July 2013 version

ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at:
http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.
Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.
Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project title: CROW RIVER HEIGHTS WEST FUTURE ADDITIONS**

2. **Proposer: Backes Development, LLC**
   Contact person: Dennis (Buck) Backes
   Title: Developer
   Address: 11413 Ashbury Circle N.
   City, State, Zip: Champlin, MN 55316
   Phone: 612-369-7750
   Fax: 763-566-1525
   Email: dcbackes@gmail.com

3. **RGU: City of Hanover**
   Contact person: Cindy Nash
   Title: City Planner
   Address: 11250 5th Street NE
   City, State, Zip: Hanover, MN 55341
   Phone: 763-473-0569
   Fax: 763-497-1873
   Email: cnash@collaborative-planning.com

4. **Reason for EAW Preparation:** (check one)

Required:	Discretionary:
☐ EIS Scoping	☐ Citizen petition
X☐ Mandatory EAW	☐ RGU discretion
	☐ Proposer initiated

   If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
   4410.4300 Subpart 19B, Residential Development

5. **Project Location:**
   County: Wright
   City/Township: Hanover
   PLS Location (¼, ¼, Section, Township, Range): NE ¼ Section 34, TWP 120N, R 24W
   Watershed (81 major watershed scale): South Fork Crow River
   GPS Coordinates: 45.163671, -93.689999
   Tax Parcel Number: 108500341102

   At a minimum attach each of the following to the EAW:
   - County map showing the general location of the project;
   - U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and
   - Site plans showing all significant project and natural features. **(Attachments 1-3)**

6. **Project Description:**
   a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

The development of 159 single family detached homes on 72 acres in the City of Hanover. The project will be developed as a Planned Unit Development (PUD) allowing an average lot size of 11,968 square feet. The proposed lots are part of a revived development started in 1999.

   b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

The development of 159 single family detached homes on 72 acres in the City of Hanover. The Project is the revived development of a 274-residential single-family subdivision. In September of 1999 the City of Hanover submitted an EAW for West Crow River Heights Residential Development. In 1999, a negative declaration for an EIS was approved by the City. In 2000 a preliminary plat was approved and the developer completed 106 of the lots and graded most of the roads for the development before stopping construction in 2007. In 2018, a new developer (Backes Development LLC) is completing the project with some changes to the previously approved plans. The plan is altered due to new wetland setback and buffer ordinances and with the replacement of 77 previously approved detached town-homes with single family lots. The project will be developed as a Planned Unit Development (PUD) allowing an average lot size of 11,968 square feet. Several small wetland basins will be filled and mitigated by using on-site wetland replacement. Due to the lapse of time from the initial EAW the city ordered a new EAW for the uncompleted portion of the development, with the exception of 30 lots which were allowed to be developed in 2017. Disturbance of the site will be for grading the roads, installation of municipal water and sanitary sewer infrastructure, installation of stormwater infrastructure, and completion of pads for building sites. The project is anticipated to be developed in phases consisting of approximately 30 lots per phase for a total of 5 to 6 phases. With the current demand for single family homes, each phase could begin every year for a completion date of within 5 to 6 years.

   c. Project magnitude:

Total Project Acreage	71.98 acres
Linear project length	NA
Number and type of residential units	159 Single Family
Commercial building area (in square feet)	NA
Industrial building area (in square feet)	NA
Institutional building area (in square feet)	NA
Other uses – specify (in square feet)	NA
Structure height(s)	NA

   d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The project purpose is to complete a single-family subdivision for which construction had been previously commenced and then stopped. The project will meet the housing demands for the City of Hanover and the surrounding area.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes X No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

f. Is this project a subsequent stage of an earlier project? X Yes ☐ No
If yes, briefly describe the past development, timeline and any past environmental review.

In 1999, a negative declaration for an EIS was approved by the City of Hanover upon their review of the 1999 EAW for the West Crow River Heights Residential Development. The City of Hanover approved the original West Crow River Heights preliminary plat of 274 single family lots in 2000. In 2007 the developer had constructed 106 of the lots and graded most of the roads within the project area prior to stopping construction due to the slow-down in housing sales. In 2017, Backes Development, LLC proposed to complete the remaining lots. The city approved the development of 30 lots in 2017 with the condition of a new EAW submittal for the remaining 159 lots.

7. **Cover types:** Estimate the acreage of the site with each of the following cover types before and after development:

	Before	**After**		**Before**	**After**
Wetlands	6.1	5.6	Lawn/landscaping	0	45.4
Deep water/streams	0	0	Impervious surface	0	16.6
Wooded/forest	9.1	0.5	Stormwater Pond	1.2	3.3
Brush/Grassland	13.9	0.6	Previously Graded Area	29.6	0
Cropland	12.1	0			
			TOTAL	**72.0**	**72.0**

8. **Permits and approvals required:** List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Unit of government	Type of application	Status
US Corps of Engineers	Section 404 Wetland Impact	Obtain if needed
DNR Waters	Dewatering Permit	Obtain if needed
MPCA	NPDES Permit	To be obtained
MPCA	Sanitary Sewer Permit	To be obtained
MDH	Water Extension Permit	To be obtained
Wright SWCD-LGU	WCA Permit	To be obtained

City of Hanover	Plat Approval	To be obtained
City of Hanover	Rezoning	To be obtained
City of Hanover	Planned Unit Development	To be obtained
City of Hanover	Building Permit	To be obtained

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land use:

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

The majority of the site has been farmed and/or grazed in the past, prior to previous grading activity. Much of the site was graded in the early 2000's, and then that grading work was abandoned. There are wetlands and forested areas within the site. Adjacent lands are:

South: single family wooded lots, the project will connect the adjacent neighborhood via Jandel Ave, NE
North: single family homes with Beebe Lake Rd NE and Lake Wilhelm beyond
East: single family homes, part of the earlier development of Crow River Heights West and Crow River Heights East
West: farmed and/or grazed fields with woods to the south and a single family residential development to the north

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The City adopted a Comprehensive Plan on July 15, 2008. The plan includes a future land use map (amended July 2009) identifying this area as Neighborhood Residential. The Comprehensive Plan was amended in 2017 to change the number of dwelling units allowed per acre within the Neighborhood Residential land use category to be between 2 and 4 dwelling units per net developable acre. This is the same land use designated for the previous developed portion of Crow River Heights West. The developed land to the south is identified as Rural Preservation, 2.5 acre lots. (**Attachment 4, Land Use**)

The Comprehensive Plan also includes a park map and a trail map identifying future search areas and connections near the project site. A park search area is identified to the east of the site. The Park and Trail System Map was updated as part of the 2011 Park Dedication Fee Study that removes the park search for this area but shows a future trail connection to the north and a neighborhood link to the west. (**Attachment 5, park plan**)

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The site is zoned R-1A, Single Family Residential. The project will require the rezoning of the site for a Planned Unit Development (PUD) allowing an average lot size of 11,968 square feet. The project utilizes

the underlying R-1A zoning district in establishing development standards and to be in conformance to the previous approved lots. The minimum lot size in the R-1A is 12,000 square feet. PUD flexibility will be requested for lot area, (minimum lot size is 7,342), setbacks and length of a cul-de-sac.

The City adopted a Wetland Overlay District that provides sound management practices and mitigation as provided in the Wetland Conservation Act (WCA).

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The project is the revived construction of a previously approved and mostly developed subdivision. It is generally in conformance with the City's zoning and comprehensive plan. The proposed project incorporates the new wetland ordinance standards providing improved protection of wetlands than what was previously allowed.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The project continues to conform to the city's comprehensive plan and is compatible to the city's underlying R-1A district. It continues to follow the same development pattern that was used in the earlier stages of the development. The project has removed the previously approved 77 detached townhomes and converted them to single-family lots, which are more in line with the surrounding homes. Since the original development was approved in 2000 the city has adopted new wetland protection and buffer ordinances. The new ordinance requires a 30-foot vegetated buffer from the edge of wetlands which is incorporated into the proposed plans.

10. Geology, soils and topography/land forms:

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

A 1999 Geotechnical Exploration was conducted by GME Consultants for the previous Crow River Heights Housing Development. The exploration consisted of 20 borings, with borings 1-6 located within this EAW project area. (**Attachment 6, 1999 Geotechnical Report**). The report notes that based on the Minnesota of Natural Resource (DNR) Atlas for this area, the predominate soil types consist of Des Moines lobe clayey glacial drift underlain by Superior lobe clay till with buried sand and gravel deposits of variable thickness. Low lying, poorly drained areas have accumulated surficial deposits of alluvial silt and organics.

The past studies noted that there are no known geologic site hazards located within the project area and that the minimum depth to bedrock is at 50 feet with the average depth at over 100 feet. (**Attachment 7, Geology Map**)

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction

to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

The NRCS classifications for the project site consists of 5 soil types which are predominately Angus-Cordova and Angus -LeSueur soils. The soils include: (**Attachment 8, NRCS map**)

Glencoe clay loam, 0-1 percent slopes	(Map Unit Symbol 114)
Hamel-Glencoe complex, 0-2 percent slopes	(Map Unit Symbol 740)
Angus-Cordova complex, 0-5 percent slopes	(Map Unit Symbol 1094B)
Cordova loam, 0-2 percent slopes	(Map Unit Symbol 1156)
Angus-LeSueur complex, 1-5 percent slope	(Map Unit Symbol 1901B)

Based on the 6 borings from the 1999 Geotechnical exploration study within the EAW project area the borings logs noted mostly Brown and Gray Silty Sandy Clays. The borings went to a depth of 15 feet. Groundwater was encountered in two of the borings (1 & 4). Piezometers were installed in the borings and they were dry to elevations 931 to 970.6 feet. However, the piezometer reading in boring 1 noted groundwater at an elevation of 976.7 feet. This was determined to be perched water moving laterally through the site.

The site has rolling hills and generally slopes from west to east with scattered wetlands. The western elevation is at or around 992 feet sloping to 960 feet on the east. Portions of the site had been previously graded for the construction of roads that would serve this project and connect to adjoining roads. The topography of the site in relation to the proposed development does not appear to create any limitations to the project. The geotechnical exploration opinion was that houses may be supported on conventional spread footings. Standard erosion control measures will be used in accordance with the MPCA's best management practices incorporated in the NPDES permit that will be obtained.

The site grading is limited to only the portions of the site which have not been previously graded. Therefore, site grading will occur on approximately 42 acres with an estimated quantity of 250,000 cubic yards of soil excavation. The construction will be phased over a period of 5-6 years. Grading will be accomplished with conventional earth moving equipment such as scrapers, dozers, backhoes and compactors. The grading will be vegetated within the required time frame or sooner to minimize the risk of erosion. All graded surfaces that are constructed on 3:1 slopes will be required to have erosion control blankets placed to stabilize the slopes. All grading and erosion control measures will be completed in accordance with the requirements of the NPDES permit.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

11. Water resources:

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.
   i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired

Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

There are no protected DNR public waters within the site. Lake Wilhelm (DNR # 86-20P) is located 250 feet north of the site across County Road 34 (Beebe Lake Rd). A Crow River backwater basin is located 3,000 feet southeast of the site and identified by the DNR Public Water Inventory as Unnamed (86-24W). The National Hydrography Dataset showed two smaller Lake/Pond water features to the southeast and west of the site. (**Attachment 9, Water Resources Map**)

In April, 1999 a wetland delineation was conducted by Kjolhaug Environmental Services for the original project and was subsequently re-approved in October, 2005. On May 3, 2017 the wetlands were re-delineated by Kjolhaug Environmental Services for the subject site and 12 wetlands were delineated. The 12 wetlands are larger in size than the same wetlands delineated in 1999. The cause of the increased size was due to incidental impacts caused by the site preparation of the larger development. (**Attachment 10, Wetland Delineation & No-Loss Report**)

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

The project site lies above the Franconia-Ironton-Galesville Aquifer. The Franconia is not a significant source of water regionally, but the Ironton-Galesville (sandstone) may be an important source outside of the boundary of the Prairie du Chein-Jordan aquafer as noted in the Designation of Principal Water Supply Aquifers in Minnesota, US Geological Survey 1981. (**Attachment 11, Aquifers Map**)

Per the 1999 EAW it was noted that the minimum depth to groundwater is 0-3 feet with an average depth of 20-40 feet throughout the larger development site. As noted in the 1999 Geotechnical Exploration they encountered groundwater in six of the 20 borings, at depth of 2-14 feet. Piezometers were installed in the borings and they were dry to elevations 931 to 970.6 feet. However, the piezometer reading in boring 1 noted groundwater at an elevation of 976.7 feet. This was determined to be perched water moving laterally through the site.

The site is not within a MDH wellhead protection area and there are no known wells within the project site. Wells were identified in 1999 on the eastern (developed) side of the site and were capped as part of the development.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Only normal domestic sewage will be generated by this residential project. The sewage loading is estimated at 0.053 MGD for the ultimate development. The sewage from the development will be directed to the St. Michael Wastewater Treatment Facility. The plant has a current capacity of 2.5 MGD with a current flow of 0.971 MGD. The sewage treatment plant will have capacity to accept the sewage

from this project. The sewage will be collected by onsite sanitary sewer piping and will connect to existing pipe stubs adjacent to the site.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

N/A

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

N/A

ii. Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Since a portion of the site has been graded several stormwater ponds exist on the site. These ponds were designed to collect stormwater runoff and provide rate control and treatment. This project will utilize the existing ponds and expand them and provide additional ponds to provide additional treatment as required by the NPDES permit.

The ponds are required to provide the following:
- Rate control so that the runoff rates do not exceed 0.1 cubic feet per second per acre of drainage area for the 1, 10, 100 and the 100 year-10 day snowmelt rainfall events.
- Volume control to capture the one-inch runoff volume from the new impervious surfaces and provide infiltration / filtration
- Water quality to reduce the total suspended solids (TSS) by 85% and reduce the total phosphorus (TP) load by 55%.

Stormwater runoff from the project will be directed to stormwater treatment and retention ponds on site via storm sewer and overland flow prior to discharging off-site. While the quantity of storm water generated by the project is anticipated to increase, the proposed discharge rate for the site will not exceed the existing discharge rate.

The major downstream water body is the Crow River. Since the water will be pre-treated and discharge rates will be held to pre-development rates, this project is not anticipated to negatively affect downstream water bodies. Silt fencing and seeding plus any other required erosion control measures through the NPDES permit review will be utilized on the site.

The site erosion control plan will implement several BMP's starting with minimize disturbed areas, temporary mulch, erosion control blankets and re-vegetation within 14 days of completed construction activities. Silt fence will be utilized as perimeter control and will be maintained throughout the construction and will be removed when honesties have been completed and lawns established.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Soil borings had identified possible perched water in the project area. Dewatering may be necessary for construction. The contractor will obtain the required DNR permit if necessary.
The project will be served by city water service. Watermain stubs are available adjacent to the project site for water connections.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

The wetlands within the project area are mostly Type 1 small isolated basins with a couple of large basin along the eastern side and the northwest corner of the project area. The plan was designed to avoid wetlands where possible and preserve them throughout the site. The larger basins were fully preserved. Other basins will be fully or partially impacted to provide the necessary grading for the proposed road connectivity and building sites. It is anticipated that the construction impacts will require the fill and mitigation of 0.57 acres of wetland (24,901 sq ft). The impacted wetlands will be mitigated on-site.

Due to the small size and disconnect between the wetland basins there will be minimal impact to the host watershed. The smaller basins would provide little benefit within a built environment. The wetlands that will remain will be protected under the city and watershed wetland ordinances and buffer standards.

The final wetland locations have been reviewed and approved by the Technical Evaluation Panel (TEP). A meeting was held at the City on March 2, 2018 to discuss the wetland impacts. Representatives from the City, Kjolhaug, the TEP and the developer were in attendance. In the proposed plans it is assumed that the small isolated wetlands would ultimately be impacted by any surrounding development and will be mitigated. Larger wetland areas were preserved. The impacted wetlands will be mitigated on-site.

b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are

proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

There are no other surface water features except for the above noted wetlands. The surrounding surface waters, Lake Wilhelm and the Crow River backwater basin will be protected by an erosion control plan and an NPDES permit.

12. Contamination/Hazardous Materials/Wastes:

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

There are no known existing contamination or potential environmental hazards on or in close proximity to the project site.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

During the construction phase solid waste such as lumber, sheetrock and other typical debris will be collected and disposed of to a demolition/construction landfill. The site contains no existing buildings or other manufactured solid waste. The development of 159 homes will generate an estimated 1120 pounds of typical household solid waste per day. The City encourages recycling, which will reduce the amount of solid waste. The waste will be disposed of by contracted waste removal operations that provide home refuse collection services.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

During construction, hazardous materials such as fuels (small quantities stored above ground) and specific construction materials would be on site during construction and stored and handled in conformance with state and federal regulations to prevent accidental spill or release of hazardous materials. Builders and contractors are responsible for proper management of hazardous materials utilized during construction. The contractor would minimize and mitigate adverse effects from the generation and storage of hazardous wastes by recycling wastes that can be recycled, and by developing a spill prevention plan for the project.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal.

Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling. Upon completion of the project it is anticipated that no hazardous waste or materials will be produced.

Outside of the materials described above, the project is not anticipated to generate or require the storing, handling or disposal of hazardous wastes during construction or operation of the project.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features):

a. Describe fish and wildlife resources as well as habitats and vegetation on or near the site.

The northerly portion of the site is used for agriculture purposes with the majority of the remaining site is undisturbed. A wooded area in the southwestern portion and sporadic wetland basins. This land provides habitat for a variety of bird, mammal, reptile and amphibian species common to the area such as deer, fox, squirrels and turkeys.

The surrounding land uses consist of a developed residential neighborhood with sodded yards to the east and residential homes on 2-acre wooded lots to the south with agricultural fields to the west. Lake Wilhelm is located north of the site across County Road 34.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-____) and/or correspondence number (ERDB #,ES#) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

A Natural Heritage Data Review was conducted per the 1999 EAW review, ES# 990724. Based on that review there were 6 known occurrences of rare species or natural communities within an approximate 1-mile search area. The only specific comment received for an element that may have a potential impact by the project was regarding the Blanding turtle.

A new Natural Heritage Information System (NHIS) request was submitted for this EAW. On March 30, 2018 a response letter was received, ERDB 210880366. (**Attachment 12, 2018 NHIS letter**)

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

Based on the DNR review they identified the Blanding turtle as a rare feature that may be adversely affected by the project by direct fatality or habitat disturbance.

A tree survey was conducted on February 5th 2018. The survey identified 771 trees consisting of 21 different specimens. The most prominent specimens are Ash, Elm and Maple trees. Many of the trees will be removed for site grading, especially for the road connection to Jandel Ave, south of the site. The development will preserve the trees along the property lines to provide a natural buffer from the adjoining lots. (**Attachment 13, Tree Survey**)

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Per the DNR letter recommendations actions will be taken to minimize disturbance of the turtles. Measures include: avoid type 2 & 3 wetlands; implement wildlife friendly erosion control methods; distribute the fact sheet and flyer to contractors for easier identification and encourage contractors and home builders to report sightings of turtles and turtle habitat.

Preserved trees will be protected during the construction period to prevent impacts to the tree and root that could cause future damage to the trees.

14. Historic properties:

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

On January 10, 2018 an EAW database search for historic properties was requested from the State Historic Preservation Office (SHPO). On the same day we received a responding email from Jesse Kling stating that the results of the cultural resources database search found that no historic structures were identified in a search of the Minnesota Archaeological Inventory and Historic and Architectural Inventory for the search area requested. (**Attachment 14, SHPO letter**)

15. Visual:

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The site consists of agricultural land surrounded by single family development. Although Lake Wilhelm is 250 feet north of the project site it is across a paved road (Beebe Lake Road) and surrounded by existing homes. Scenic views of the lake will be very limited from the project site.

There are no anticipated visual effects from the project site as it will be a detached single-family project surrounded by other single-family homes. The project site is the continuous development of a larger development phased plan.

16. Air:

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

There will be no stationary source of air emissions.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Construction vehicles will create temporary exhaust emissions while grading the site. Construction activities will be conducted during daytime regulated hours and all vehicles will be to state and federal standards. The proposed project will generate an increase in carbon monoxide levels due to an increase in passenger vehicle and truck trips. The project will not require an indirect source permit. No baseline air quality monitoring or modeling is proposed and no measures to mitigate for the increase in vehicle related emissions are being considered.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Construction vehicles may create dust if the construction conditions are dry. Since a portion of the road system has already been graded this will minimize the construction time for the project. The sensitive receptors in the vicinity are the surrounding single-family homes. The homes to the south are buffered by woods to help in restricting dust entering their homes. Dust control measures will be utilized per the city permits.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Construction vehicles will generate temporary increases to the existing noise levels. Construction activities will be conducted during daytime regulated hours and all vehicles will be to state and federal standards. The noise generated will be no different than previous development activities and regulated by approved permits.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

A traffic study was prepared by Swing Traffic Solutions, LLC in February, 2018. The study, at that time, assumed a development with a total of 166 lots and is based upon the traffic generated by 166 lots. The current site plan shows 159 total lots. Swing Traffic Solutions has reviewed the study for any notable impacts from the reduction in proposed lots and determined that a revised traffic study is not necessary since the decrease in traffic volume is fairly insignificant and will only result in better traffic conditions. The following data from the traffic study is based upon a development of 166 lots.

The proposed development is occurring on undeveloped land, without existing parking. The development of the land will result in 166 single family homes with generally 2 to 3 car garages. The trip generation estimates are based on the Institute of Transportation Engineers Trip Generation Manual 10th Edition

Land Use Code 210 for Single Family Homes. The largest peak hour is the PM Peak, and the Table Below summarizes the AM, PM and Daily trip generation estimates. Transit is not available in the area.

