section 151.113 for information on unauthorized removals.

Miscellaneous Maintenance Practices

Stump Removal: The stumps of all removed trees shall be ground to a depth of at least eight inches (8") below the surrounding ground level. The excess stump chips shall be removed, the hole filled with clean topsoil, and the site graded and seeded. Watering of newly established grass will then be the responsibility of the adjacent property owner. All costs associated with stump removal shall be borne by whoever bears the cost of tree removal.

Fertilization: The city does not, in general, fertilize boulevard trees. A resident who wishes to fertilize the boulevard tree(s) adjacent to their property shall request written permission from the city. The Department of Public Works has the authority to approve or deny a fertilization request. All fertilization shall adhere to the American National Standards Institute's *Standard Practices for Tree Care Operations – Fertilization (ANSI A 300 (Part 2)*.

Cabling and Bracing: Tree support systems are used to provide supplemental support to leaders, individual branches, and /or entire trees by limiting their movement. When a tree has a structural defect or condition that poses a high risk of failure, a supplemental support system can often reduce the risk. However, not all potential hazards can be mitigated by their installation and cabling and bracing will be prohibited in boulevards. It is essential that each tree be carefully examined for risk of failure by a qualified arborist to ensure that the system

will achieve its objective of providing added support, without increasing the risk of tree failure.

As a general rule, cables should be located above the crotch at a point approximately two-thirds (2/3) of the distance between the crotch and tops of the branch ends. Rust-resistant cables, thimbles and lags should be used and thimbles must be used in the eye splice in each end of the cable. Under no circumstances shall cable be wrapped around a branch. All cabling and bracing practices shall follow the American National Standards Institute's *Standard Practices for Tree Care Operations – Support Systems, Cabling, Bracing, and Guying (ANSI A300 (Part 3)*-2000) and the International Society of Arboriculture's companion publication *Best Management Practices – Tree Support Systems: Cabling, Bracing, and Guying* (2001).

Chemical Treatment: The city, in general, limits the use of pesticides, fungicides and herbicides on its public trees. Applications may be done for the control of specific diseases or insects with the proper timing and materials to obtain the desired level of control. Suitable precautions shall be taken to protect and warn the public chemical treatment is being done. All application practices shall conform to the appropriate State and Federal regulations.

A resident who wishes to apply chemical treatments to the boulevard tree(s) adjacent to their property shall request written permission from the city. The Department Public Works has the authority to approve or deny a chemical treatment application request. Residents applying for permission to apply chemical treatments must submit the following information: type of chemical, timing (weeks(s) to be applied), quantity to be used, application method, reason for chemical use and proof of a valid Minnesota Department of Agriculture Commercial Applicator License Number.

Gopher State One and Local Utilities

Upon issuance of a permit, a person planting an item shall have underground utilities located prior to digging or planting by calling Gopher State One at 651-454-0002 or online at www.gopherstateonecall.org. Proper marking of excavation sites prior to calling ensures that no resident, employee or utility are at risk from damage to unmarked utilities. Work within 18" of any underground utility requires hand digging to expose the facility and prevent unnecessary damage to utilities. Private utilities (i.e. irrigation, pet fences, private lighting etc.) located within the public right-of-way shall be marked by the adjacent property owner at their expense. The city cannot assume responsibility for any damage as a result of unmarked private utilities in the right-of-way.

References

American National Standards Institute. *American National Standards for Forestry Operations-Pruning, Repairing, Maintaining and Removing Trees, and Cutting Brush-Safety Requirements (*Z133.1-2000). International Society of Arboriculture, Champaign, IL.

American National Standards Institute. *American Standard for Nursery Stock*, (Z60.1-2014). American Nursery and Landscape Association, Washington D.C..

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Pruning)* (A300, Part 1-2001). National Arborist Association, Manchester, NH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Fertilization)* (A300, Part 2-1998). National Arborist Association, Manchester, NH.

American National Standards Institute. *American National Standards for Tree Care Operations-Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices (Support Systems a. Cabling, Bracing, and Guying* (A300, Part 3-2000). National Arborist Association, Manchester, NH.