Table 1
Trip Generation

Land Use	AM Peak Hour		PM Peak Hour		Daily Trips
	Enter	Exit	Enter	Exit	
Single Family Homes (166 Homes)	31 Trips	92 Trips	104 Trips	61 Trips	1,567 Trips
TOTAL	**123 Trips**		**165 Trips**		**1,567 Trips**

1. Per the data and methodologies in Trip Generation, 10th Edition, published by ITE.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. *If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW.* Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 *(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)* or a similar local guidance,

While the development of the remaining property associated with Crow River Heights West does not generate enough traffic to warrant a full traffic study, one has been completed and is included in the Appendices. The community of Hanover is a bedroom community with large proportion of traffic destined to the Twin Cities during the AM Peak, and from the Twin Cities during the PM peak. Labeaux Avenue NE (CSAH 19) is the primary route taken to destinations to the east. The analysis considered two design years 2025, (the year after build out), and 2040 (the design year consistent with current long- range planning). The analysis indicated that development of 166 single family homes would not result in a change in traffic operations in terms of Level of Service at any of the intersections studied. The study showed that all study area intersections will operate at acceptable Level of Service C or better in the year 2025. However, the analysis did identify that Labeaux Avenue NE (CSAH 19), with or without the project will operate with long queues during the peak hours in 2025 and 2040.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

While the project does not result in a change in operations, it suggested that Wright County give consideration to widening Labeaux Avenue NE or CSAH 19 from the existing three lane section to a four-lane section after 2025 to accommodate anticipate growth in background traffic. This improvement will reduce vehicle queuing throughout the community of Hanover. Results of the traffic operational are detailed in the traffic study. (**Attachment 15, Traffic Study**)

19. Cumulative potential effects: (Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

N/A

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

20. Other potential environmental effects: If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

N/A

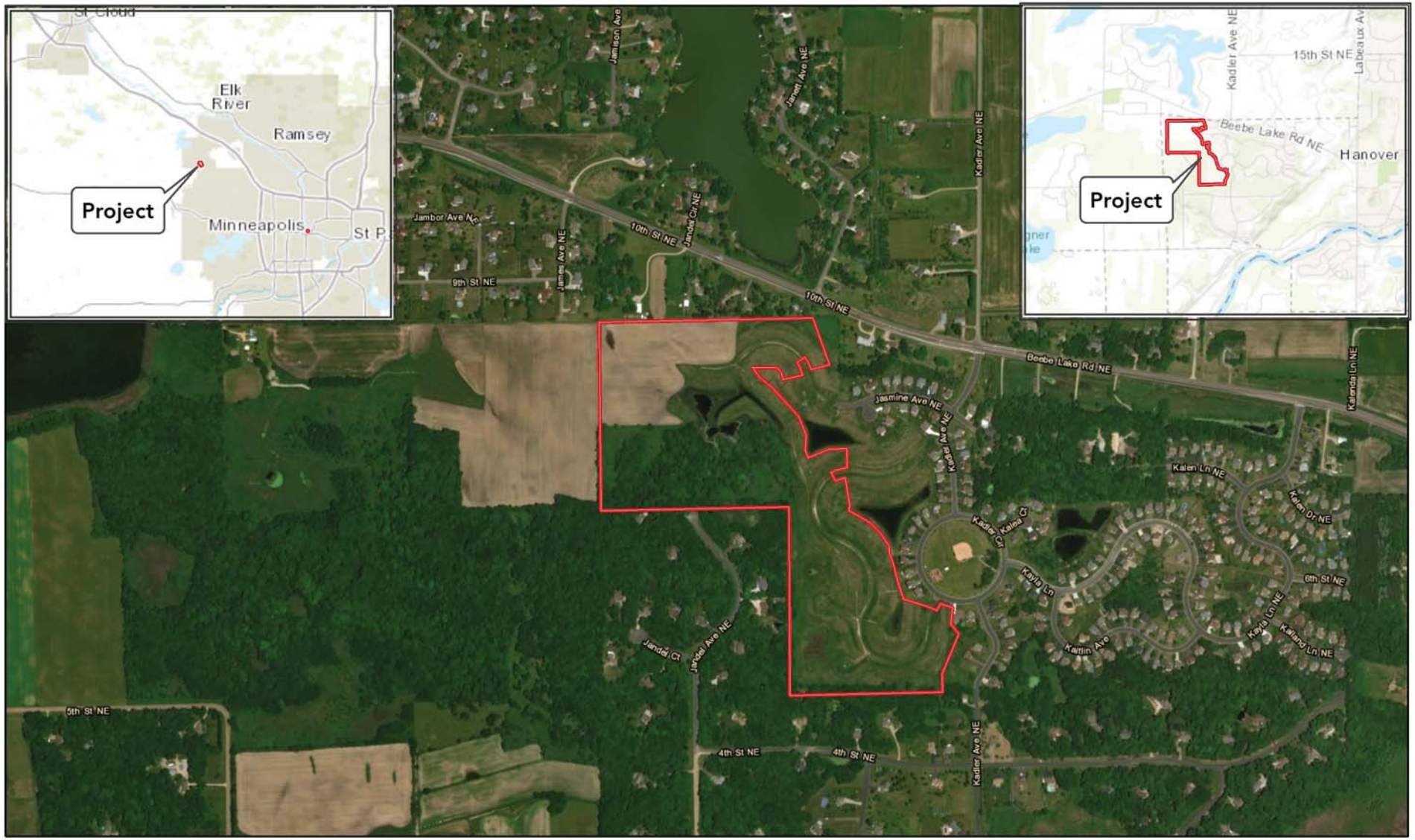
RGU CERTIFICATION. *(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature Cynthia M Wash Date 4/23/18

Title City Planner



This map was created using Loucks Geographic Information Systems (GIS), it is a compilation of information and data from various sources. This map is not a surveyed or legally recorded map and is intended to be used as a reference. Tom Loucks, Inc. is not responsible for any inaccuracies contained herein.

LOUCKS

Legend

Project Boundary

N

0 1,000

Scale In Feet

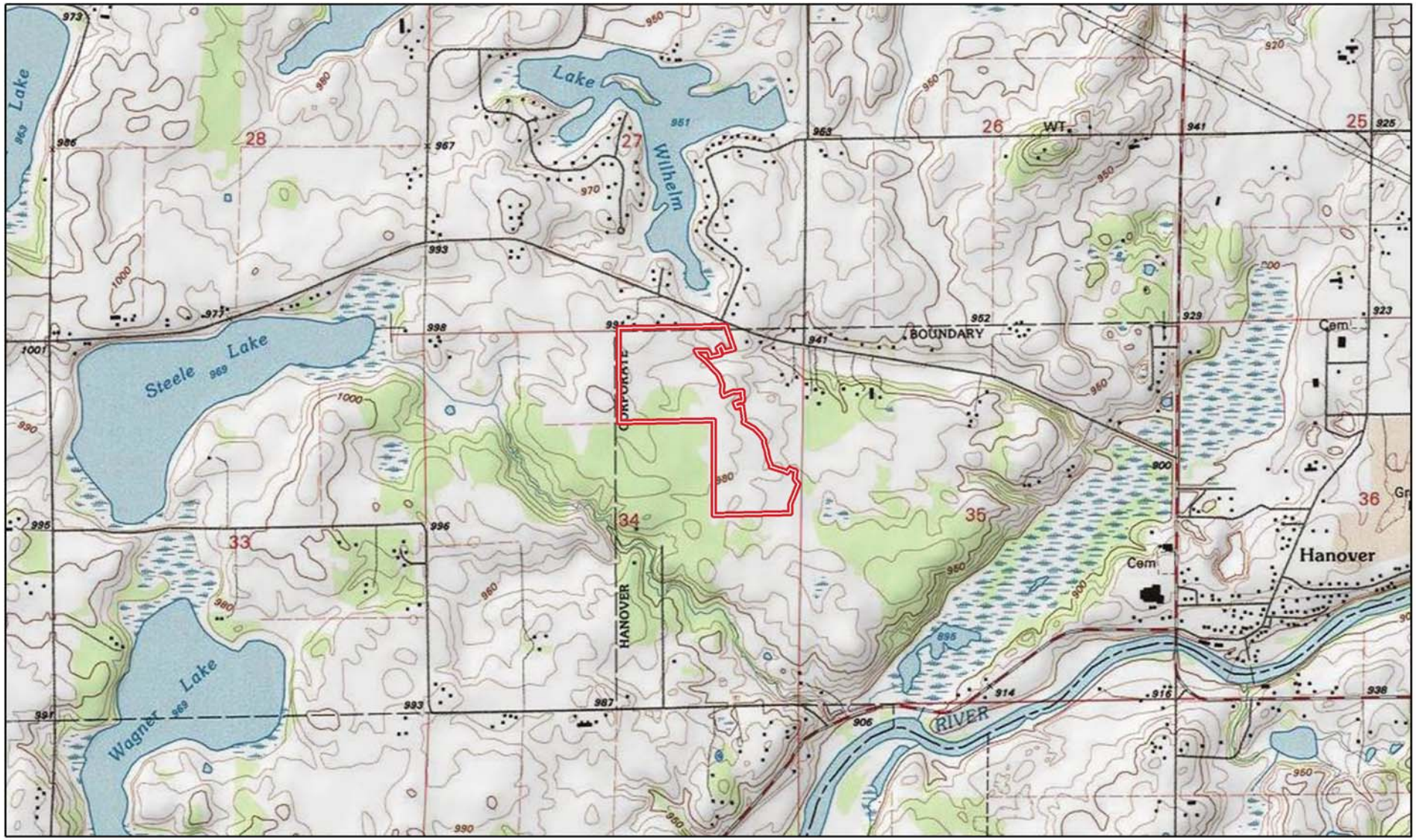
Crow River Heights

Hanover, MN

Site Location

Exhibit 1

ATTACHMENT 1



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LOUCKS

Legend

Project Boundary
Sec. 34, T. 120, R. 24

N

0 2,000
Scale In Feet

Crow River Heights

Hanover, MN

USGS Topography

Exhibit 2

ATTACHMENT 2

Attachment 3

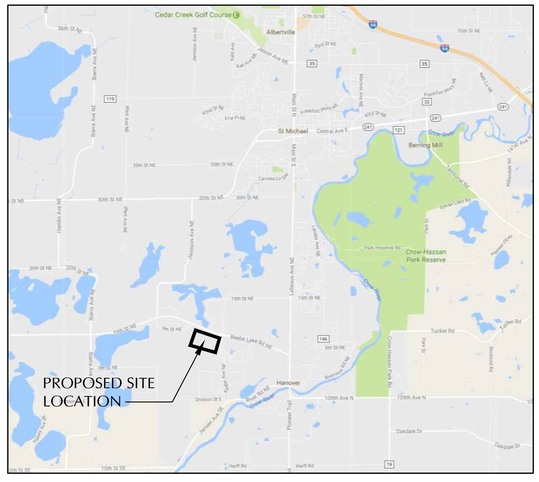
CROW RIVER HEIGHTS WEST

FUTURE ADDITIONS

HANOVER, MINNESOTA

PRELIMINARY PLANS FOR:
SITE GRADING, SANITARY SEWER, WATERMAIN,
STORM SEWER AND STREET CONSTRUCTION

VICINITY MAP



WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

DEVELOPER

BACKES DEVELOPMENT, LLC
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316

DENNIS BACKES
TEL: 612.369.7750
FAX: 612.566.1525

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

BENCHMARKS
TOP NUT HYDRANT AT END OF JASMINE CT
CUL-DE-SAC, Elevation = 975.48 feet (NGVD1929).

CROW RIVER HEIGHTS WEST FUTURE ADD.
HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

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ENVIRONMENTAL
7200 Hemlock Lane, Suite 300
Maple Grove, MN 55369
763.424.5505
www.loucksinc.com

CADD QUALIFICATION

SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

Licensed Professional Engineer - Zachary H. McLouth - PE
License Number 20383
Date

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

COVER SHEET
C0-1

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N

0 100 200
SCALE IN FEET

SURVEY LEGEND

Abbr.	Tree	Symbol	Symbol
AS	ASH	CATCH BASIN	STORM SEWER
AP	APPLE	STORM MANHOLE	SANITARY SEWER
BA	BASSWOOD	SANITARY MANHOLE	WATERMAIN
BI	BIRCH	WATER MANHOLE	SANITARY SEWER SERVICE
BO	BOXELDER	HYDRANT	WATER SERVICE
BU	BUCKEYE	GATE VALVE	CULVERT
BS	BUSH	POWER POLE	UNDERGROUND CABLE TV
CA	CATULPA	LIGHT POLE	UNDERGROUND ELECTRIC
CE	CEDAR	YARD LIGHT	UNDERGROUND FIBER OPTIC
CO	COTTONWOOD	GUY WIRE	UNDERGROUND GAS
DE	DEAD TREE	SIGN	UNDERGROUND TELEPHONE
EL	ELM	SPOT ELEVATION	UNDERGROUND UTILITY
FR	MISC FRUIT	A/C UNIT	OVERHEAD UTILITY
FI	FIR	CABLE TV PEDESTAL	UNDERGROUND TRAFFIC
HA	HACKBERRY	ELECTRIC TRANSFORMER	DRAIN TILE
HI	HICKORY	TELEPHONE PEDESTAL	FORCE MAIN
IR	IRONWOOD	UTILITY PEDESTAL	CHAIN LINK FENCE
LI	LINDEN	ELECTRIC MANHOLE	POST FENCE
LO	LOCUST	GAS VALVE	WOOD FENCE
MA	MAPLE	TELEPHONE MANHOLE	GUARDRAIL
OA	OAK	UTILITY MANHOLE	RETAINING WALL
PA	PALM	ELECTRIC METER	TRAFFIC SIGNAL
PI	PINE	GAS METER	CONCRETE CURB
PO	POPLAR	HAND HOLE	CONCRETE
SP	SPRUCE	ROOF DRAIN	BITUMINOUS
TR	TREE (GEN)	ELECTRIC OUTLET	PAVERS
WA	WALNUT	FIRE CONNECTION	CONTOUR
WI	WILLOW	MAILBOX	RAILROAD TRACKS
TC	TOP OF CURB	FLAG POLE	CONIFEROUS TREE
TW	TOP OF WALL	GUARDPOST	DECIDUOUS TREE
THSD	ELEV @ THRESHOLD	MONITORING WELL	WETLAND DELINATION KJOLHAUG ENV. 05/17/18
		POST INDICATOR VALVE	
		SOIL BORING	

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

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CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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CADD QUALIFICATION

SUBMITTAL/REVISIONS

04/20/18 CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

License No. Todd W. McLouth - PE 20383
Date

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

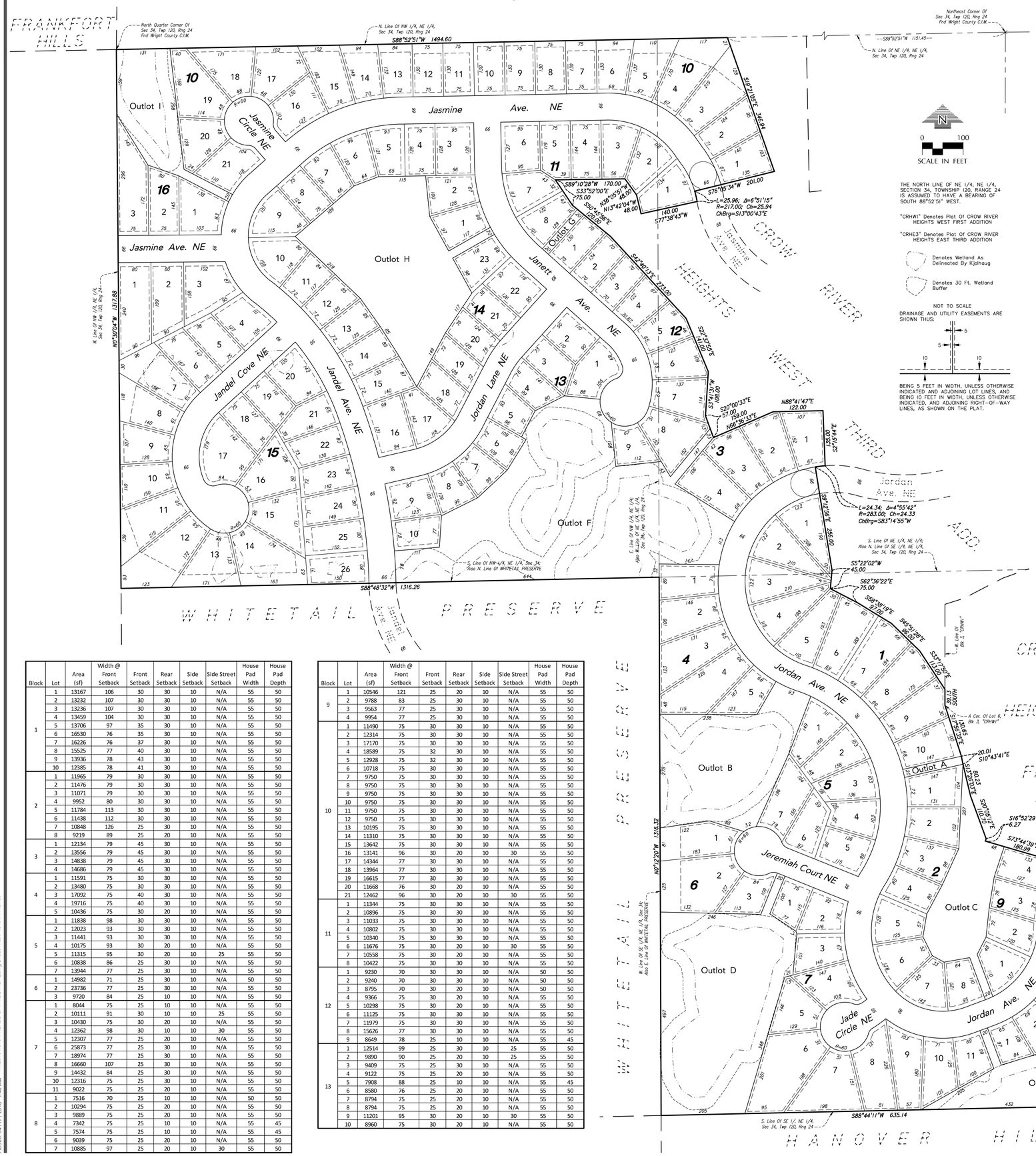
SHEET INDEX

EXISTING CONDITIONS

C1-0

Plotted: 04 /18 / 2018 8:22 AM W:\2016\16101A\CADD DATA\CIVIL_dwg Sheet Files\C1-1 EXISTING CONDITIONS

Preliminary Plat: CROW RIVER HEIGHTS WEST FUTURE ADDITIONS



PRELIMINARY PLAT GENERAL NOTES

LEGAL DESCRIPTION:

Those parts of the Northeast Quarter of the Northeast Quarter, the Northwest Quarter of the Northeast Quarter, and the Southeast Quarter of the Northeast Quarter of Section 34, Township 120 North, Range 24 West, Wright County, Minnesota, lying westerly, northerly, southwesterly, westerly, southwesterly and westerly of the following described line:

Commencing at the Northeast corner of said Northeast Quarter; thence westerly, on an assumed bearing of South 88 degrees 52 minutes 51 seconds West, along the north line of said Northeast Quarter, a distance of 1151.45 feet to the point of beginning of the line to be described; thence South 19 degrees 21 minutes 05 seconds East a distance of 346.94 feet; thence South 76 degree 05 minutes 34 seconds West a distance of 201.00 feet; thence southerly 25.96 feet along a non-tangential curve concave to the west, said curve has a radius of 217.00 feet, a central angle of 6 degrees 51 minutes 15 seconds, and a chord that bears South 13 degrees 00 minutes 43 seconds East; thence South 77 degrees 38 minutes 43 seconds West, not tangent to said curve a distance of 140.00 feet; thence North 13 degrees 42 minutes 04 seconds West a distance of 48.00 feet; thence North 36 degrees 05 minutes 51 seconds West a distance of 48.00 feet; thence South 89 degrees 10 minutes 28 seconds West a distance of 170.00 feet; thence South 33 degrees 52 minutes 00 seconds East a distance of 75.00 feet; thence South 50 degrees 45 minutes 56 seconds East a distance of 120.00 feet; thence South 42 degrees 40 minutes 13 seconds East a distance of 273.00 feet; thence South 22 degrees 37 minutes 55 seconds East a distance of 141.00 feet; thence South 3 degrees 41 minutes 31 seconds West a distance of 108.00 feet; thence South 20 degrees 00 minutes 33 seconds East a distance of 57.00 feet; thence North 66 degrees 36 minutes 33 seconds East a distance of 159.00 feet; thence North 88 degrees 41 minutes 47 seconds East a distance of 122.00 feet; thence South 2 degrees 15 minutes 44 seconds East a distance of 135.00 feet; thence westerly 24.34 feet along a non-tangential curve concave to the south, said curve has a radius of 283.00 feet, a central angle of 4 degrees 55 minutes 42 seconds, and a chord that bears South 83 degrees 14 minutes 55 seconds West; thence South 9 degrees 12 minutes 56 seconds East, not tangent to said curve a distance of 256.00 feet; thence South 5 degrees 22 minutes 02 seconds West a distance of 45.00 feet; thence South 62 degrees 36 minutes 22 seconds East a distance of 75.00 feet; thence South 58 degrees 38 minutes 19 seconds East a distance of 97.00 feet; thence South 45 degrees 51 minutes 28 seconds East a distance of 96.00 feet; thence South 33 degrees 17 minutes 50 seconds East a distance of 113.00 feet to the west line of Block 3, CROW RIVER HEIGHTS WEST FIRST ADDITION, Wright County, Minnesota; thence on a bearing of SOUTH, a distance of 39.13 feet to a corner of Lot 6, said Block 3; thence southeasterly, northeasterly, easterly, southerly and southeasterly, along the southwesterly boundary of said CROW RIVER HEIGHTS WEST FIRST ADDITION, a distance of 945.55 feet to the most southerly corner of Lot 1, Block 5, said CROW RIVER HEIGHTS WEST FIRST ADDITION, which corner is also on the west line of Block 4, CROW RIVER HEIGHTS EAST THIRD ADDITION, said Wright County; thence southwesterly and southerly, along the westerly line of said CROW RIVER HEIGHTS EAST THIRD ADDITION, and said line extended, a distance of 428.09 feet, to the south line of said Southeast Quarter of the Northeast Quarter and there terminating.

SURVEYOR:
Loucks
7200 Hemlock Lane, Suite 300
Maple Grove, MN 55330
612-369-7750

OWNER/DEVELOPER:
Backes Development, LLC
11413 Ashbury Circle N.
Champlin, MN 55316
612-369-7750

DATE OF PREPARATION:
April 2018

BENCHMARK:
Top nut of hydrant located in cul-de-sac of Jasmine Court as shown on Sheet 2 of 3.
Elev. = 975.48 (NAVD 88)

EXISTING ZONING:
Zone: R1A

PROPOSED ZONING:
Zone: R1A with PUD Overlay

FLOOD ZONE DESIGNATION:
This property is contained in an unprinted Flood Insurance Rate Map (no special flood hazard areas).

AREAS:

Proposed Lots =	1,902,756 SF	or 43.68 Acres
Proposed Outlot A =	2,938 SF	or 0.07 Acres
Proposed Outlot B =	87,377 SF	or 2.00 Acres
Proposed Outlot C =	45,233 SF	or 1.04 Acres
Proposed Outlot D =	137,323 SF	or 3.15 Acres
Proposed Outlot E =	68,170 SF	or 1.56 Acres
Proposed Outlot F =	210,356 SF	or 4.83 Acres
Proposed Outlot G =	2,594 SF	or 0.06 Acres
Proposed Outlot H =	113,041 SF	or 2.60 Acres
Proposed Outlot I =	40,859 SF	or 0.94 Acres
Proposed R.O.W. =	524,799 SF	or 12.05 Acres
Total Property =	3,135,448 SF	or 71.98 Aces

PROPOSED BUILDING SETBACKS:

Front	=	25 - 45 Feet Minimum, Varies
Side (Corner)	=	25/30 Feet Minimum, Varies
Side (Interior)	=	10 Feet
Rear	=	10/20/30 Feet Minimum, Varies

PROPOSED LOT DATA:
No. Lots = 159
Minimum Lot Size = 7,342 SF
Average Lot Size = 11,968 SF

WETLANDS:
Wetland Area = 267,156 SF or 6.13 Acres

Block	Lot	Area (sf)	Width @ Front Setback	Front Setback	Rear Setback	Side Setback	Side Street Setback	House Pad Width	House Pad Depth
1	1	13167	106	30	30	10	N/A	55	50
	2	13232	107	30	30	10	N/A	55	50
	3	13236	107	30	30	10	N/A	55	50
	4	13459	104	30	30	10	N/A	55	50
	5	13706	97	35	30	10	N/A	55	50
	6	16530	76	35	30	10	N/A	55	50
	7	16226	76	37	30	10	N/A	55	50
	8	15525	77	40	30	10	N/A	55	50
	9	13936	78	43	30	10	N/A	55	50
	10	12385	78	41	30	10	N/A	55	50
2	1	11965	79	30	30	10	N/A	55	50
	2	11476	79	30	30	10	N/A	55	50
	3	11071	79	30	30	10	N/A	55	50
	4	9952	80	30	30	10	N/A	55	50
	5	11784	113	30	30	10	N/A	55	50
	6	11438	112	30	30	10	N/A	55	50
	7	10848	126	25	30	10	N/A	55	50
	8	9219	89	25	20	10	N/A	55	50
3	1	12134	79	45	30	10	N/A	55	50
	2	13556	79	45	30	10	N/A	55	50
	3	14838	79	45	30	10	N/A	55	50
	4	14686	79	45	30	10	N/A	55	50
4	1	11591	75	30	30	10	N/A	55	50
	2	13480	75	30	30	10	N/A	55	50
	3	17092	75	40	30	10	N/A	55	50
	4	19716	75	40	30	10	N/A	55	50
	5	10436	75	30	20	10	N/A	55	50
5	1	11838	98	30	30	10	N/A	55	50
	2	12023	93	30	30	10	N/A	55	50
	3	11441	93	30	30	10	N/A	55	50
	4	10175	93	30	20	10	N/A	55	50
	5	11315	95	30	20	10	25	55	50
	6	10838	86	25	30	10	N/A	55	50
	7	13944	77	25	30	10	N/A	55	50
6	1	14982	71	25	30	10	N/A	50	50
	2	23736	77	25	30	10	N/A	55	50
	3	9720	84	25	10	10	N/A	55	50
7	1	8044	75	25	10	10	N/A	55	50
	2	10111	91	30	10	10	25	55	50
	3	10430	75	30	20	10	N/A	55	50
	4	12362	98	30	10	10	30	55	50
	5	12307	77	25	20	10	N/A	55	50
	6	25873	77	25	30	10	N/A	55	50
	7	18974	77	25	30	10	N/A	55	50
	8	16660	107	25	30	10	N/A	55	50
	9	14432	84	25	30	10	N/A	55	50
	10	12316	75	25	30	10	N/A	55	50
	11	9022	75	25	20	10	N/A	55	50
8	1	7516	70	25	10	10	N/A	50	50
	2	10294	75	25	20	10	N/A	55	50
	3	9889	75	25	20	10	N/A	55	50
	4	7342	75	25	10	10	N/A	55	45
	5	7574	75	25	10	10	N/A	55	45
	6	9039	75	25	20	10	N/A	55	50
	7	10885	97	25	20	10	30	55	50

Block	Lot	Area (sf)	Width @ Front Setback	Front Setback	Rear Setback	Side Setback	Side Street Setback	House Pad Width	House Pad Depth
9	1	10546	121	25	20	10	N/A	55	50
	2	9788	83	25	30	10	N/A	55	50
	3	9563	77	25	30	10	N/A	55	50
	4	9954	77	25	30	10	N/A	55	50
10	1	11490	75	30	30	10	N/A	55	50
	2	12314	75	30	30	10	N/A	55	50
	3	17170	75	30	30	10	N/A	55	50
	4	18589	75	32	30	10	N/A	55	50
	5	12928	75	32	30	10	N/A	55	50
	6	10718	75	30	30	10	N/A	55	50
	7	9750	75	30	30	10	N/A	55	50
	8	9750	75	30	30	10	N/A	55	50
	9	9750	75	30	30	10	N/A	55	50
	10	9750	75	30	30	10	N/A	55	50
	11	9750	75	30	30	10	N/A	55	50
	12	9750	75	30	30	10	N/A	55	50
	13	10195	75	30	30	10	N/A	55	50
	14	11310	75	30	30	10	N/A	55	50
	15	13642	75	30	30	10	N/A	55	50
	16	13141	96	30	20	10	30	55	50
	17	14344	77	30	30	10	N/A	55	50
	18	13964	77	30	30	10	N/A	55	50
	19	16615	77	30	30	10	N/A	55	50
	20	11668	76	30	20	10	N/A	55	50
	21	12462	96	30	20	10	30	55	50
11	1	11344	75	30	30	10	N/A	55	50
	2	10896	75	30	30	10	N/A	55	50
	3	11033	75	30	30	10	N/A	55	50
	4	10802	75	30	30	10	N/A	55	50
	5	10340	75	30	30	10	N/A	55	50
	6	11676	75	30	20	10	30	55	50
	7	10558	75	30	20	10	N/A	55	50
	8	10422	75	30	30	10	N/A	55	50
12	1	9230	70	30	30	10	N/A	50	50
	2	9240	70	30	30	10	N/A	50	50
	3	8795	70	30	20	10	N/A	50	50
	4	9366	75	30	20	10	N/A	55	50
	5	10298	75	30	20	10	N/A	55	50
	6	11125	75	30	30	10	N/A	55	50
	7	11979	75	30	30	10	N/A	55	50
	8	15626	77	30	30	10	N/A	55	50
	9	8649	78	25	10	10	N/A	55	45
13	1	12514	99	25	30	10	25	55	50
	2	9890	90	25	20	10	25	55	50
	3	9409	75	25	30	10	N/A	55	50
	4	9122	75	25	20	10	N/A	55	50
	5	7908	88	25	10	10	N/A	55	45
	6	8580	76	25	20	10	N/A	55	50
	7	8794	75	25	20	10	N/A	55	50
	8	8794	75	25	20	10	N/A	55	50
	9	11201	95	30	20	10	30	55	50
	10	8960	75	30	20	10	N/A	55	50

Block	Lot	Area (sf)	Width @ Front Setback	Front Setback	Rear Setback	Side Setback	Side Street Setback	House Pad Width	House Pad Depth
14	1	9909	75	30	30	10	N/A	55	50
	2	10171	75	30	30	10	N/A	55	50
	3	12118	95	30	30	10	30	55	50
	4	9563	75	30	30	10	N/A	55	50
	5	9928	87	30	20	10	N/A	55	50
	6	9757	88	30	20	10	N/A	55	50
	7	9778	86	30	20	10	N/A	55	50
	8	9315	75	30	20	10	N/A	55	50
	9	11959	136	30	20	10	N/A	55	50
	10	11855	137	30	20	10	N/A	55	50
	11	9130	75	30	20	10	N/A	55	50
	12	9406	75	30	20	10	N/A	55	50
	13	9734	75	30	20	10	N/A	55	50
	14	9951	75	30	30	10	N/A	55	50
	15	10611	75	30	30	10	N/A	55	50
	16	13145	95	25	30	10	30	55	50
	17	10807	106	25	30	10	N/A	55	50
	18	9446	75	25	20	10	N/A	55	50
	19	8773	70	25	20	10	N/A	55	50
	20	9199	75	25	20	10	N/A	55	50
	21	9531	75	25	30	10	N/A	55	50
	22	11622	95	25	30	10	30	55	50
	23	10080	75	30	20	10	N/A	55	50
15	1	17544	80	30	30	10	N/A	55	50
	2	14281	80	30	30	10	N/A	55	50
	3	15284	114	30	30	10	45	55	50
	4	11671	95	30	20	10	30	55	50
	5	10254	75	30	30	10	N/A	55	50
	6	11818	75	30	30	10	N/A	55	50
	7	16244	70	30	30	10	N/A	50	50
	8	13483	71	30	30	10	N/A	50	50
	9	11222	75	30	30	10	N/A	55	50
	10	11777	75	30	30	10	N/A	55	50
	11	16767	75	30	30	10	N/A	55	50
	12	21468	75	30	30	10	N/A	55	50
	13	14738	77	30	30	10	N/A	55	50
	14	19994	77	30	30	10	N/A	55	50
	15	14730	77	30	30	10	N/A	55	50
	16	15387	76	30	30	10	N/A	55	50
	17	16473	166	30	20	10	N/A	55	50
	18	10093	75	30	30	10	N/A	55	50
	19	9134	75	30	20	10	N/A	55	50
	20	12387	102	30	20	10	N/A	55	50
	21	10312	81	30	30	10	N/A	55	50
	22	10478	78	30	30	10	N/A	55	50
	23	10328	78	30	30	10	N/A	55	50
	24	11006	78	30	30	10	N/A	55	50
	25	11356	78	30	30	10	N/A	55	50
	26	11394	78	30	30	10	N/A	55	50
16	1	12712	106	30	20	10	40	55	50
	2	11877	75	30	30	10	N/A	55	50
	3	17538	75	30	30	10	N/A	55	50

CROW RIVER HEIGHTS WEST FUTURE ADD.
HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
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FAX (612) 566-1525

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SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

I hereby certify that this survey, plan 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.

Henry D. Nelson

License No. Henry D. Nelson - MN
Date 4/2/18

QUALITY CONTROL

Loucks Project No.	16-101.AA
Project Lead	HDN
Drawn By	SFM
Checked By	HDN
Field Crew	DP/GF

SHEET INDEX

PRELIMINARY PLAT
C1-2

Plotted: 04 /17 / 2018 9:40 AM W:\2016\16101\A\CADD DATA\SURVEY_dwg Sheet Files\P16101A-PrePlat

N

0 100 200

SCALE IN FEET

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
	WATER SERVICE	
	SANITARY SERVICE	
	HANDICAP PARKING	
	DIRECTION OF FLOW	
	SPOT ELEVATION	
	CONTOURS	
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
	FORCEMAIN	
	DRAINTILE	
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

WETLANDS

ID #	Area sf	Impact sf	Mitigation sf
1	10,783	0	0
2A	1,712	1,712	3,424
2B	1,600	1,600	3,200
2C	4,153	4,153	8,306
2D	21,766	0	0
2E	40,216	0	0
3	1,276	1,276	2,552
4	18,376	0	0
5	5,981	5,981	11,962
6	39,712	0	0
7	1,014	1,014	2,028
8	2,536	2,536	5,072
10	6,629	6,629	13,258
11	41,815	0	0
12	69,587	0	0

Total Wetland Area = 267,156 sf
Total Wetland Impact = 24,901 sf
Total Mitigation Area= 49,802 sf

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TOLL FREE: 1-800-252-1166

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CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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CHAMPLIN, MN 55316
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SUBMITTAL/REVISIONS

04/20/18 CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

License No. Date Timothy W. McElmouth - PE 20383

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

OVERALL SITE PLAN

C2-0

Plotted: 04 /19 / 2018 9:35 AM W:\2016\16101A\CADD DATA\CIVIL\ dwg Sheet Files\C2-1 SITE PLAN

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
	WATER SERVICE	
	SANITARY SERVICE	
	HANDICAP PARKING	
	DIRECTION OF FLOW	
	SPOT ELEVATION	
	CONTOURS	
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
	FORCEMAIN	
	DRAINTILE	
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

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CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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PRELIMINARY

License Number: Zachary W. McLouth - PE 20383
Date:

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

NORTH SITE PLAN

C2-1

Plotted: 04 /19 / 2018 9:35 AM W:\2016\16101A\CADD DATA\CIVIL\..dwg Sheet File\C2-1 SITE PLAN

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
W	WATER SERVICE	
S	SANITARY SERVICE	
	HANDICAP PARKING	
1.0%	DIRECTION OF FLOW	1.0%
959.8	SPOT ELEVATION	959.8
962	CONTOURS	962
	SANITARY SEWER	
	STORM SEWER	
W	WATERMAIN	
FM	FORCEMAIN	FM
DT	DRAINTILE	DT
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
X	FENCE LINE	X
TEL	UNDERGROUND TELE	
GAS	UNDERGROUND GAS	
OH	OVERHEAD UTILITY	

0 50 100
SCALE IN FEET

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PARK

OUTLOT B

EXISTING WETLAND HWL=961.0±

Kistler Circle

Outlot E

Jordan Ave NE

Jeremiah Court NE

Hallquist Lane NE

POND 4
NWL - 958.6
100 YR HWL 962.1
10YR TDSM HWL - 960.4
BOTTOM - 953.0
EOF - 962.5
LF - 965.1
LO - 963.5

EX. POND 5
NWL - 954.0
100 YR HWL 958.3
100 YR TDSM HWL - 957.6
BOTTOM - 950.0
EOF - 961.7
LF - 963.3
LO - 962.7

Outlot A

Outlot C

Outlot B

Outlot D

EXISTING WETLAND HWL=979.0

EXISTING WETLAND HWL=973.3

NG WETLAND WL=981.2

100 YR HWL - 963.4
100 YR TDSM HWL - 961.9
BOTTOM - 954.0
EOF - 964.0
LF - 966.4
LO - 965.0

Plotted: 04/19/2018 9:35 AM W:\2016\16101A\CADD DATA\CIVIL\ dwg Sheet Files\C2-1 SITE PLAN

CROW RIVER HEIGHTS WEST FUTURE ADD.
HANOVER, MN

BACKES COMPANIES
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CHAMPLIN, MN 55316
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PRELIMINARY

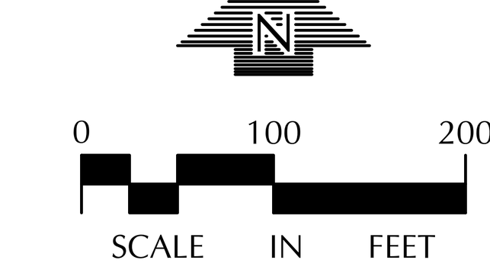
License No. Matthew J. Scott - PE
Date 20383

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZWH
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

SOUTH SITE PLAN
C2-2



EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
◎PIV	POST INDICATOR VALVE	◎PIV
	LIGHT POLE	
	POWER POLE	
	SIGN	
BM #3	BENCHMARK	
B-	SOIL BORINGS	B-
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
W	WATER SERVICE	
S	SANITARY SERVICE	
	HANDICAP PARKING	
1.0%	DIRECTION OF FLOW	1.0%
924.6 x	SPOT ELEVATION	924.6 x
924	CONTOURS	924
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
FM	FORCEMAIN	FM
DT	DRAINTILE	DT
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
X	FENCE LINE	X
TEL	UNDERGROUND TELE	
GAS	UNDERGROUND GAS	
OH	OVERHEAD UTILITY	

CROW RIVER HEIGHTS WEST FUTURE ADD.

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Todd W. McLouth - PE

License No. 20383

Date

PRELIMINARY

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Project Lead	TWM
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Checked By	TWM
Review Date	04/02/18

SHEET INDEX

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TOLL FREE: 1-800-252-1166

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OVERALL GRADING PLAN

C3-0

EXISTING	CIVIL LEGEND	PROPOSED
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	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
	WATER SERVICE	
	SANITARY SERVICE	
	HANDICAP PARKING	
	DIRECTION OF FLOW	
	SPOT ELEVATION	
	CONTOURS	
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
	FORCEMAIN	
	DRAINTILE	
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
TEL	UNDERGROUND TELE	
GAS	UNDERGROUND GAS	
OH	OVERHEAD UTILITY	

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PROFESSIONAL SIGNATURE

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PRELIMINARY

License No. 20383
Date

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

NORTH GRADING PLAN

C3-1

Plotted: 04/19/2018 9:36 AM W:\2016\16101A\CADD DATA\CIVIL dwg Sheet Files\C3-1 GRADING PLAN

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
	WATER SERVICE	
	SANITARY SERVICE	
	HANDICAP PARKING	
	DIRECTION OF FLOW	
	SPOT ELEVATION	
	CONTOURS	
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
	FORCEMAIN	
	DRAINTILE	
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

0 50 100

SCALE IN FEET

CALL BEFORE YOU DIG!

Gopher State One Call

TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

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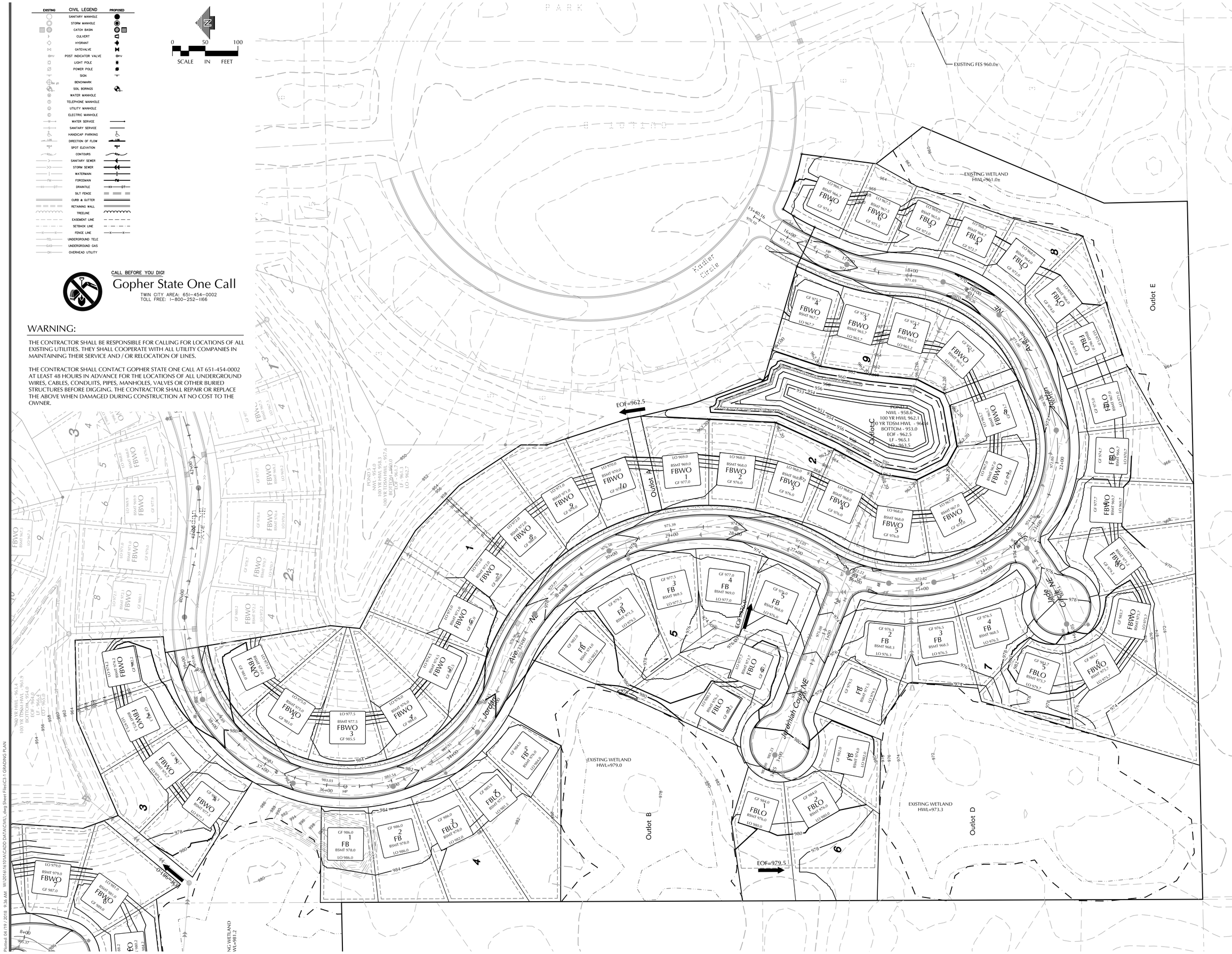

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CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

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04/20/18	CITY SUBMITTAL

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SHEET INDEX

SOUTH GRADING PLAN

C3-2

0 50 100
SCALE IN FEET

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
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	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
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	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

SITE PLAN LEGEND

- SILT FENCE
- BIOROLL
- INLET PROTECTION
- EXISTING DRAINAGE PATTERN
- PROPOSED DRAINAGE PATTERN
- ROCK CONSTRUCTION ENTRANCE
- WOODFIBER BLANKET

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SHEET INDEX

NORTH SWPPP
C3-3

Plotted: 04 /19 / 2018 9:37 AM W:\2016\16101A\CADD DATA\CIVIL\ dwg Sheet Files\C3 3 SWPPP

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	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
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	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

0 50 100

SCALE IN FEET

SITE PLAN LEGEND

- SF — SILT FENCE
- BIOROLL
- INLET PROTECTION
- EXISTING DRAINAGE PATTERN
- PROPOSED DRAINAGE PATTERN
- ROCK CONSTRUCTION ENTRANCE
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SILT FENCE (TYP.)
BIO-ROLLS (TYP.)
ROCK CONSTRUCTION ENTRANCE (TYP.)
EXISTING WETLAND HWL=961.0±
STAGE 2 SILT FENCE (TYP.)
EOF=962.5
EOF=979.5
INLET PROTECTION (TYP.)
EXISTING WETLAND HWL=979.0
EXISTING WETLAND HWL=973.3
NC WETLAND WL=981.2
EX. POND 5 NWL - 954.0 100 YR HWL - 963.4 100 YR TDSM HWL - 961.9 BOTTOM - 946.0 EOF - 962.0 LF - 965.6 LO - 965.7
POND 3 NWL - 950.6 100 YR HWL 962.1 100 YR TDSM HWL - 960.9 BOTTOM - 953.0 EOF - 962.5 LF - 965.1 LO - 963.5
Outlet A
Outlet B
Outlet D
Outlet E
Kistler Circle
Jordan Avenue
Jeremiah Court NE
Jeremiah Avenue NE
Cedar Avenue NE

PARK

CROW RIVER HEIGHTS WEST FUTURE ADD.

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Tyler W. Loucks South - PE
20383

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SHEET INDEX

SOUTH SWPPP

C3-4

Plotted: 04/19/2018 9:37 AM W:\2016\16101A\CADD DATA\CIVIL\ dwg Sheet Files\C3-3 SWPPP

SWPPP NOTES

1. PROJECT DESCRIPTION
THE NATURE OF THIS PROJECT WILL CONSIST OF CONSTRUCTING SINGLE FAMILY RESIDENTIAL LOTS AND HOMES, UTILITIES AND STREETS.