City of New London, *Forestry Specifications Manual*. New London Tree Board, 2005. New London, WI. 28 pp.

Council of Tree and Landscape appraisers, 2000. *Guide for Plant Appraisal*. International Society of Arboriculture, Champaign, IL. 143 pp.

Smiley, E.T. and S. Lilly. 2001. *Best Management Practices Tree Support Systems: Cabling, Bracing and Guying.* International Society of Arboriculture, Champaign, IL. 30 pp.

Bedker, Peter J., O'Brien, Joseph G., and Mielke, Manfred M. *How to Prune Trees*. USDA Forest Service. Northeastern Area State and Private Forestry. NA-FR-01-95. 12 pp.

USDA Forest Service Northeastern Area. *Urban Tree Risk Management: A community Guide to Program Design and Implementation* (NA-TP-03-03). 1992 Folwell Avenue, St Paul, MN.

APPENDIX A – RECOMMENDED TREE SPECIES TO PLANT

The following are recommended tree species to be planted along boulevards and non-boulevards:

Hackberry	(*Celtis occidentalis*)
Thornless Honeylocust	(*Gleditisia triacanthos var. intermis*)
American Linden	(*Tilia americana var. Redmond*)
Freeman Maple	(*Acer x freemanii 'Jeffersred'*)
Norway Maple	(*Acer platanoides*)
Discovery Elm	(*Ulmus davidiana var. japonica*)
Patriot Elm	(*Ulmus x 'Patriot'*)
Northern Red Oak	(*Quercus rubra*)
White Oak	(*Quercus alba*)
Bur Oak	(*Quercus macrocarpa*)
Gingko (Male Only)	(*Ginkgo biloba*)
Kentucky Coffeetree	(Gymnocladus dioicus)
Northern Catalpa	(catalpa speciosa)
Autumn Splendor Buckeye	(Aesculus x arnoldiana 'autumn splendor')

The following are recommended tree species to be planted only in non-boulevard areas:

Northern Pin Oak	(*Quercus ellipsoidalis*)
Bitternut Hickory	(*Carya cordiformis*)
Shagbark Hickory	(*Carya ovata*)
Black Walnut	(*Juglans nigra*)
American Hornbeam	(Carpinus caroliniana)
American Mountain Ash	(Sorbus americana)
Black Cherry	(Prunus serotina)
River Birch	(Betula nigra)
Sugar Maple	(Acer saccharum)
Black Maple	(Acer nigrum)
Horse Chestnut	(Aesculus hippocastanum)
Butternut Tree	(Juglans cinerea)

The following are recommended tree species to be planted as visual barriers and non-boulevard areas:

Eastern white pine	(*Pinus strobes*)
Red Pine	(Pinus resinosa)
White spruce	(*Picea glauca*)
Balsam Fir	(Abies balsamea)
White Fir	(Abies concolor)
Fraser Fir	(Abies fraseri)
Douglas Fir	(Pseudotsuga menziesii)
White Cedar	(Thuja occidentalis)
Black Hills Spruce	(*Picea glauca var. densata*)
Eastern Red Cedar	(*Juniperus virginiana*)

American Larch	(Larix laricina)
European Larch	(Larix decidua)
Japanese Larch	(Larix kaempferi)
Ponderosa Pine	(Pinus ponderosa)
Scots Pine	(Pinus sylvestris)
Siberian Larch	(Larix sibirica)
Jack Pine	(Pinus banksiana)

The tree lists above are recommendations but are subject to change based on availability of trees from suppliers. Please contact the city regarding approved trees to be planted in conservation easements.