2. SEQUENCING OF MAJOR CONSTRUCTION ACTIVITIES ARE AS FOLLOWS:

1. INSTALL VEHICLE TRACKING BMP
2. INSTALL SILT FENCE AROUND SITE
3. INSTALL PROTECTIVE FENCE AROUND INFILTRATION AREAS
4. CLEAR AND GRUB SITE
5. STRIP AND STOCKPILE TOPSOIL
6. REMOVE PAVEMENTS AND UTILITIES
7. CONSTRUCT STORMWATER MANAGEMENT BASINS
8. INSTALL SILT FENCE AROUND BASINS
9. ROUGH GRADE SITE
10. IMPORT CLEAN FILL FOR REPLACEMENT AND BALANCE
11. INSTALL UTILITIES
12. INSTALL BUILDING FOUNDATIONS
13. INSTALL CURB AND GUTTER
14. INSTALL PAVEMENTS AND WALKS
15. INSTALL SMALL UTILITIES (GAS, PHONE, ELECTRIC, CABLE, ETC.)
16. FINAL GRADE SITE
17. REMOVE ACCUMULATED SEDIMENT FROM BASINS
18. CONSTRUCT INFILTRATION BASIN
19. SEED AND MULCH
20. WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS STABILIZED, REMOVE SILT FENCE AND RESEED ANY AREAS DISTURBED BY THE REMOVAL.

3. SITE DATA:
AREA OF DISTURBANCE: ±52.313 AC
PRE-CONSTRUCTION IMPERVIOUS AREA: ±0.0 AC
POST-CONSTRUCTION IMPERVIOUS AREA: ±16.6 AC

GENERAL SOIL TYPE: SEE GEOTECHNICAL REPORT IN SPECIFICATIONS

4. THE LOCATION OF AREAS NOT TO BE DISTURBED MUST BE IDENTIFIED WITH FLAGS, STAKES, SIGNS, SILT FENCE, ETC. BEFORE CONSTRUCTION BEGINS.

5. ALL DISTURBED GROUND LEFT INACTIVE FOR SEVEN (7) OR MORE DAYS SHALL BE STABILIZED BY SEEDING OR SODDING (ONLY AVAILABLE PRIOR TO SEPTEMBER 15) OR BY MULCHING OR COVERING OR OTHER EQUIVALENT CONTROL MEASURE. AT A RATE OF 1.5 TIMES STANDARD SEEDING FINAL STABILIZATION TO BE DONE PER LANDSCAPE PLAN, SEE SHEET L1-1.

6. ON SLOPES 3:1 OR GREATER MAINTAIN SHEET FLOW AND MINIMIZE RILLS AND/OR GULLIES, SLOPE LENGTHS CAN NOT BE GREATER THAN 75 FEET.
ALL 3:1 SLOPES TO BE STABILIZED WITH EROSION CONTROL BLANKET

7. ALL STORM DRAINS AND INLETS MUST BE PROTECTED UNTIL ALL SOURCES OF POTENTIAL DISCHARGE ARE STABILIZED.

8. TEMPORARY SOIL STOCKPILES MUST HAVE EFFECTIVE SEDIMENT CONTROL AND CAN NOT BE PLACED IN SURFACE WATERS OR STORM WATER CONVEYANCE SYSTEMS. TEMPORARY STOCKPILES WITHOUT SIGNIFICANT AMOUNT OF SILT, CLAY, OR ORGANIC COMPOUNDS ARE EXEMPT EX: CLEAN AGGREGATE STOCK PILES, DEMOLITION CONCRETE STOCKPILES, SAND STOCKPILES.

9. SEDIMENT LADEN WATER MUST BE DISCHARGED TO A SEDIMENTATION BASIN WHENEVER POSSIBLE. IF NOT POSSIBLE, IT MUST BE TREATED WITH THE APPROPRIATE BMP'S.

10. SOLID WASTE MUST BE DISPOSED OF PROPERLY AND MUST COMPLY WITH MPCA DISPOSAL REQUIREMENTS.

11. THE WATERSHED DISTRICT OR THE CITY MAY HAVE REQUIREMENTS FOR INSPECTIONS OR AS-BUILT DRAWINGS VERIFYING PROPER CONSTRUCTION OF THE BMPS.

12. THE OWNER WHO SIGNS THE NPDES PERMIT APPLICATION IS A PERMITTEE AND IS RESPONSIBLE FOR COMPLIANCE WITH ALL TERMS AND CONDITIONS OF THE PERMIT. THE OPERATOR (CONTRACTOR) WHO SIGNS THE NPDES PERMIT APPLICATION IS A PERMITTEE FOR PARTS II.B., PART II.C, PART II.B-F, PART V, PART IV AND APPLICABLE CONSTRUCTION ACTIVITY REQUIREMENTS FOUND IN APPENDIX A, PART C. OF THE NPDES PERMIT AND IS JOINTLY RESPONSIBLE WITH THE OWNER FOR COMPLIANCE WITH THOSE PORTIONS OF THE PERMIT.

13. TERMINATION OF COVERAGE-PERMITTEE(S) WISHING TO TERMINATE COVERAGE MUST SUBMIT A NOTICE OF TERMINATION (NOT) TO THE MPCA. ALL PERMITTEE(S) MUST SUBMIT A NOT WITHIN 30 DAYS AFTER ONE OR MORE OF THE FOLLOWING CONDITIONS HAVE BEEN MET:
   A. FINAL STABILIZATION, PER NPDES PERMIT PART IV.G. HAS BEEN ACHIEVED ON ALL PORTIONS OF THE SITE FOR WHICH THE PERMITTEE IS RESPONSIBLE.
   B. TRANSFER OF OWNERSHIP AS DESCRIBED IN THE PERMIT.

15. INSPECTIONS
   A. INITIAL INSPECTION FOLLOWING SILT FENCE INSTALLATION BY CITY REPRESENTATIVE IS REQUIRED.
   B. EXPOSED SOIL AREAS: ONCE EVERY 7 DAYS AND WITHIN 24 HOURS FOLLOWING A RAINFALL EVENT GREATER THAN OR EQUAL TO 0.5" IN 24 HOURS.
   C. STABILIZED AREAS: ONCE EVERY 30 DAYS
   D. FROZEN GROUND: AS SOON AS RUNOFF OCCURS OR PRIOR TO RESUMING CONSTRUCTION.
   E. INSPECTION AND MAINTENANCE RECORDS MUST BE RETAINED FOR 3 YEARS AFTER FILING OF THE NOTICE OF TERMINATION AND MUST INCLUDE: DATE AND TIME OF ACTION, NAME OF PERSON(S) CONDUCTING WORK, FINDING OF INSPECTIONS AND RECOMMENDATIONS FOR CORRECTIVE ACTION, DATE AND AMOUNT OF RAINFALL EVENTS GREATER THAN 0.5 INCHES IN A 24 HOUR PERIOD.

16. MINIMUM MAINTENANCE
   A. SILT FENCE TO BE REPAIRED, REPLACED, SUPPLEMENTED WHEN NONFUNCTIONAL, OR 1/3 FULL; WITHIN 24 HOURS
   B. SEDIMENT BASINS DRAINED AND SEDIMENT REMOVED WHEN REACHES 1/2 STORAGE VOLUME. REMOVAL MUST BE COMPLETE WITHIN 72 HOURS OF DISCOVERY.
   C. SEDIMENT REMOVED FROM SURFACE WATERS WITHIN (7)SEVEN DAYS
   D. CONSTRUCTION SITE EXITS INSPECTED, TRACKED SEDIMENT REMOVED WITH 24 HOURS.
   E. PROVIDE COPIES OF EROSION INSPECTION RESULTS TO CITY ENGINEER FOR ALL RAIN EVENTS GREATER THAN 0.5" OVER 24 HOURS

17. THE SWPPP, INCLUDING ALL CHANGES TO IT, AND INSPECTIONS AND MAINTENANCE RECORDS MUST BE KEPT AT THE SITE DURING CONSTRUCTION ACTIVITY BY THE PERMITTEE(S) WHO HAVE OPERATIONAL CONTROL OF THE SITE.

18. OWNER MUST KEEP RECORDS OF ALL PERMITS REQUIRED FOR THE PROJECT, THE SWPPP, ALL INSPECTIONS AND MAINTENANCE, PERMANENT OPERATION AND MAINTENANCE AGREEMENTS, AND REQUIRED CALCULATIONS FOR TEMPORARY AND PERMANENT STORM WATER MANAGEMENT SYSTEMS. THESE RECORDS MUST BE RETAINED FOR THREE YEARS AFTER FILING NPDES NOTICE OF TERMINATION.

19. SWPPP MUST BE AMENDED WHEN:
   A. THERE IS A CHANGE IN DESIGN, OPERATION, MAINTENANCE, WEATHER OR SEASONAL CONDITIONS THAT HAS A SIGNIFICANT EFFECT ON DISCHARGE
   B. INSPECTIONS INDICATE THAT THE SWPPP IS NOT EFFECTIVE AND DISCHARGE IS EXCEEDING WATER QUALITY STANDARDS.
   C. THE BMP'S IN THE SWPPP ARE NOT CONTROLLING POLLUTANTS IN DISCHARGES OR IS NOT CONSISTENT WITH THE TERMS AND CONDITIONS OF THE PERMIT.
   D. AT ANY TIME AFTER PERMIT COVERAGE IS EFFECTIVE, THE MPCA MAY DETERMINE THAT THE PROJECT'S STORMWATER DISCHARGES MAY CAUSE, HAVE REASONABLE POTENTIAL TO CAUSE, OR CONTRIBUTE TO NON-ATTAINMENT OF ANY APPLICABLE WATER QUALITY STANDARD, OR THAT THE SWPPP DOES NOT INCORPORATE THE APPLICABLE REQUIREMENTS IN PART III.A.8., (IMPAIRED WATERS AND TMDLS). IF A WATER QUALITY STANDARD CHANGES DURING THE TERM OF THIS PERMIT, THE MPCA WILL AKE A DETERMINATION AS TO WHETHER A MODIFICATION OF THE SWPPP IS NECESSARY TO ADDRESS THE NEW STANDARD. IF THE MPCA MAKES SUCH DETERMINATION(S) OR ANY OF THE DETERMINATIONS IN PARTS III.B.1.-3., THE MPCA WILL NOTIFY THE PERMITTEE(S) IN WRITING. IN RESPONSE, THE PERMITTEE(S) MUST AMEND THE SWPPP TO ADDRESS THE IDENTIFIED CONCERNS AND SUBMIT INFORMATION REQUESTED BY THE MPCA, WHICH MAY INCLUDE AN INDIVIDUAL PERMIT APPLICATION. IF THE MPCA'S WRITTEN NOTIFICATION REQUIRES A RESPONSE, FAILURE TO RESPOND WITHIN THE SPECIFIED TIMEFRAME CONSTITUTES A PERMIT VIOLATION.

20. CONCRETE WASHOUT AREA
   A. CONTRACTOR TO PROVIDE PREFABRICATED CONCRETE WASH-OUT CONTAINER WITH RAIN PROTECTION PER PLAN.
   B. CONCRETE WASH-OUT TO BE IDENTIFIED WITH SIGNAGE STATING "CONCRETE WASHOUT AREA DO NOT OVERFILL".
   C. CONCRETE WASHOUT WATER NEEDS TO BE PUMPED WITHIN 24 HOURS OF STANDING WATER IN WASHOUT AREA.

21. IN THE EVENT OF ENCOUNTERING A WELL OR SPRING DURING CONSTRUCTION CONTRACTOR TO CEASE CONSTRUCTION ACTIVITY AND NOTIFY ENGINEER.

22. PIPE OUTLETS MUST BE PROVIDED WITH TEMPORARY OR PERMANENT ENERGY DISSIPATION WITHIN 24 HOURS AFTER CONNECTION TO A SURFACE WATER.

23. TEMPORARY AND PERMANENT SOIL STABILIZATION
   A. TEMPORARY SOIL STABILIZATION MEASURES SHALL CONSIST OF SEEDING.
   B. PERMANENT SOIL STABILIZATION SHALL CONSIST OF HYDRO MULCH OR STRAW MULCH.
   C. 7 DAY STABILIZATION TIME FRAME IS REQUIRED FOR ALL EXPOSED SOILS THAT ARE DORMANT OR NOT BEING WORKED WITHIN THE 7 DAY WINDOW.

24. FINAL STABILIZATION
FINAL STABILIZATION REQUIRES THAT ALL SOIL DISTURBING ACTIVITIES HAVE BEEN COMPLETED AND THAT DISTURBED AREAS ARE STABILIZED BY A UNIFORM PERENNIAL VEGETATIVE COVER WITH 70% OF THE EXPECTED FINAL DENSITY, AND THAT ALL PERMANENT PAVEMENTS HAVE BEEN INSTALLED. ALL TEMPORARY BMP'S SHALL BE REMOVED, DITCHES STABILIZED, AND SEDIMENT SHALL BE REMOVED FROM PERMANENT CONVEYANCES AND SEDIMENTATION BASINS IN ORDER TO RETURN THE POND TO DESIGN CAPACITY.

24. TEMPORARY SEDIMENTATION BASINS
   A. THE TEMPORARY SEDIMENTATION BASINS SHALL BE CONSTRUCTED AND MADE OPERATIONAL PRIOR TO DISTURBANCE OF 10 OR MORE ACRES DRAINING TO A COMMON LOCATION.
   B. TEMPORARY SEDIMENTATION BASINS ARE REQUIRED PRIOR TO RUNOFF LEAVING THE CONSTRUCTION SITE OR ENTERING SURFACE WATERS WHEN 5 OR MORE ACRES OF DISTURBED SOILS DRAIN TO A COMMON LOCATION, SINCE THE SITE IS WITHIN ONE MILE OF IMPAIRED WATER BODY. THE BASIN MUST PROVIDE 3,600 CUBIC FEET OF STORAGE BELOW THE OUTLET PER ACRE DRAINED. IF HYDRAULIC CALCULATIONS ARE AVAILABLE, THE TEMPORARY SEDIMENTATION BASIN MUST PROVIDE A STORAGE VOLUME EQUIVALENT TO THE 2-YEAR, 24-HOUR STORM, BUT IN NO CASE LESS THAN 1800 CUBIC FEET PER ACRE DRAINED. THE TEMPORARY SEDIMENTATION BASIN MUST BE CONSTRUCTED AND MADE OPERATIONAL CONCURRENT WITH THE START OF SOIL DISTURBANCE UP GRADIENT OF THE POND. THE TEMPORARY SEDIMENTATION BASIN SHALL BE DESIGNED TO PREVENT SHORT CIRCUITING. THE OUTFALL SHALL BE DESIGNED TO REMOVE FLOATABLE DEBRIS, ALLOW FOR COMPLETE DRAWDOWN OF THE POND FOR MAINTENANCE ACTIVITIES, AND HAVE ENERGY DISSIPATION. THE EMERGENCY SPILLWAY SHALL BE STABILIZED.
   C. TEMPORARY SEDIMENTATION BASINS SHALL BE SITUATED OUTSIDE OF SURFACE WATERS AND ANY REQUIRED BUFFER ZONE, AND MUST BE DESIGNED TO AVOID DRAINING WETLANDS, UNLESS THE IMPACT IS IN COMPLIANCE WITH THE REQUIREMENTS OF THIS PERMIT.
   D. EXCESSIVE SEDIMENT-LADEN WATER THAT IS NOT PROPERLY FILTERED WILL NOT BE PERMITTED TO DISCHARGE FROM SITE.

25. DEWATERING AND BASIN DRAINING
   A. TURBID OR SEDIMENT-LADEN WATERS RELATED TO DEWATERING OR BASIN DRAINING SHALL BE DISCHARGED TO A TEMPORARY OR PERMANENT SEDIMENTATION BASIN ON THE PROJECT SITE UNLESS INFEASIBLE. THE TEMPORARY OR PERMANENT BASIN MAY DISCHARGE TO SURFACE WATERS IF THE BASIN WATER HAS BEEN VISUALLY CHECKED TO ENSURE ADEQUATE TREATMENT HAS BEEN OBTAINED IN THE BASIN AND THAT THE NUISANCE CONDITIONS WILL NOT RESULT FROM THE DISCHARGE. DISCHARGE POINTS SHALL BE ADEQUATELY PROTECTED FROM EROSION AND PROPER VELOCITY DISSIPATION PROVIDED.
   B. ALL WATER FROM DEWATERING OR BASIN-DRAINING ACTIVITIES MUST BE DISCHARGED IN A MANNER THAT DOES NOT CAUSE NUISANCE CONDITIONS, EROSION IN THE RECEIVING CHANNELS OR ON DOWN SLOPE PROPERTIES, OR INUNDATION IN WETLANDS CAUSING SIGNIFICANT ADVERSE IMPACTS TO THE WETLAND.
   C. IF FILTERS WITH BACKWASH WATERS ARE USED, THE BACKWASH WATER SHALL BE HAULED AWAY FOR DISPOSAL, RETURNED TO THE BEGINNING OF THE TREATMENT PROCESS, OR INCORPORATED INTO SITE IN A MANNER THAT DOES NOT CAUSE EROSION. BACKWASH WATER MAY BE DISCHARGED TO SANITARY SEWER IF PERMISSION IS GRANTED BY THE SANITARY SEWER AUTHORITY.

26. POLLUTION PREVENTION
   A. BUILDING PRODUCTS THAT HAVE THE POTENTIAL TO LEACH POLLUTANTS MUST BE UNDER COVER TO PREVENT DISCHARGE OR PROTECTED BY AN EFFECTIVE MEANS DESIGNED TO MINIMIZE CONTACT WITH STORMWATER.
   B. PESTICIDES, HERBICIDES, INSECTICIDES, FERTILIZERS, TREATMENT CHEMICALS, AND LANDSCAPE MATERIALS MUST BE UNDER COVER.
   C. HAZARDOUS MATERIALS AND TOXIC WASTE CONTAINER MUST BE PROVIDED TO PREVENT VANDALISM.
   D. SOLID WASTE MUST BE STORED, COLLECTED AND DISPOSED OF IN COMPLIANCE WITH MINN. R. CH 7035.
   E. PORTABLE TOILETS MUST BE POSITIONED SO THAT THEY ARE SECURE AND WILL NOT BE TIPPED OR KNOCKED OVER. SANITARY WASTE MUST BE DISPOSED OF PROPERLY IN ACCORDANCE WITH MINN. R. CH 7041.
   F. DISCHARGE OF SPILLED OR LEAKED CHEMICALS, INCLUDING FUEL, FROM ANY AREA WHERE CHEMICALS OR FUEL WILL BE LOADED OR UNLOADED SHALL BE PREVENTED USING DRIP PANS OR ABSORBENTS. SUPPLIES SHALL BE AVAILABLE AT ALL TIMES TO CLEAN UP DISCHARGED MATERIALS AND THAT AN APPROPRIATE DISPOSAL METHOD MUST BE AVAILABLE FOR RECOVERED SPILLED MATERIALS.

27. DESIGN CALCULATIONS
TEMPORARY & PERMANENT STORMWATER TREATMENT ARE DESIGNED TO MEET MPCA GENERAL & SPECIAL WATER REQUIREMENTS. CALCULATIONS ARE PART OF THE HYDROLOGY REPORT, WHICH IS TO BE CONSIDERED PART OF THE SWPPP DOCUMENTS. SEE HYDROLOGY REPORT FOR ADDITIONAL INFORMATION.

28. GENERAL STORMWATER DISCHARGE REQUIREMENTS
ALL REQUIREMENTS LISTED IN PART III OF THE PERMIT FOR DESIGN OF THE PERMANENT STORMWATER MANAGEMENT SYSTEM AND DISCHARGE HAVE BEEN INCLUDED IN THE PREPARATION OF THIS SWPPP. THESE INCLUDE BUT ARE NOT LIMITED TO:
   A. THE EXPECTED AMOUNT, FREQUENCY, INTENSITY, AND DURATION PRECIPITATION.
   B. THE NATURE OF STORMWATER RUNOFF AND RUN-ON AT THE SITE.
   C. PEAK FLOW RATES AND STORMWATER VOLUMES TO MINIMIZE EROSION AT OUTLETS AND DOWNSTREAM CHANNEL AND STREAM BANK EROSION.
   D. THE RANGE OF SOIL PARTICLE SIZES EXPECTED TO BE PRESENT ON THE SITE.

29. CONSTRUCTION OF FILTRATION BASINS
   A. NO HEAVY TRAFFIC ON FILTRATION AREAS. CONSTRUCTION TO BE DONE WITH MINIMAL COMPACTION TO FILTRATION AREAS. IF COMPACTION IS ENCOUNTERED, BASIN SOILS MUST BE REMOVED & RELAID.
   B. INFILTRATION SYSTEMS MUST NOT BE EXCAVATED TO FINAL GRADE UNTIL THE CONTRIBUTING DRAINAGE AREA HAD BEEN CONSTRUCTED AND FULLY STABILIZED UNLESS RIGOROUS EROSION PREVENTION AND SEDIMENT CONTROLS ARE PROVIDED(PART III.D.1.C.).
   C. WHEN AN INFILTRATION SYSTEM IS EXCAVATED TO FINAL GRADE (OR WITHIN THREE (3) FEET OF FINAL GRADE), THE PERMITTEE(S) MUST EMPLOY RIGOROUS EROSION PREVENTION AND SEDIMENT CONTROLS (E.G., DIVERSION BERMS) TO KEEP SEDIMENT AND RUNOFF COMPLETELY AWAY FROM THE INFILTRATION AREA. THE AREA MUST BE STAKED OFF AND MARKED SO THAT HEAVY CONSTRUCTION VEHICLES OR EQUIPMENT WILL NOT COMPACT THE SOIL IN THE PROPOSED INFILTRATION AREA.
   D. TO PREVENT CLOGGING OF THE INFILTRATION OR FILTRATION SYSTEM, THE PERMITTEE(S) MUST USE A PRETREATMENT DEVICE SUCH AS A VEGETATED FILTER STRIP, SMALL SEDIMENTATION BASIN, OR WATER QUALITY INLET (E.G., GRIT CHAMBER) TO SETTLE PARTICULATES BEFORE THE STORMWATER DISCHARGES INTO THE INFILTRATION OF FILTRATION SYSTEM.

30. POST CONSTRUCTION
THE WATER QUALITY VOLUME THAT MUST BE RETAINED ON SITE BY THE PROJECT'S PERMANENT STORMWATER MANAGEMENT SYSTEM DESCRIBED IN PART III.D. SHALL BE ONE (1) INCH OF RUNOFF FROM THE NEW IMPERVIOUS SURFACES CREATED BY THE PROJECT. SEE PART III.D.1. FOR MORE INFORMATION ON INFILTRATION DESIGN, PROHIBITIONS AND APPROPRIATE SITE CONDITIONS.

31. RESPONSIBILITIES
   A. THE OWNER MUST IDENTIFY A CONTRACTOR WHO WILL OVERSEE THE SWPPP IMPLEMENTATION AND THE PERSON RESPONSIBLE FOR INSPECTION AND MAINTENANCE:
   B. THE OWNER MUST IDENTIFY THE A PERSON WHO WILL BE RESPONSIBLE FOR LONG TERM OPERATIONS AND MAINTENANCE OF THE PERMANENT STORMWATER MANAGEMENT SYSTEM:

32. TRAINING REQEMENTS
THE PERMITTES(S) SHALL ENSURE THE FOLLOWING INDIVIDUALS IDENTIFIED IN THIS PART HAVE BEEN TRAINED IN ACCORDANCE WITH THIS PERMIT'S TRAINING REQUIREMENTS.
   A. WHO MUST BE TRAINED:
1. INDIVIDUAL(S) PREPARING THE SWPPP FOR THE PROJECT
2. INDIVIDUAL(S) OVERSEEING IMPLEMENTATION OF, REVISING, AND AMENDING THE SWWP AND INDIVIDUALS(S) PERFORMING INSPECTIONS AS REQUIRED IN PART IV.E. ONE OF THESE INDIVDUAL(S) MUST BE AVAILABLE FOR AN ONSITE INSPECTION WITHIN 72 HOURS UPON REQUEST BY THE MPCA.
3. INDIVIDUAL(S) PERFORMING OR SUPERVISING THE INSTALLATION, MAINTENANCE AND REPAIR OF BMPS. AT LEAST ONE INDIVIDUAL ON A PROJECT MUST BE TRAINED IN THE JOB DUTIES.
   B. TRAINING CONTENT:
1. THE CONTENT AND EXTENT OF TRAINING MUST BE COMMENSURATE WITH THE INDIVIDUAL'S JOB DUTIES AND RESPONSIBILITIES WITH REGARD TO ACTIVITIES COVERED UNDER THIS PERMIT FOR THE PROJECT. AT LEAST ONE INDIVIDUAL PRESENT ON THE PERMITTED PROJECT SITE (OR AVAILABLE TO THE PROJECT SITE IN 72 HOURS) MUST BE TRAINED IN THE JOB DUTIES DESCRIBED IN PART III.F.1.B. AND PARTIII.F.1.C.
   C. THE PERMITTEE(S) SHALL ENSURE THAT THE INDIVIDUALS ARE TRAINED BY LOCAL, STATE, FEDERAL AGENCIES, PROFESSIONAL OR OTHER ENTITIES WITH EXPERTISE IN EROSION PREVENTION, SEDIMENT CONTROL, PERMANENT STORMWATER MANAGEMENT AND THE MINNESOTA NPDES/SDS CONSTRUCTION STORMWATER PERMIT. AN UPDATE REFESHER-TRAINING MUST BE ATTENDED EVERY THREE (3) YEARS STARTING THREE (3) YEARS FROM THE ISSUANCE DATE OF THIS PERMIT.

LIST OF CONTACTS

TILE	CONTACT	COMPANY	PHONE NUMBER
OWNER	DENNIS BACKES	BACKES COMPANIES	612-369-7750
PROJECT MANAGER	TODD MCLOUTH	LOUCKS	763-496-6742
SWPPP DESIGNER	ZACH WEBBER	LOUCKS	763-496-6753
CONTRACTOR	TBD		
SITE MANAGER	TBD		

* MPCA 24HR. HAZARDOUS SPILL HOTLINE: 651-649-5457 OF 80420798

EROSION CONTROL NOTES

1. ALL STREETS IN AND ADJACENT TO THE PROJECT SHALL REMAIN CLEAN AND PASSABLE AT ALL TIMES.
2. A STABILIZED CONSTRUCTION ENTRANCE WILL BE PLACED AT ALL ENTRANCES THAT LEAD TO THE PROJECT SITE IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN AND THE APPROVED DETAILS.
3. SEDIMENT CONTROLS MUST BE IN PLACE AND APPROVED BY THE ENGINEER BEFORE ANY PHASE OF CONSTRUCTION CAN BEGIN.
4. INLET PROTECTION WILL BE INSTALLED AT ALL CATCH BASINS WITHIN THE PROJECT AREA PER STANDARD DETAILS UNTIL THE SITE IS STABILIZED.
5. PIPE OUTLETS MUST BE PROVIDED WITH TEMPORARY OR PERMANENT ENERGY DISSIPATION WITHIN 24 HOURS AFTER CONNECTION TO SURFACE WATER.
6. STABILIZATION OF DISTURBED AREAS SHALL BE DONE BY PERMANENT TURF ESTABLISHMENT WHENEVER POSSIBLE.
7. IN THE EVENT THAT PERMANENT STABILIZATION CANNOT BE IMPLEMENTED WITHIN 7 DAYS AFTER CONSTRUCTION ACTIVITY IN THE DISTURBED AREA HAS CEASED, TEMPORARY STABILIZATION BMPS MUST BE SCHEDULED TO OCCUR WITHIN THAT 7 DAY TIME FRAME RAPID STABILIZATION METHOD 4 SHALL BE EMPLOYED WITHIN 200 FEET OF THE NORMAL WETTED PERIMETER OF ALL DISCHARGE POINTS WITHIN 24 HOURS.
8. ALL STOCKPILES MUST HAVE PERIMETER SEDIMENT CONTROL IMPLEMENTED AND MAINTAINED AT ALL TIMES. STOCKPILES SHALL RECEIVE TEMPORARY STABILIZATION IF UNWORKED FOR 7 DAYS.
9. CONCRETE SLURRY FROM REMOVAL OPERATIONS MUST BE VACUUMED UP IMMEDIATELY. NO CONCRETE WASHOUT SHALL COME IN CONTACT WITH THE GROUND AND MUST BE PROPERLY DISPOSED OF.
10. ADDITIONAL EROSION AND SEDIMENT CONTROL MAY BE ADDED DURING ANY PHASE OF CONSTRUCTION AS DIRECTED BY THE ENGINEER.
11. CONTRACTOR MUST SUBMIT A DEWATERING PLAN TO THE ENGINEER FOR APPROVAL 10 DAYS PRIOR TO ANY DEWATERING ON SITE. THE PLAN MUST INCLUDE A DEWATERING SYSTEM PRIOR TO DISCHARGING INTO RECEIVING WATER. THE DEWATERING PLAN MUST ENSURE THAT THE DISCHARGE WATER IS FREE OF SEDIMENT AND TURBID WATER IN ACCORDANCE WITH THE PROJECT SPEC. THE DEWATERING PLAN MUST ALSO INCLUDE A COMPONENT FOR ONSITE TESTING AND MONITORING OF TURBIDITY AND PH.
12. RAPID STABILIZATION #4 WITH CATEGORY 3N BLANKET ON SIDE SLOPES 3:1 OR STEEPER.
13. TEMPORARY OR PERMANENT STABILIZATION AND DOWN GRADIENT PERIMETER SEDIMENT CONTROL IS NEEDED ON ROW, CURB, AND GUTTER LINE.

PERMANENT STORMWATER MANAGEMENT

	INFILTRATION
	STORMWATER HARVEST AND REUSE
X	FILTRATION
X	WET SEDIMENTATION BASIN
	REGIONAL PONDING

RECEIVING WATERS

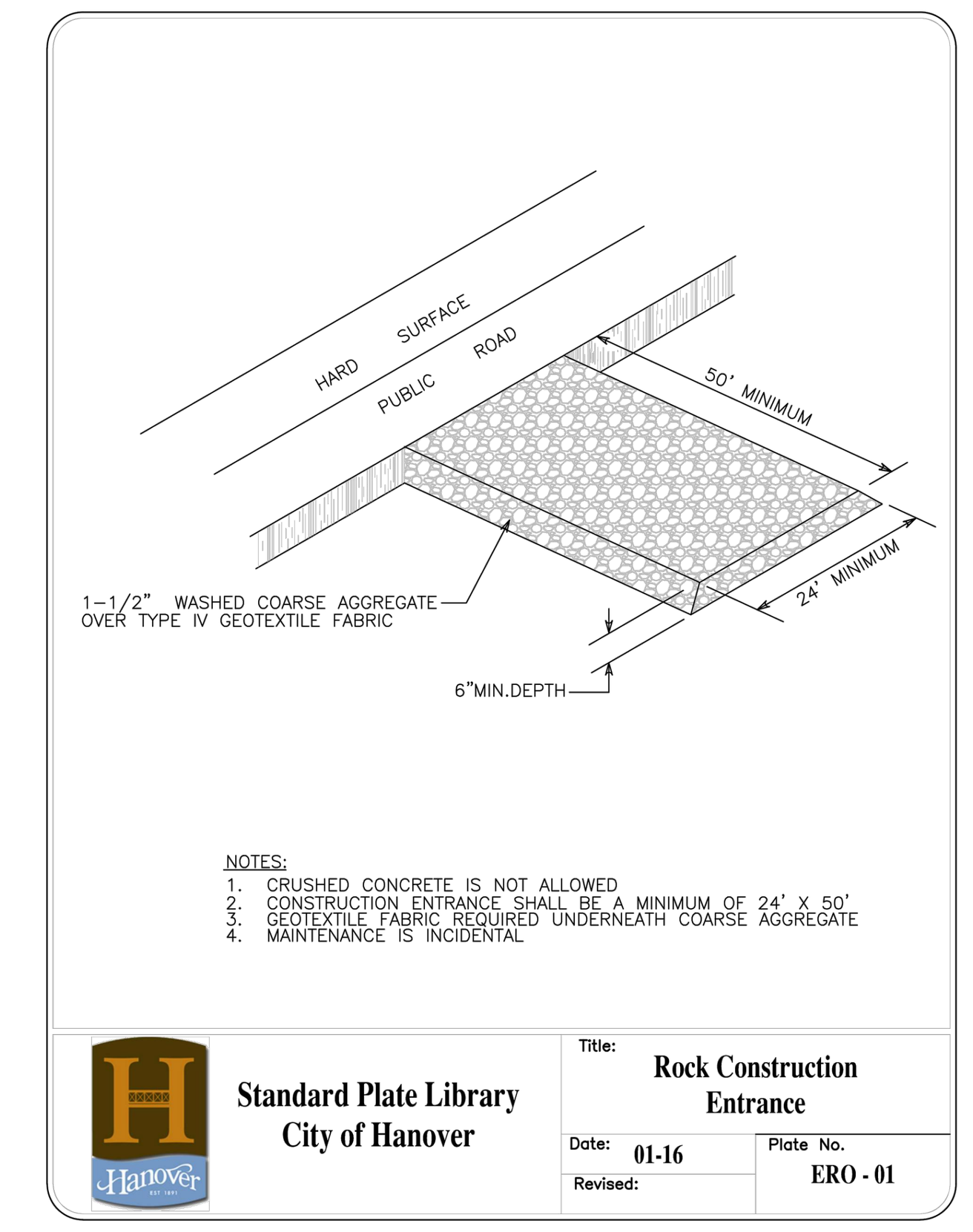
NAME OF WATER BODY	TYPE OF WATER BODY	SPECIAL WATER	IMAIRED WATER	TYPE OF SPECIAL WATER
CROW RIVER	RIVER	NO	YES	

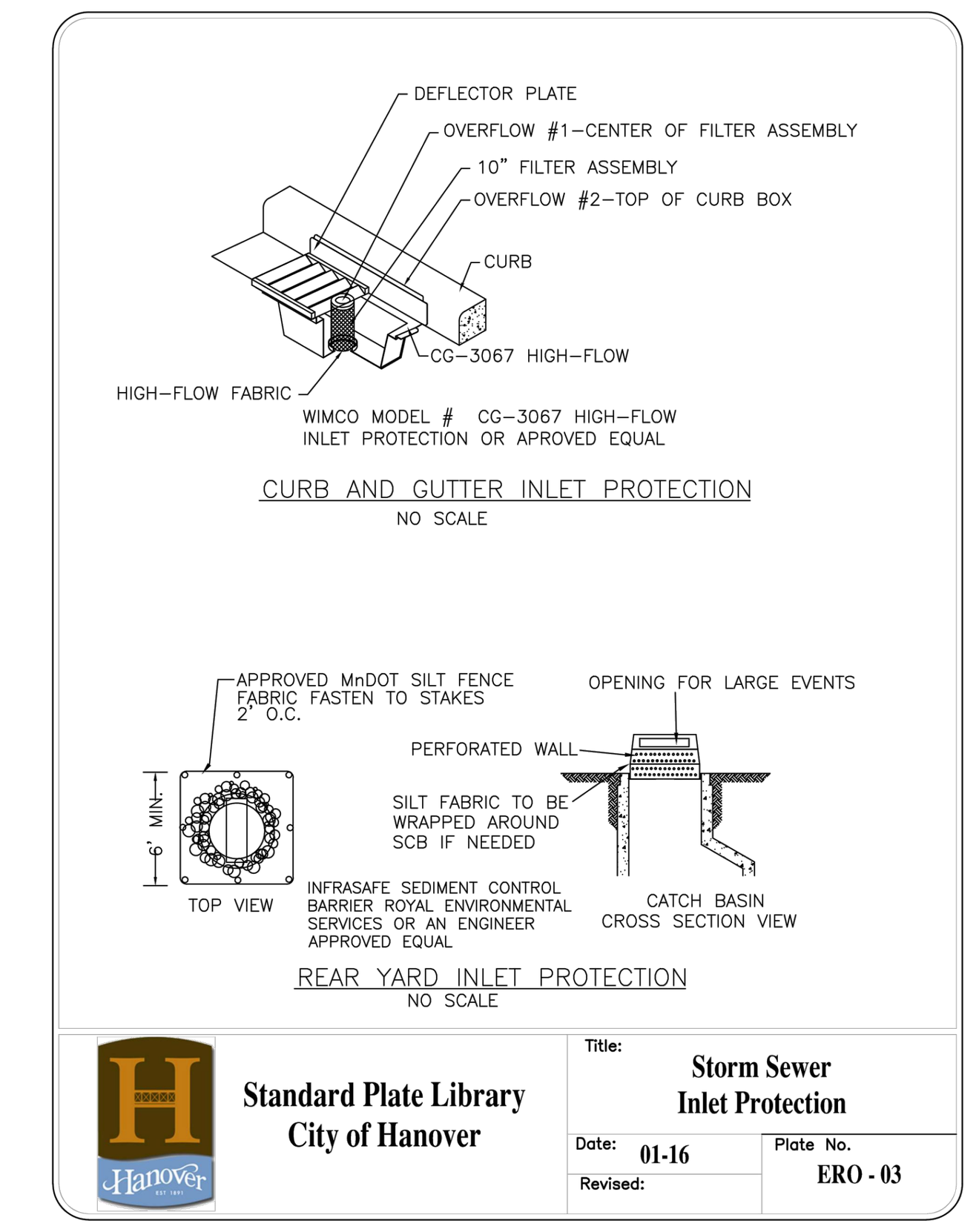
*7 DAY STABILIZATION TIME FRAME REQUIRED

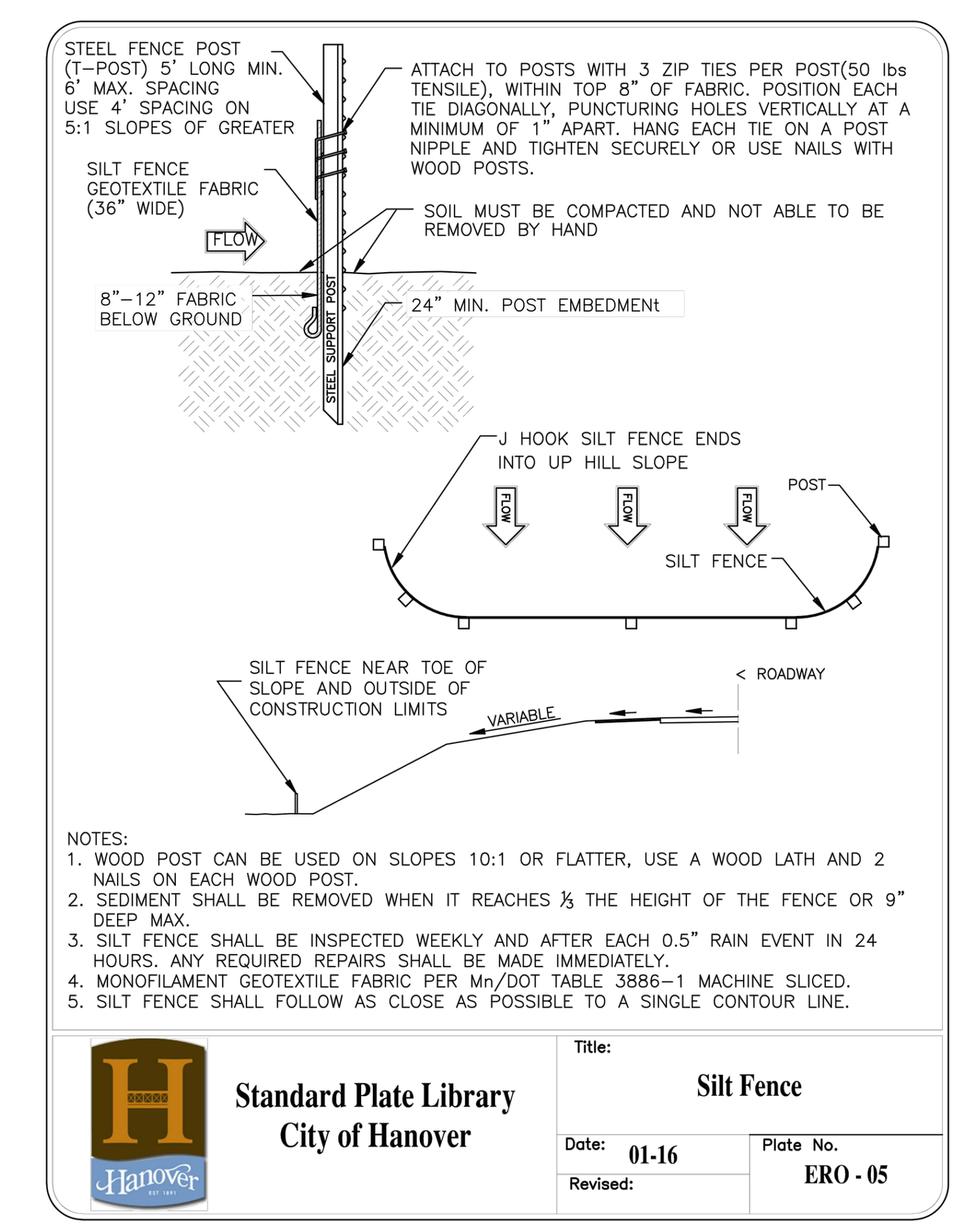
ESTIMATED QUANTITIES

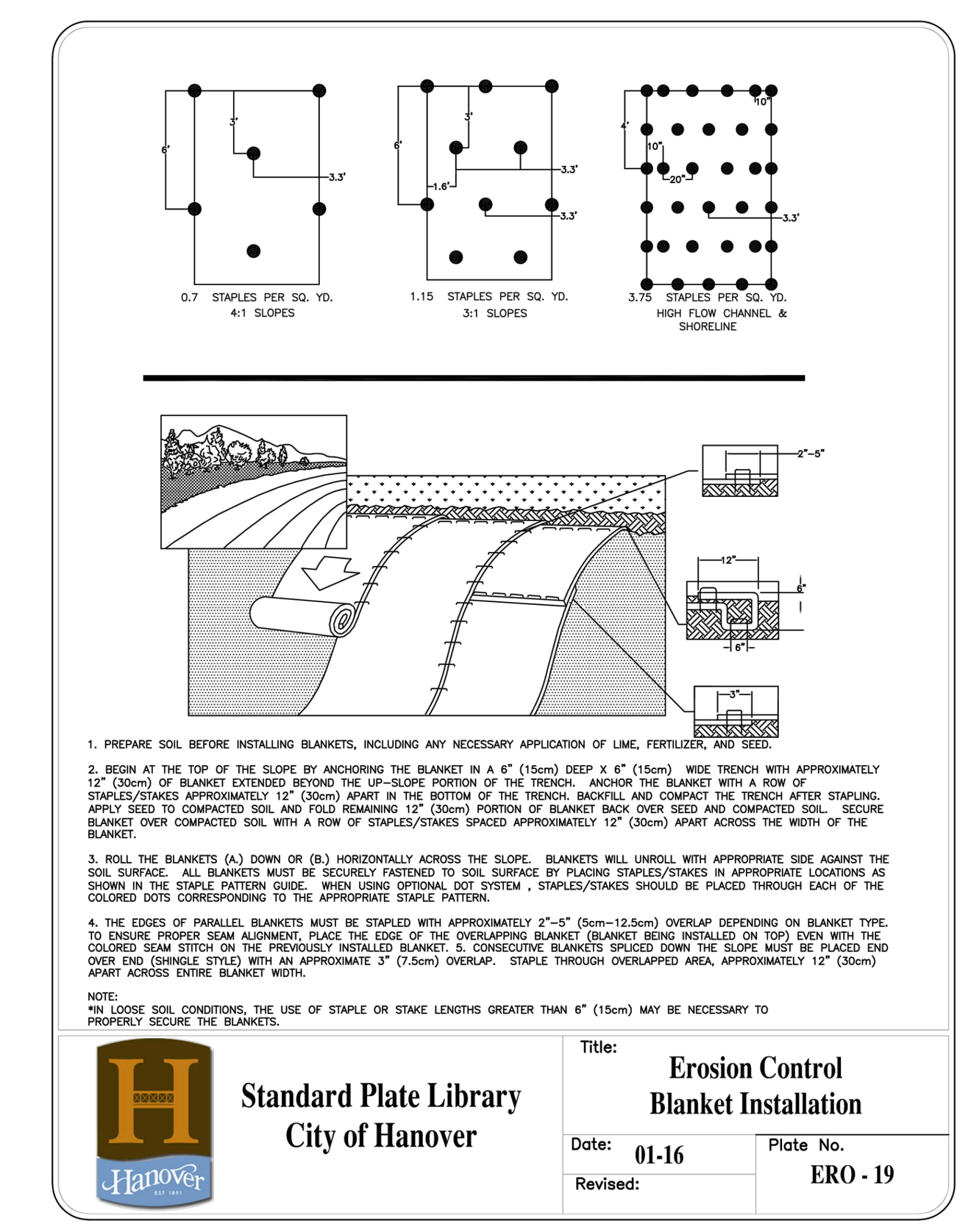
DESCRIPTION	UNIT	QUANTITY
TEMPORARY ROCK CONSTRUCTION ENTRANCE	EA	3
SILT FENCE (STANDARD)	LF	±11,590
STAGE 2 SILT FENCE (STANDARD)	LF	±3,355
INLET PROTECTION	EA	42
WOODFIBER BLANKET	SY	.
CONCRETE WASHOUT	EA	.
BIOROLL	LF	±15,465

UNIVERSITY OF MINNESOTA
Zachary Webber
Design of Construction SWPPP (May 31 2018)