CALL GOPHER STATE ONE BEFORE YOU DIG
TO HAVE UNDERGROUND UTILITIES LOCATED

651-454-0002

Online at

www.gopherstateonecall.org

APPENDIX B - UNDESIRABLE SPECIES

Scientific Name	Common Name	Problem(s) or Limitation(s)
Acer negundo	Boxelder	Weak wooded, female attracts the Boxelder bug.
Acer saccharinum	Silver Maple	Weak wooded, susceptible to storm damage, aggressive root system
Alianthus altissima	Tree of Heaven	Weak wooded
Eleagnus angustifolia	Russian olive	Invasive
Populus alba	White Poplar	Roots block sewers, weak wooded, cotton type seeds
Populus deltoides	Cottonwood	Weak wooded, susceptible to storm damage, cotton type seeds
Populus nigra italicia	Lombardy Poplar	weak wooded
Rhamnus pseudacaia	Buckthorn	Invasive
Robina spp.	Black Locust	Shallow rooted, borers
Ulmus pumila	Siberian Elm	Weak wooded
Ulmus Americana	American Elm	Disease prone (Dutch Elm)
Fraxinus	Ash (All Species)	Disease prone (EAB)

APPENDIX C- RISK EVALUATION GUIDELINES
(Companion guide to the USDA Community Tree Risk Evaluation Form)

Risk evaluation guidelines are from the reference Urban Tree Risk Management: A community Guide to Program Design and Implementation.

PROBABILITY OF FAILURE: 1-4 points

1. Low: some minor defects present:
- Minor branch/ crown dieback
- Minor defects or wounds

2. Moderate: several moderate defects present
- Stem decay or cavity within safe shell limits: shell thickness > 1 inch of sound wood for each 6 inches of stem diameter
- Crack(s) without extensive decay
- Defect(s) affecting 30-40% of the tree's circumference
- Crown damage/breakage: hardwoods up to 50%; pines up to 30%
- Weak branch union: major branch or co-dominant stem has included bark
- Stem girdling roots: <40% tree's circumference with compressed wood
- Root damage: < 40% of roots damaged within the CRR

3. High: multiple or significant defects present:
- Stem decay or cavity at or exceeding shell safety limits: shell thickness < 1 inch of sound wood for each 6 inches of stem diameter
- Cracks, particularly those in contact with the soil or associated with other defects
- Defect(s) affecting > 40% of the tree's circumference
- Crown damage/breakage: hardwoods >50%; pines >30%
- Weak branch union with crack or decay
- Girdling roots with > 40% of tree's circumference with compressed wood
- Root damage: > 40% of roots damaged within the CRR.
- Leaning tree with recent root breakage or soil mounding, crack or extensive decay
- Dead tree: standing dead without other significant defects

4. Extremely High: multiple and significant defects present; visual obstruction of traffic signs/lights or intersections:
- Stem decay or cavity exceeding shell safety limits and severe crack
- Cracks: when a stem or branch is split in half
- Defect(s) affecting > 40% of the tree's circumference or CRR and extensive decay or crack(s)
- Weak branch union with crack and decay
- Leaning tree with recent root breakage or soil mounding and a crack or extensive decay - Dead branches: broken (hangers) or with a crack
- Dead trees: standing dead with other defects such as cracks, hangers, extensive decay, or major root damage
- Visual obstruction of traffic signs/lights or intersections
- Physical obstruction of pedestrian or vehicular traffic

SIZE OF DEFECTIVE PART (S): 1-3 points

1. Parts less than **4** inches in diameter
2. Parts from **4 to 20** inches in diameter
3. Parts **greater than 20** inches in diameter

PROBABILITY OF TARGET IMPACT: 1-3 points

1.**Occasional Use:**
- Low use roads and park trails; parking lots adjacent to low use areas; natural areas such as woods or riparian zones; transition areas with limited public use; industrial areas.

2.**Intermediate Use:**
- Moderate to low use school playgrounds, parks, and picnic areas; parking lots adjacent to moderate use areas; secondary roads (neighborhoods) and park trails within moderate to high use areas; and dispersed campgrounds.

3.**Frequent Use:**
- Emergency access routes, medical and emergency facilities and shelters, and handicap access areas; high use school playgrounds, parks, and picnic areas; bus stops; visitor centers, shelters, and park administrative buildings and residences; main thoroughfares and congested intersections in high use areas; parking lots adjacent to high use areas; interpretive signs, kiosks; scenic vistas; and campsites (particularly drive-in).

OTHER RISK FACTORS: 0-2 points

- This category can be used if professional judgment suggests the need to increase the risk rating.
- It is especially helpful to use when tree species growth characteristics become a factor in risk rating. For example, some tree species have growth patterns that make them more vulnerable to certain defects such as weak branch unions (silver maple) and branching shedding (beech).
- It can also be used if the tree is likely to fail before the next scheduled risk inspection.

Table 1. Defect Codes

Code	*Defect*
D	Decay
CR	CRack
Root	Root Problems
RSG	Stem Girdling
RS	Severed
RPD	Planting Depth (too deep)
RGC	Grade Change
RSB	Sidewalk Buckling
WBU	Weak Branch Union
CA	CAnker
PTA	Poor Tree Architecture
PTA:LT	Leaning Tree
PTA:TT	Topped Tree
EE	Excessive Epicormics
DEAD	DEAD tree, tops or branches
VO	Visible Obstruction
PO	Physical Obstruction

Table 2. Corrective Action(s) Codes

Prune	
PD	Deadwood
PW	Weakwood (defective part(s))
PC	for Clearance
PT	to Thin crown or reduce crown weight
PR	to Reduce crown height
Target	
TM	Move
TEV	Exclude Visitors from Target Area
CB	Cable/Bracing
CWT	Convert to Wildlife Tree
RT	Remove Tree
Monitor	Monitor regularly
NA	No Action Required

USDA COMMUNITY TREE RISK EVALUATION FORM
Example Form *

Location:_____ Date:_____ Inspector(s):_____

Tree #	Species	DBH	Location (Street Address)	Defect Code(s)	1 Probability of Failure	2 Size of Defective Part(s)	3 Probability of Target	4 Other Risk Factors (Optional)	Description of Other Risk Factors	Risk Rating (Sum of Columns 1-4)	Corrective Action Code(s)	Action Completed	
					1-4 pts	1-3 pts	1-3 pts	0-2 pts		3-12 pts		Date	Initials

* This is an *example* form adapted from various sources by the US Forest Service, Northeastern Area Hazard Tree Training Team. The US Forest Service assumes no responsibility for conclusions derived from the use of this form. Managers should construct their own forms, based on need and experience. Revised: 4/03

APPENDIX D - Shade Tree Disease or Pest Inspection Form

CITY OF SHAKOPEE
SHADE TREE DISEASE/SHADE TREE PEST
TREE INSPECTION FORM

DATE:_____ TREE INSPECTOR:_____

TREE TAG NUMBER
(PID#):_____

PROPERTY
ADDRESS:_____

The City Tree Inspector inspected _____trees within your property. Based on this inspection the following has been determined:

□ One or more trees within your property have been diagnosed as diseased, dying or containing a shade tree pest and are required to be removed within _____days of this notice according to Minnesota Department of Agriculture regulations and Section 130.15 of the City Code.

PLEASE FILL OUT AND RETURN THE ATTACHED POSTCARD WITHIN FIVE DAYS INDICATING HOW YOU WISH TO HANDLE THE REMOVAL OF YOUR TREE CONTAINING A SHADE TREE DISEASE/SHADE TREE PEST.

REMOVAL OF THE MARKED TREES WITHIN YOUR PROPERTY WILL COST _____.

PLEASE SEE THE ATTACHMENTS FOR PAYMENT OPTIONS AND ADDITIONAL INFORMATION.

□ Quantities of _____wood were found on your property. This situation is capable of harboring the beetles or insects that can infect other trees. This wood must be destroyed in a heating appliance, debarked or hauled for disposal 20 days following the date of this notification.

□ We have marked your boulevard tree for removal. The City of Shakopee will do the removal work at no cost to you.

□ Other:

_____
_____
_____

If you have any questions please call the City of Shakopee Public Works Department at (952) 233-9550.