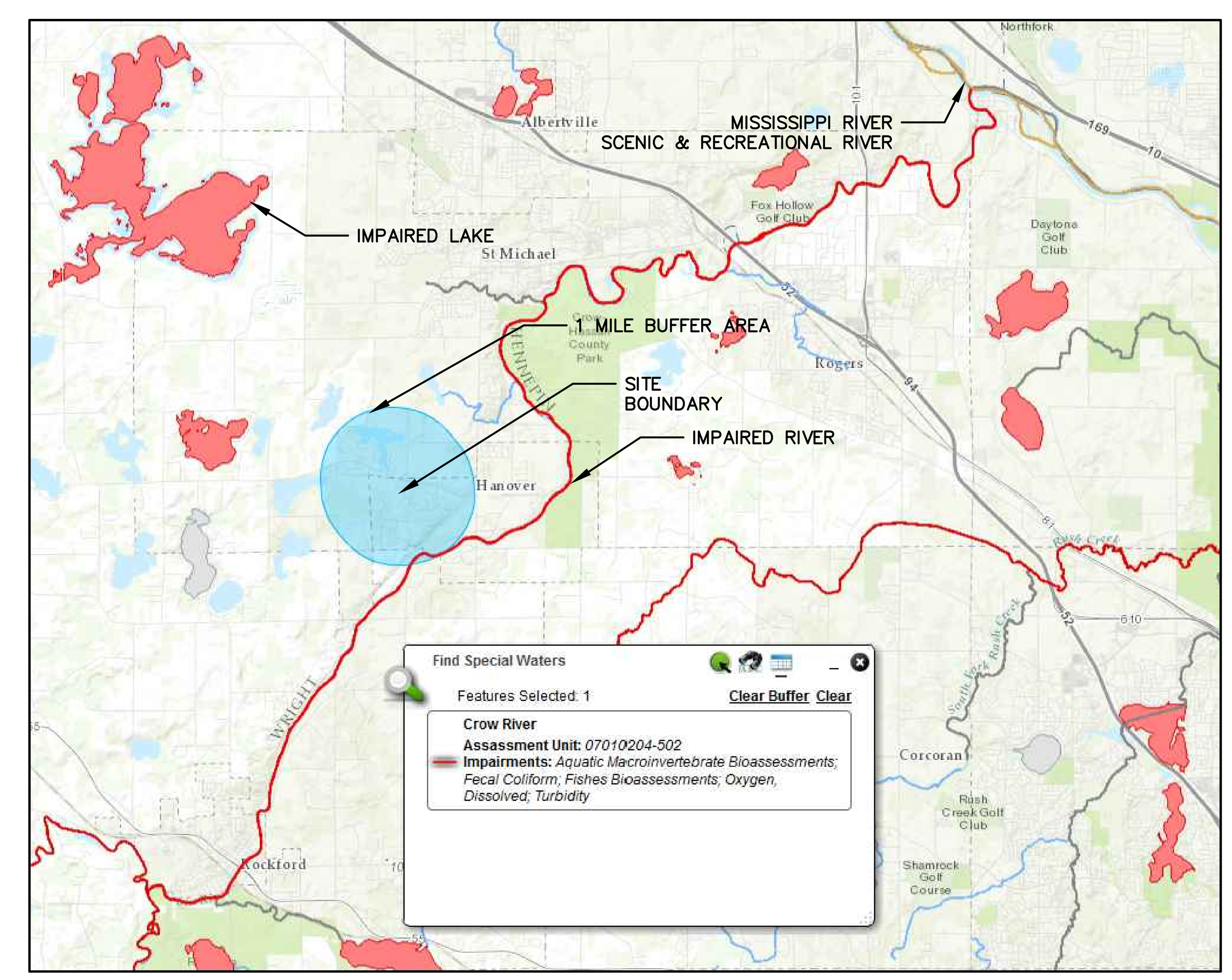








SPECIAL AND IMPAIRED WATERS MAP



CROW RIVER HEIGHTS WEST FUTURE ADD.
HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

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Maple Grove, MN 55369
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SUBMITTAL/REVISIONS
04/20/18 CITY SUBMITTAL

PROFESSIONAL SIGNATURE
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.
Todd W. McLouth - PE
License No. 20383
Date
PRELIMINARY

QUALITY CONTROL
Loucks Project No. 16101A
Project Lead TWM
Drawn By ZHW
Checked By TWM
Review Date 04/02/18

SHEET INDEX

SWPPP NOTES
C3-5

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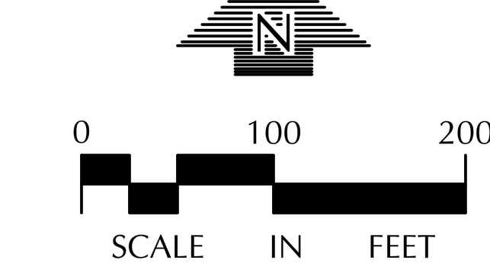

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
⊚PIV	POST INDICATOR VALVE	⊚PIV
	LIGHT POLE	
	POWER POLE	
	SIGN	
BM #3	BENCHMARK	
B–	SOIL BORINGS	B–
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
—W—	WATER SERVICE	
—S—	SANITARY SERVICE	
	HANDICAP PARKING	
1.0%	DIRECTION OF FLOW	1.0%
924.6 x	SPOT ELEVATION	924.6 x
924	CONTOURS	924
—>—	SANITARY SEWER	
—>>—	STORM SEWER	
	WATERMAIN	
—FM—	FORCEMAIN	FM
—>>—DT—	DRAINTILE	—>>—DT—
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
—x—x—	FENCE LINE	—x—x—
—TEL—	UNDERGROUND TELE	
—GAS—	UNDERGROUND GAS	
—OH—	OVERHEAD UTILITY	

CROW RIVER HEIGHTS WEST FUTURE ADD.

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SHEET INDEX

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

OVERALL UTILITY PLAN

C4-0

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

SCALE IN FEET: 0 50 100

EXISTING	CIVIL LEGEND	PROPOSED
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	CULVERT	
	HYDRANT	
	GATEVALVE	
	POST INDICATOR VALVE	
	LIGHT POLE	
	POWER POLE	
	SIGN	
	BENCHMARK	
	SOIL BORINGS	
	WATER MANHOLE	
	TELEPHONE MANHOLE	
	UTILITY MANHOLE	
	ELECTRIC MANHOLE	
	WATER SERVICE	
	SANITARY SERVICE	
	HANDICAP PARKING	
	DIRECTION OF FLOW	
	SPOT ELEVATION	
	CONTOURS	
	SANITARY SEWER	
	STORM SEWER	
	WATERMAIN	
	FORCEMAIN	
	DRAINTILE	
	SILT FENCE	
	CURB & GUTTER	
	RETAINING WALL	
	TREELINE	
	EASEMENT LINE	
	SETBACK LINE	
	FENCE LINE	
	UNDERGROUND TELE	
	UNDERGROUND GAS	
	OVERHEAD UTILITY	

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04/20/18	CITY SUBMITTAL

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SHEET INDEX

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NORTH UTILITY PLAN
C4-1

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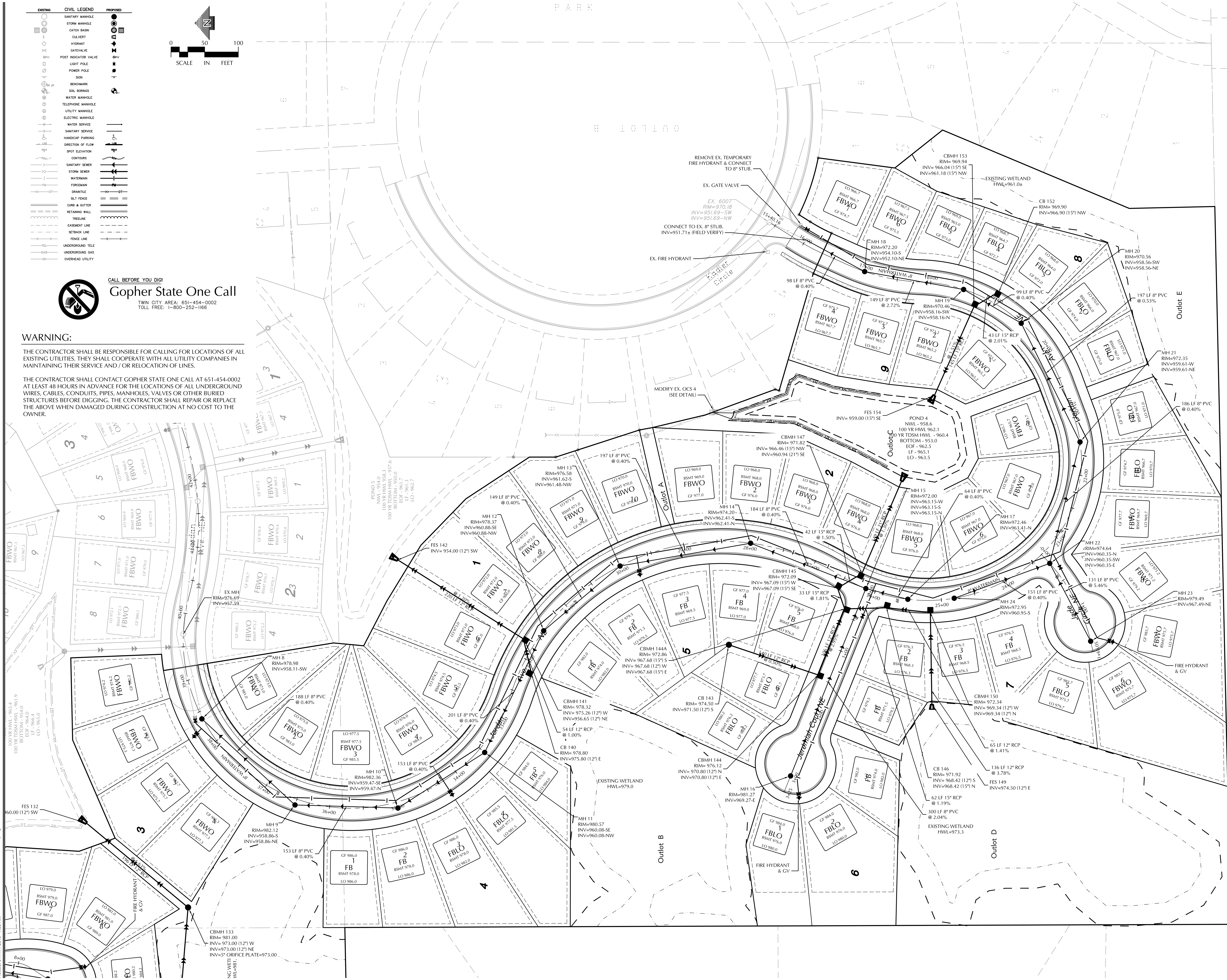

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CROW RIVER HEIGHTS WEST FUTURE ADD.

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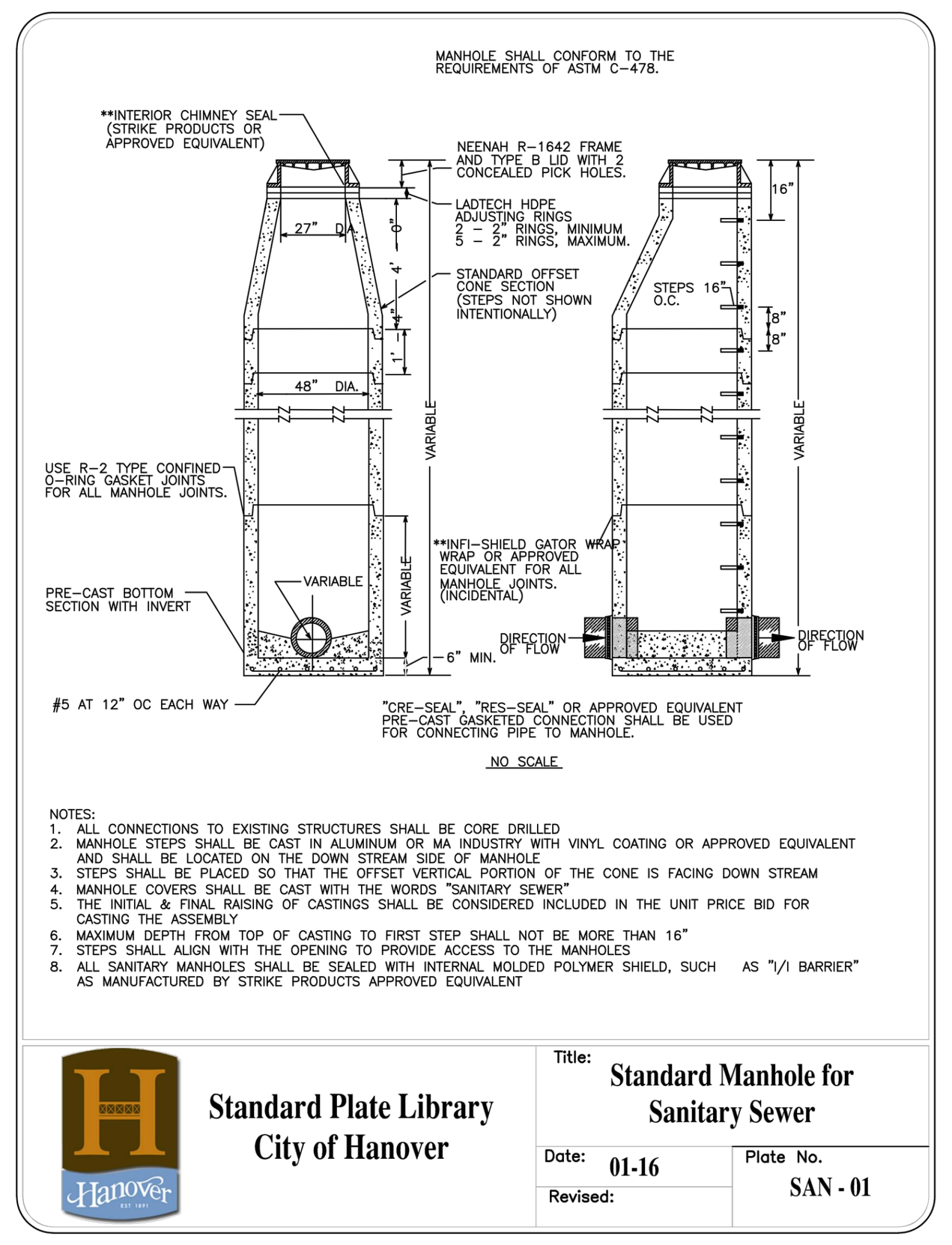
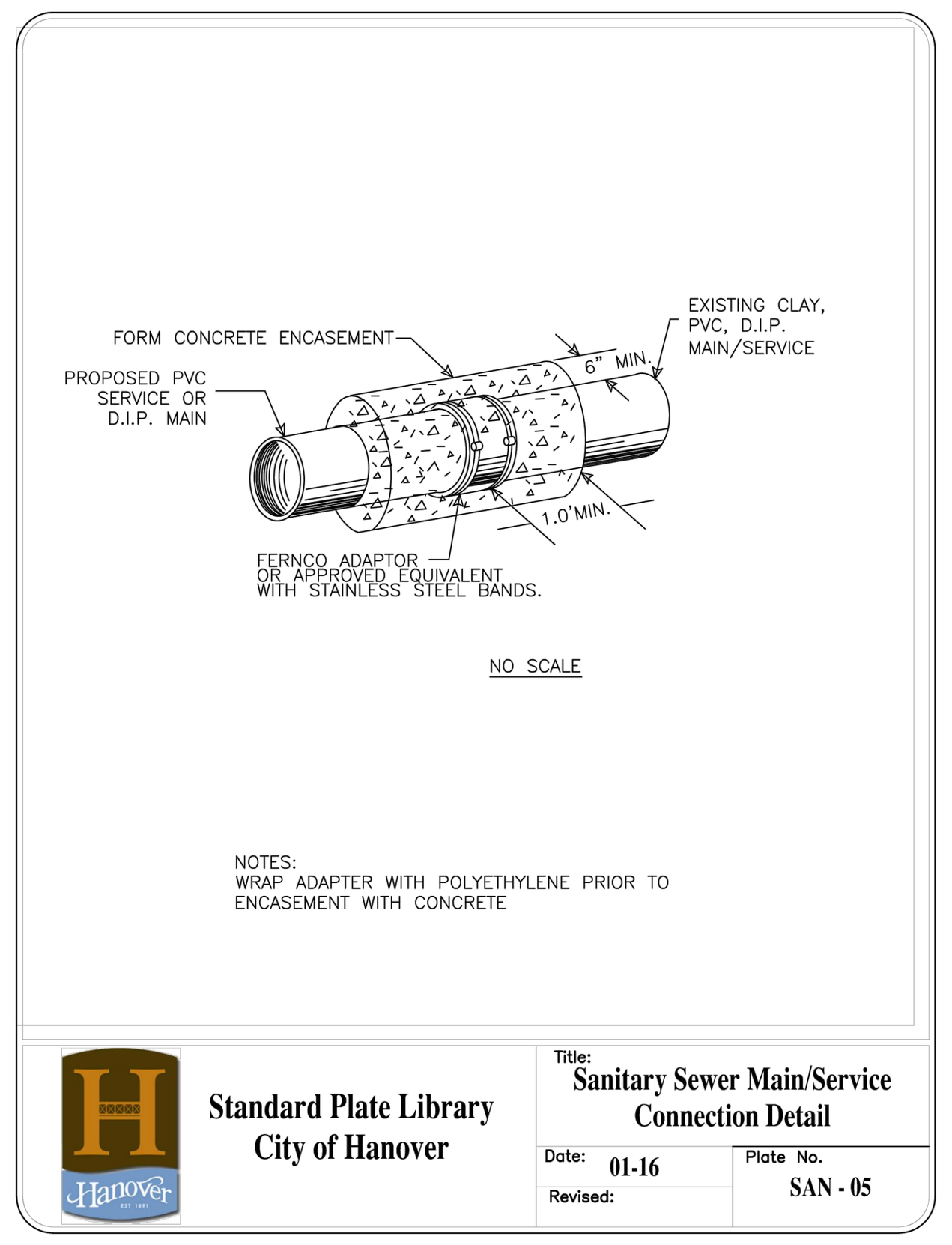
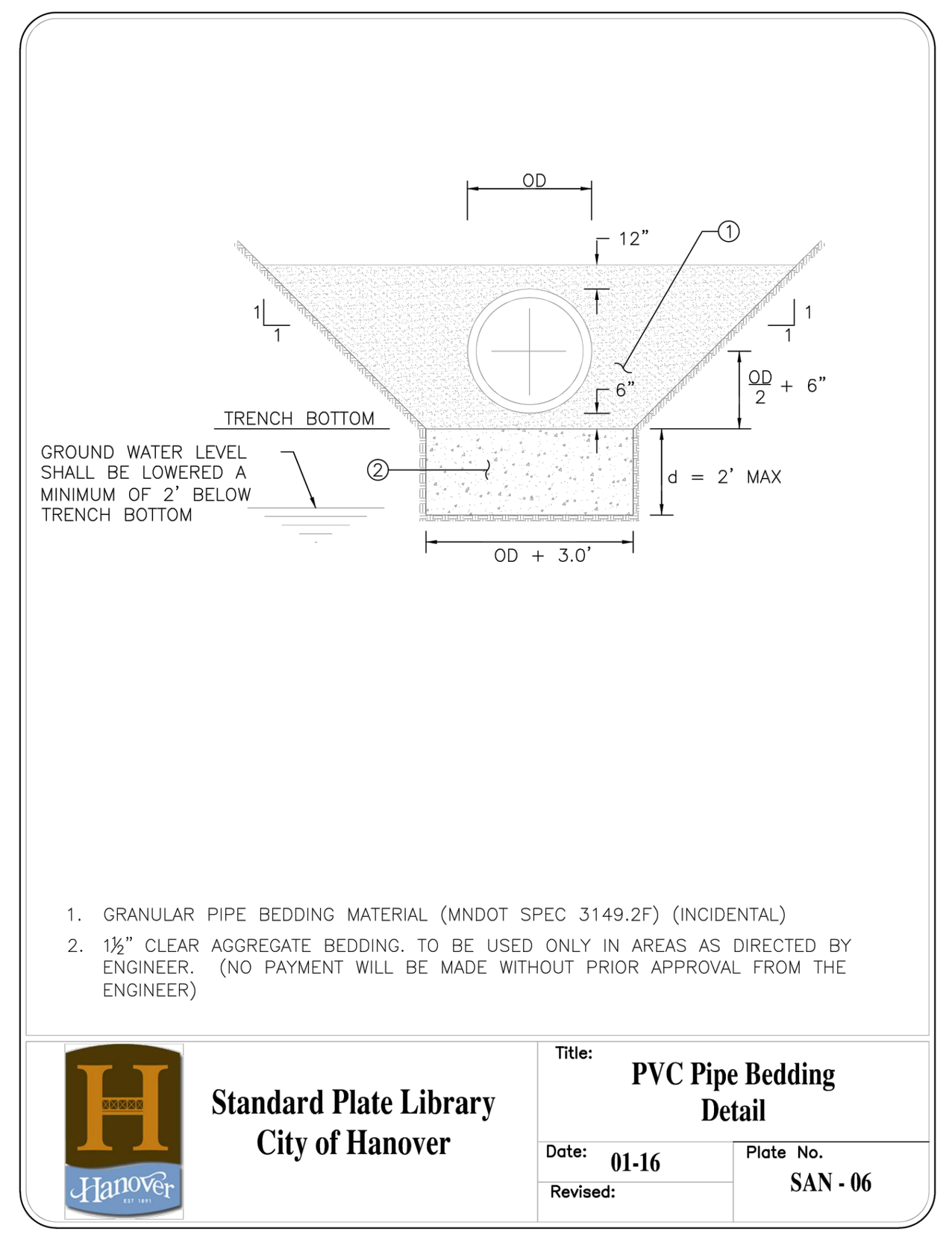
SHEET INDEX