APPENDIX E - Tree, Shrub and Bush Planting Permit Application

CITY OF SHAKOPEE

485 GORMAN STREET, SHAKOPEE, MN 55379
Phone (952) 233-9300 Fax (952) 233-3801
www.ShakopeeMN.gov

Tree, Shrub and Bush Permit Application

A permit is required to plant or place trees, shrubs or bushes in a city easement area or sight triangle or on city-owned or managed property

Site Address:_____

Applicant Name:_____

Address:_____

City:_____**State**:_____**Zip**:_____

Day Phone: (_____)_____**Cell Phone**: (_____)_____

Proposed Planting Location (Check Box):

☐ Right-of-way (Boulevard)
☐ Park and Open Space
☐ Conservation Easement
☐ Drainage & Utility Easement

Type of Species Planting (Check Box):

Species	Quantity	Size	(Scientific Name)
☐ Hackberry	_____	____	(*Celtis occidentalis*)
☐ Thornless Honeylocust	_____	____	(*Gleditisia triacanthosvar.intermis*)
☐ American Linden	_____	____	(*Tilia americana var. Redmond*)
☐ Freeman Maple	_____	____	(*Acer x freemanii 'Jeffersred'*)
☐ Discovery Elm	_____	____	(*Ulmus davidiana var. japonica*)
☐ Bur oak	_____	____	(*Quercus macrocarpa*)
☐ Red oak	_____	____	(*Quercus rubra*)
☐ Northern pin oak	_____	____	(*Quercus ellipsoidalis*)
☐ River birch	_____	____	(*Betula nigra*)
☐ Bitternut hickory	_____	____	(*Carya cordiformis*)
☐ Shagbark hickory	_____	____	(*Carya ovata*)
☐ Black walnut	_____	____	(*Juglans nigra*)
☐ Eastern white pine	_____	____	(*Pinus strobes*)
☐ White spruce	_____	____	(*Picea glauca*)
☐ Black Hills Spruce	_____	____	(*Picea glauca var. densata*)
☐ Eastern Red cedar	_____	____	(*Juniperus virginiana*)

☐ Other: Name and Quantity:_____

PLEASE FILL OUT BACKSIDE OF APPLICATION

ACKNOWLEDGEMENT OF OWNER

I hereby acknowledge the following:

a) **I have reviewed and understand the requirements of the Shakopee Tree, Shrub and Bush Planting and Placement Policy and Standards, the Shakopee Tree and Shrub Maintenance Standards, and the Shakopee Diseased Tree Removal Guideline.**

b) **I agree to install my permitted tree, shrub or bush in the approved location in accordance with these standards and policies.**

c) **I agree to indemnify, defend and hold the City of Shakopee harmless with respect to any injury or property damage caused by my work within the easement area or on city property in connection with this permit.**

d) **Pursuant to Section 90.16 of the City Code I understand that city staff may require that these items placed within an easement area be removed at my expense at any time, even these items that have been previously approved by the city and a permit has been issued. If I do not remove these items upon the request of the city or if an emergency situation exists, I understand that the city may remove these items for me and may charge me for any removal expenses that are incurred.**

e) **I also understand that if the items are required to be removed, the city is not required to compensate me for the costs of the items. The city is also not required to replace any of the items.**

_____ _____

Signature of Applicant **Date**

RESIDENTS MUST CONTACT GOPHER ONE STATE PRIOR TO DIGGING OR PLANTING TO HAVE UNDERGROUND UTILITIES LOCATED

651-454-0002 or online at www.gopherstateonecall.org

Office Use Only:

Public Works: Approve/Deny By:_____Date:_____

Natural Resources: Approve/Deny By:_____Date:_____

SPUC: Approve/Deny By:_____Date:_____

(SPUC Approval Necessary as Determined by Public Works or Natural Resources)

Installation Inspection By:_____Date:_____

GPS Data Collected (Circle): (Yes) (No)

GPS Coordinates Obtained (Circle): (Yes) (No)

Latitude:_____Longitude:_____