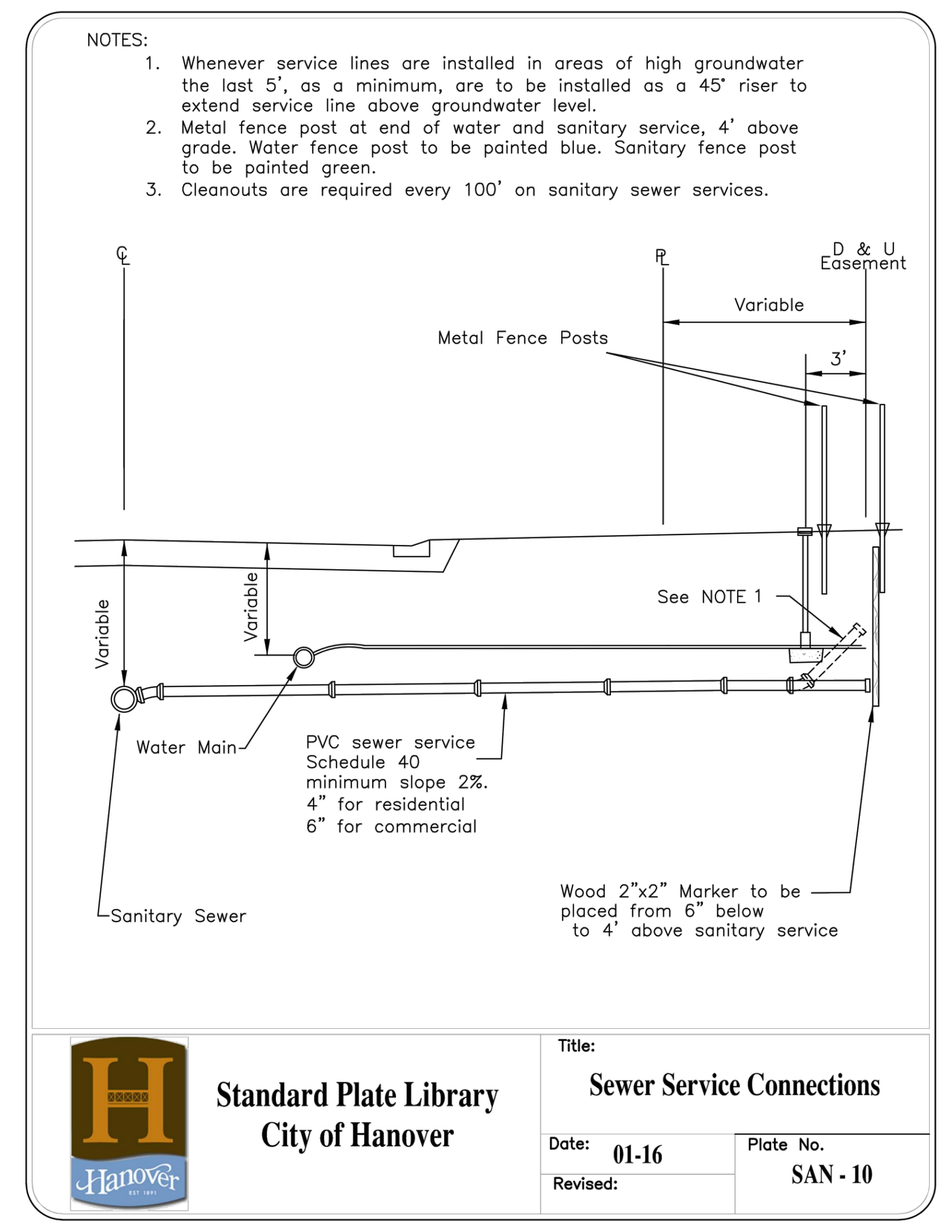
SOUTH UTILITY PLAN

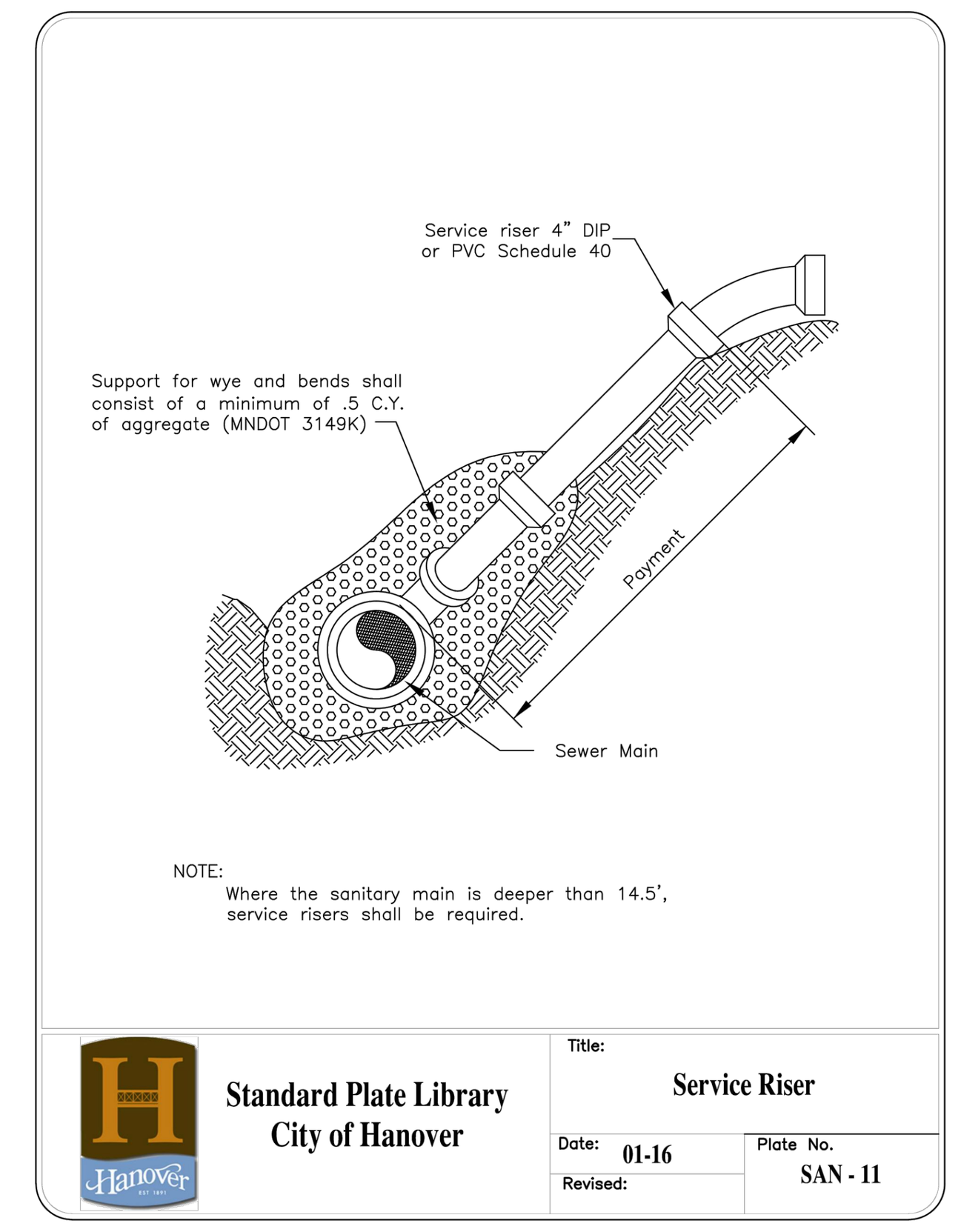
C4-2

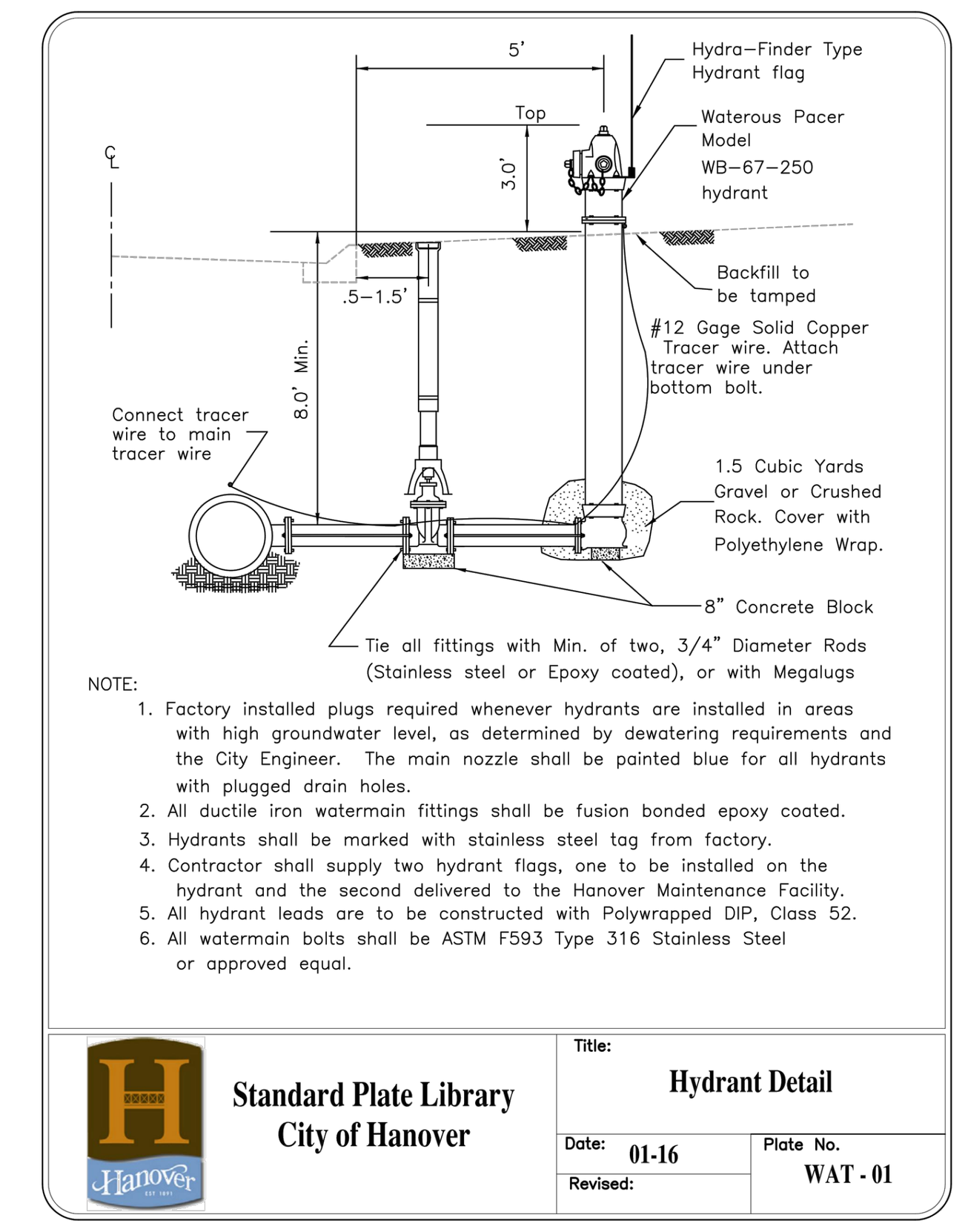


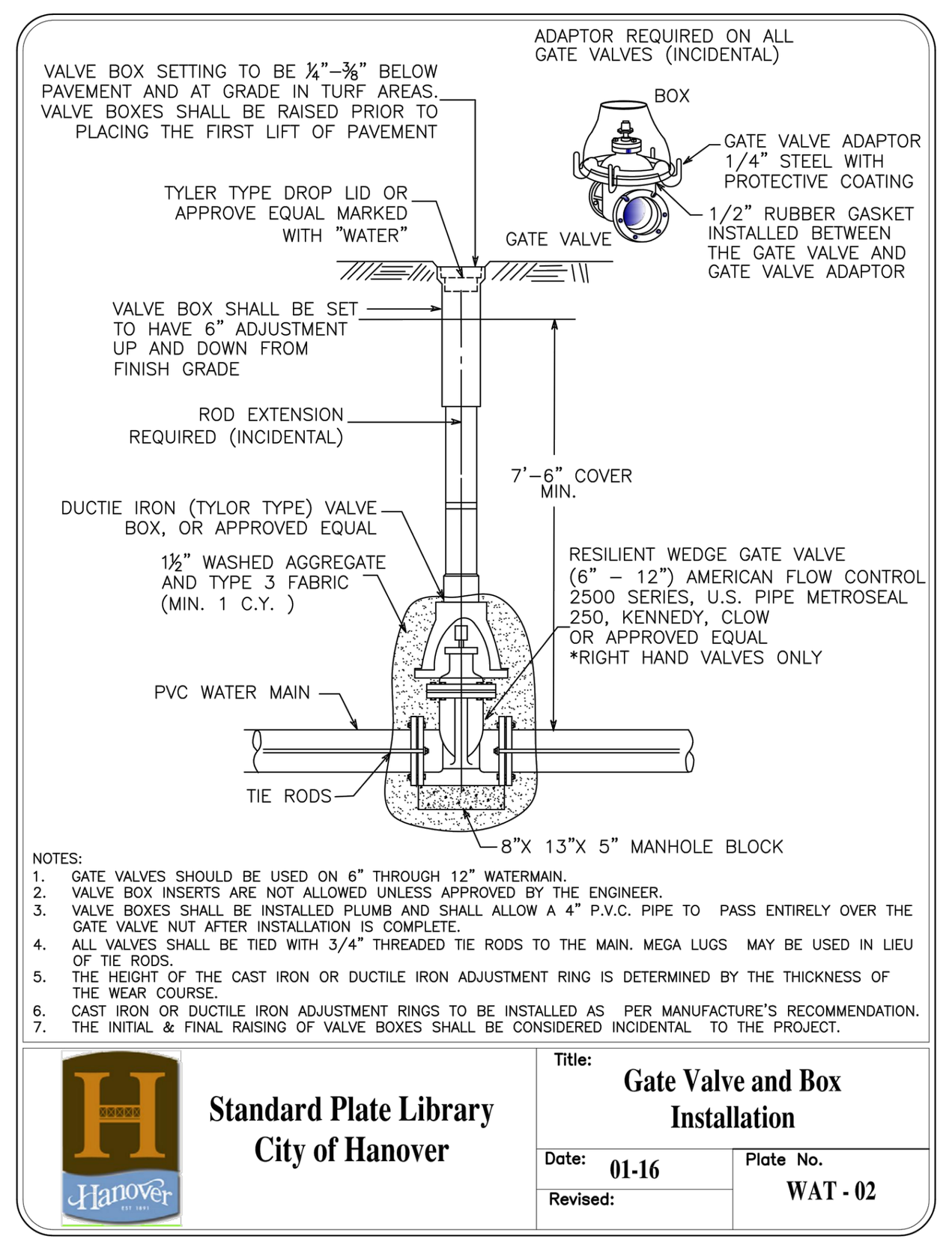


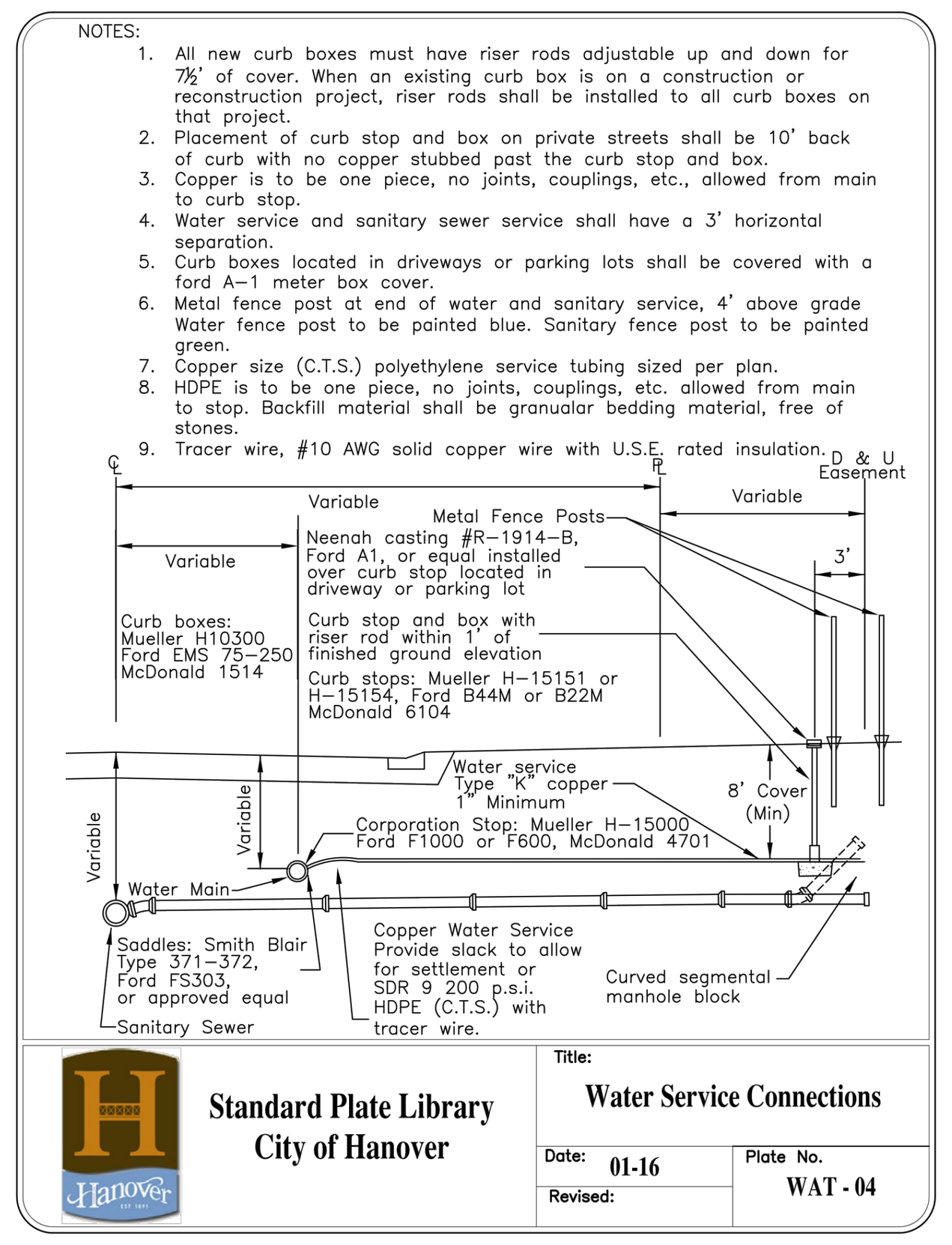


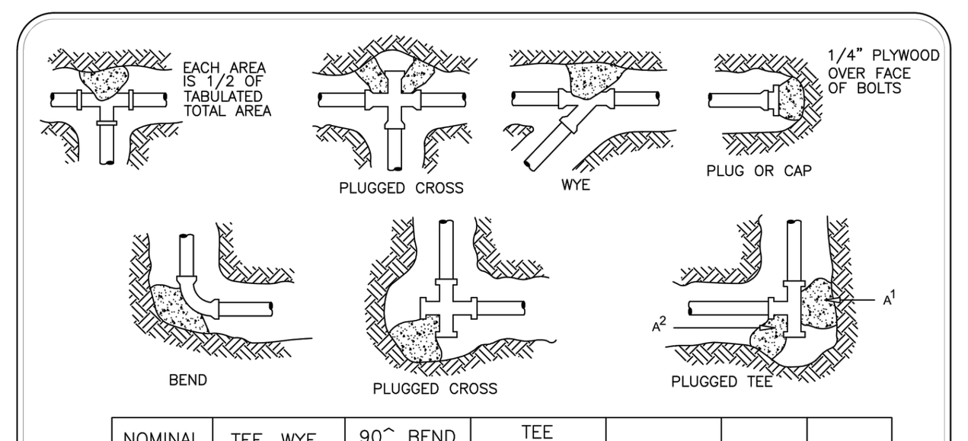








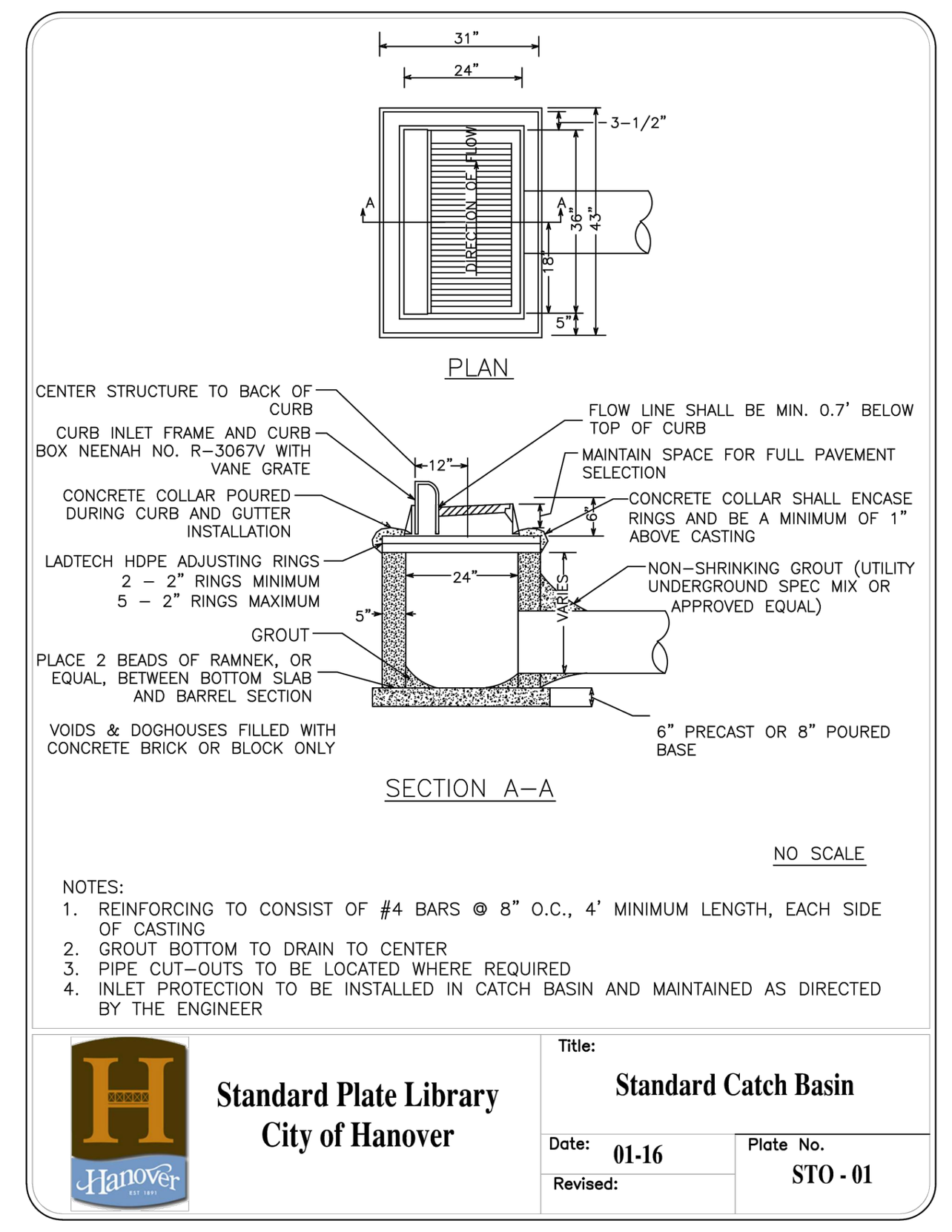


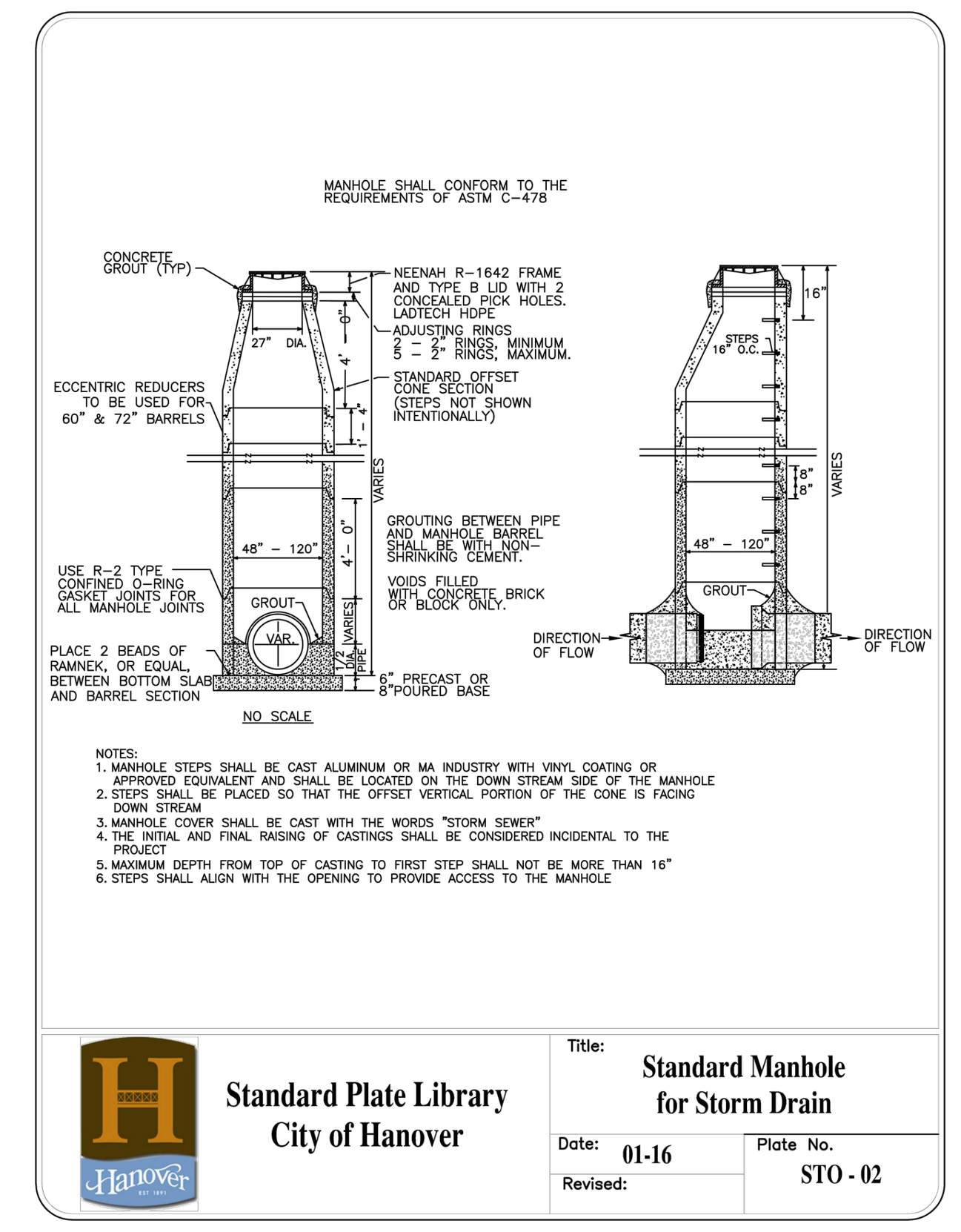


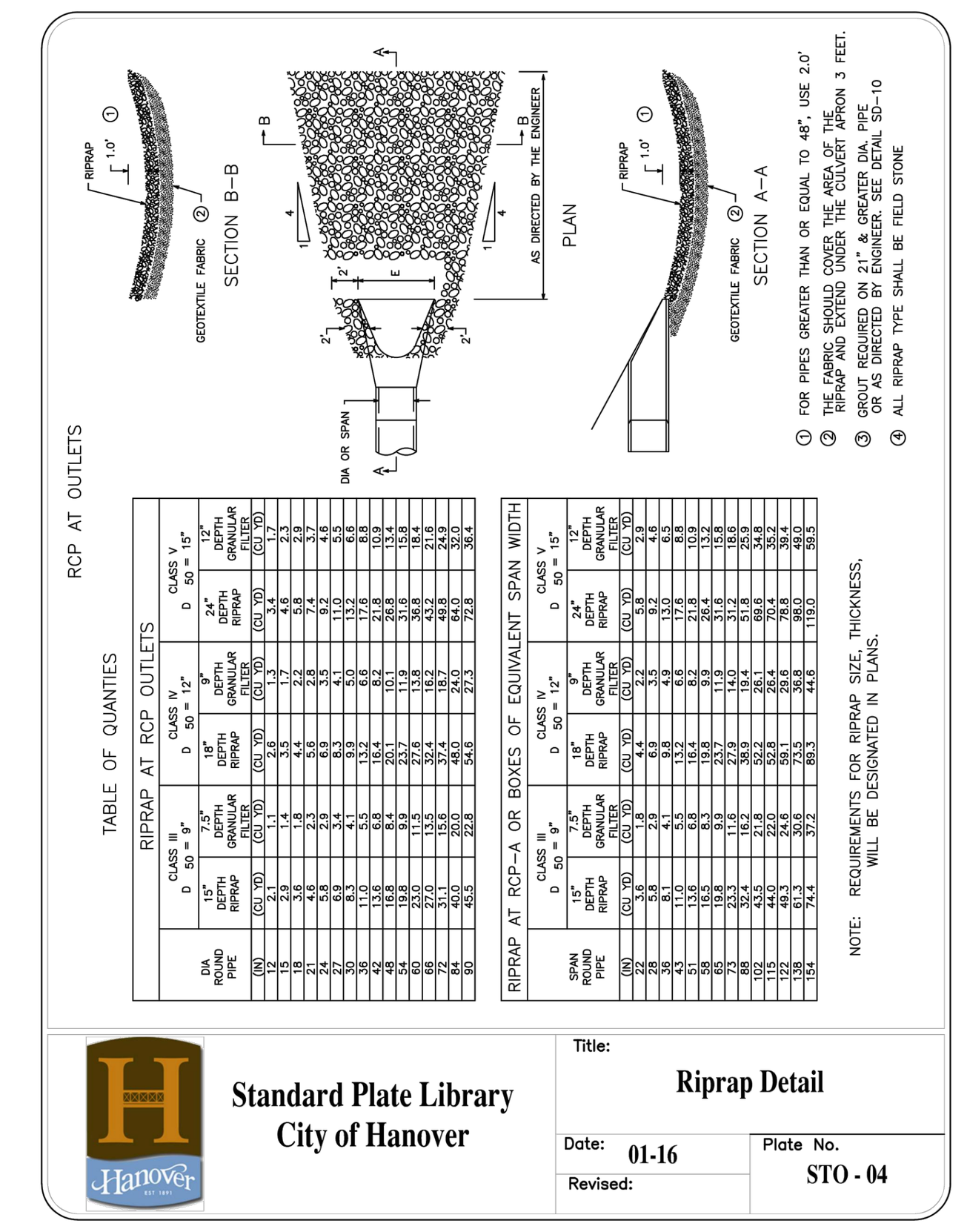
NOMINAL FITTING SIZE, INCHES	TEE, WYE, PLUG OR CAP	90° BEND, PLUGGED CROSS	TEE PLUGGED ON RUN A1	TEE PLUGGED ON RUN A2	45° BEND	22-1/2° BEND	11-1/4° BEND
4	1.0	1.4	1.9	1.4	1.0	–	–
6	2.1	3.0	4.3	3.0	1.6	1.0	–
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.6	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

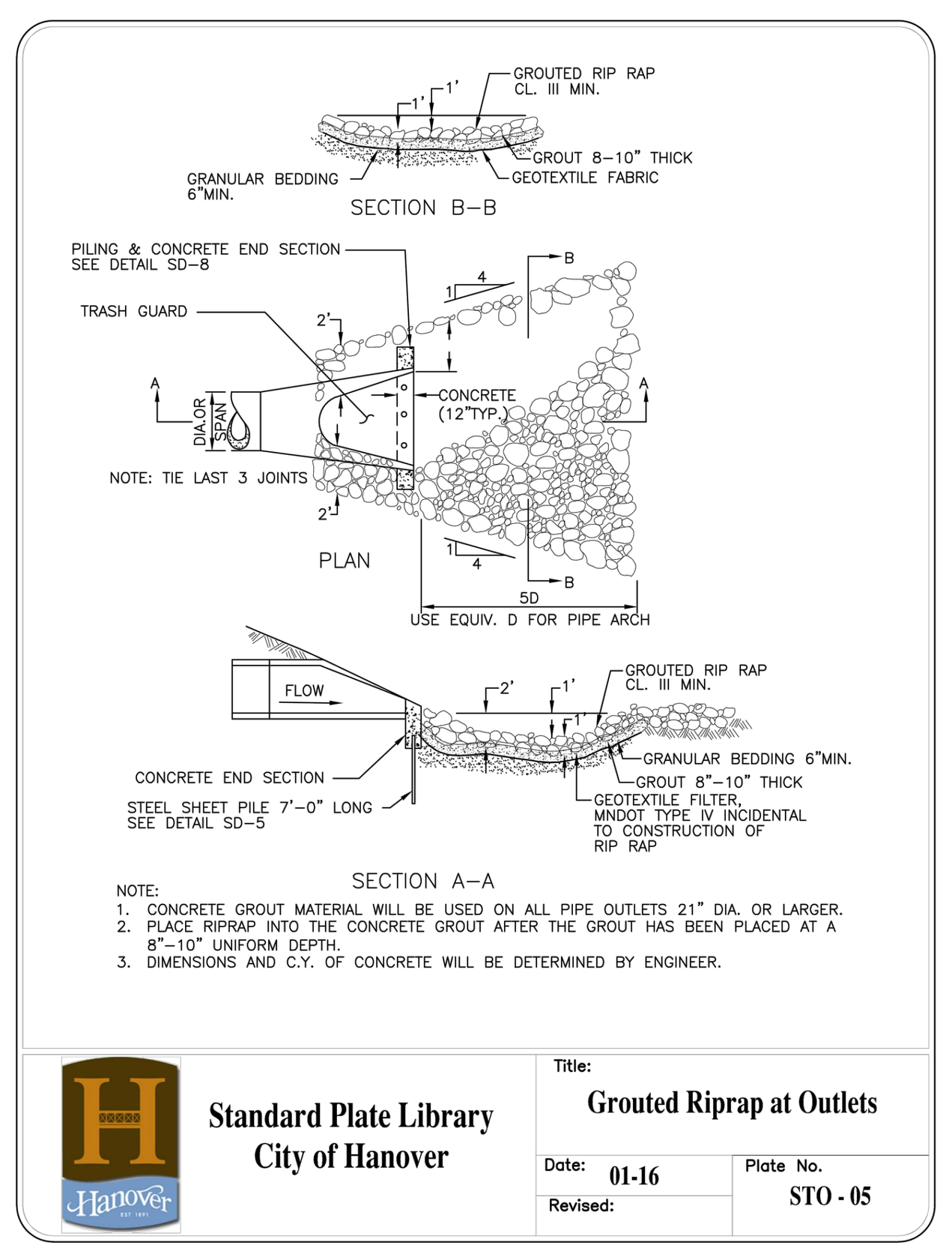
NOTES:
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.
3. REQUIRED BEARING AREAS AT FITTING SHALL BE AS NOTED ABOVE, UNLESS INDICATED OTHERWISE.
4. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS STANDARD PLATE.
5. ABOVE BEARING AREAS BASED ON TEST PRESSURES OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 LBS. PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA = (TEST PRESSURE/150) X (2000/SOIL BEARING STRESS) X (TABLE VALUE).

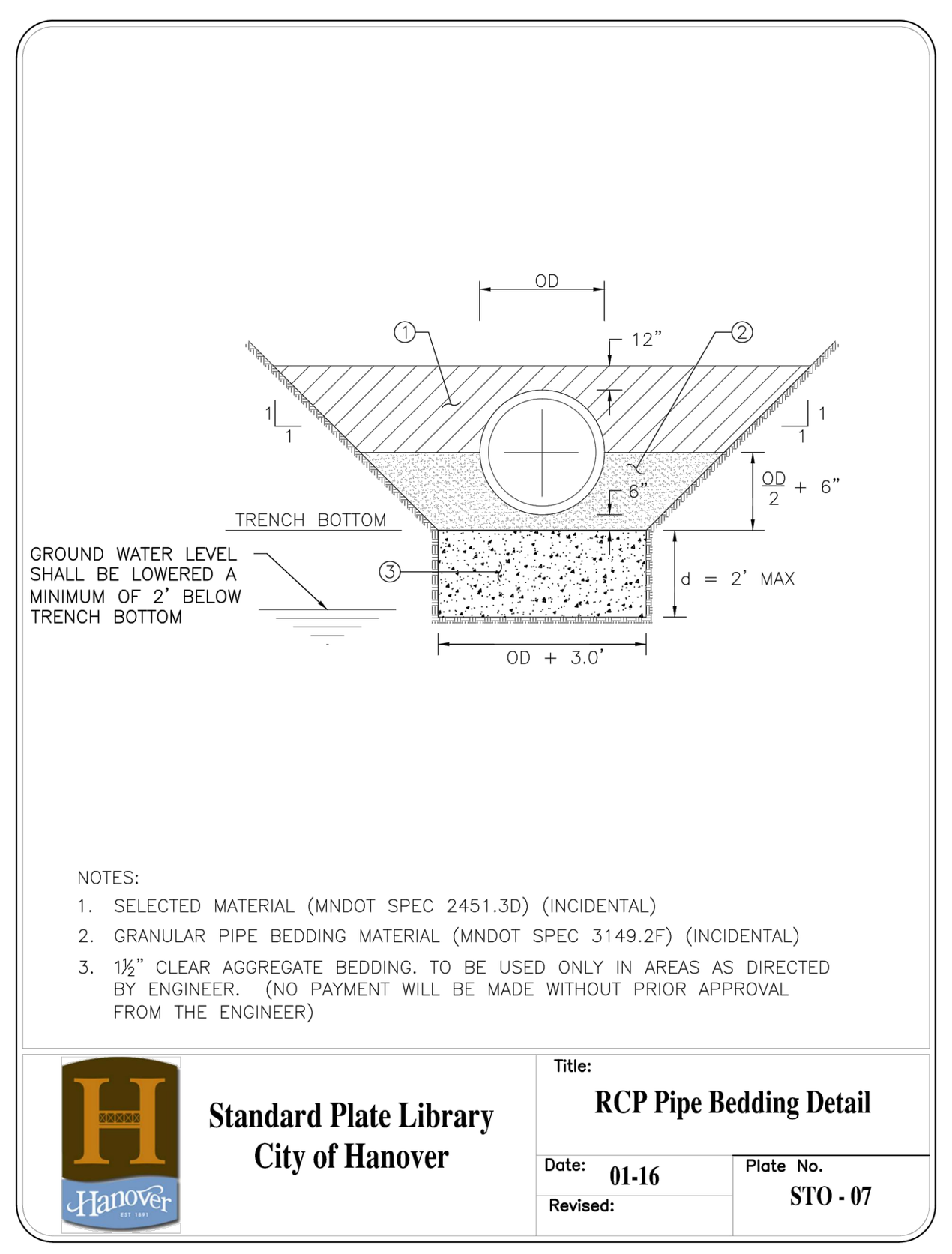
Standard Plate Library
City of Hanover
Title: Poured Concrete Thrust Blocking for Watermain
Date: 01-16
Revised:
Plate No. WAT - 05

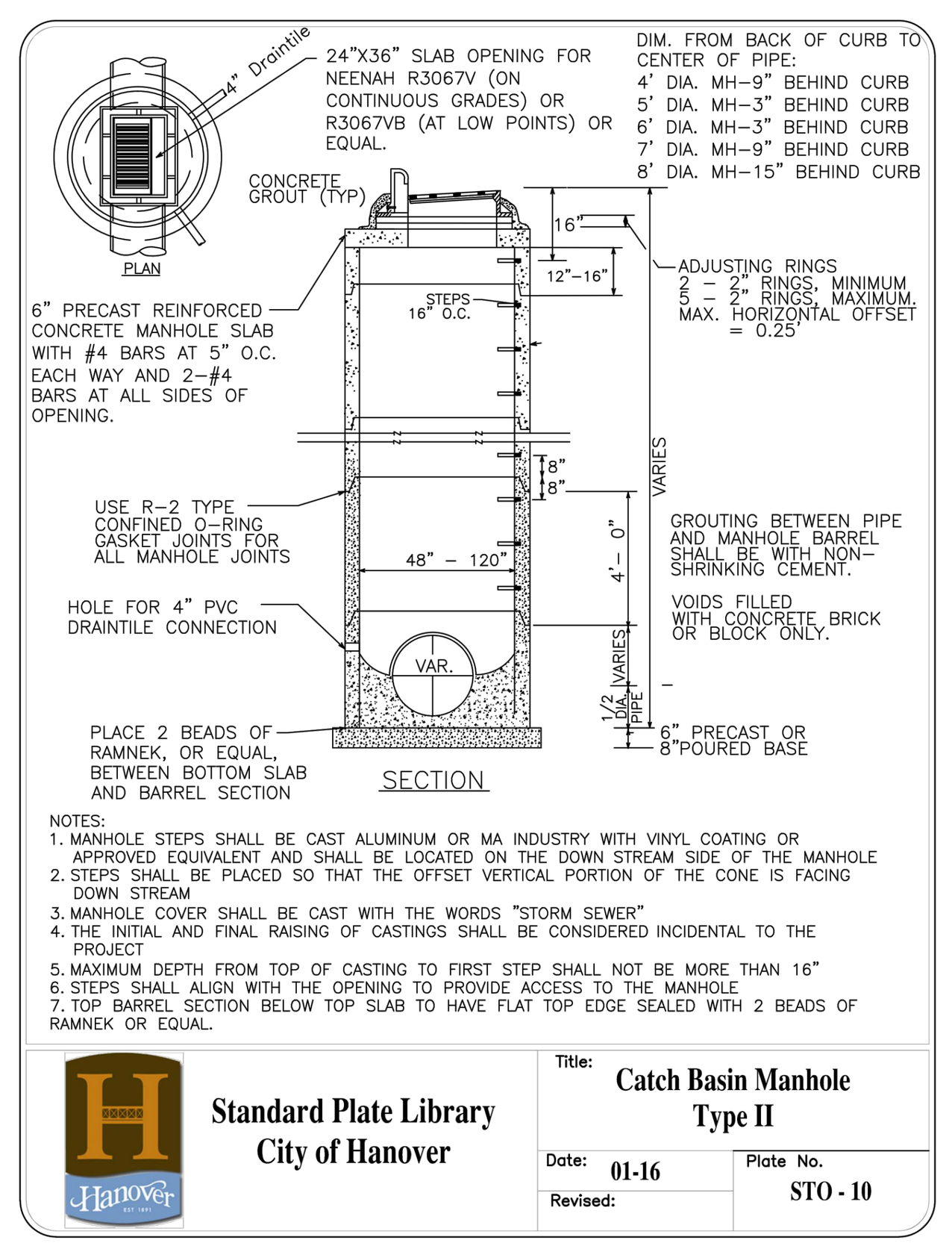


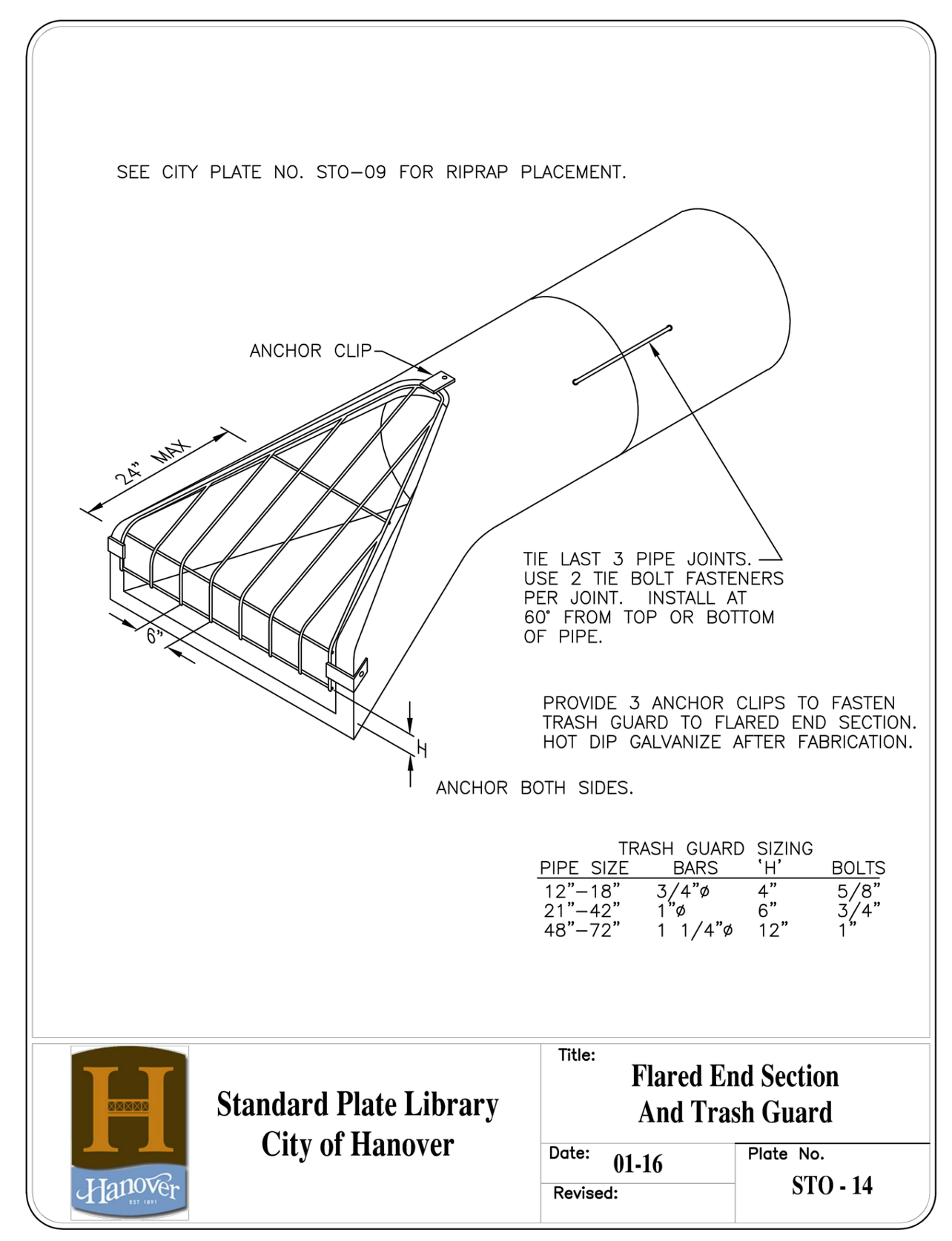


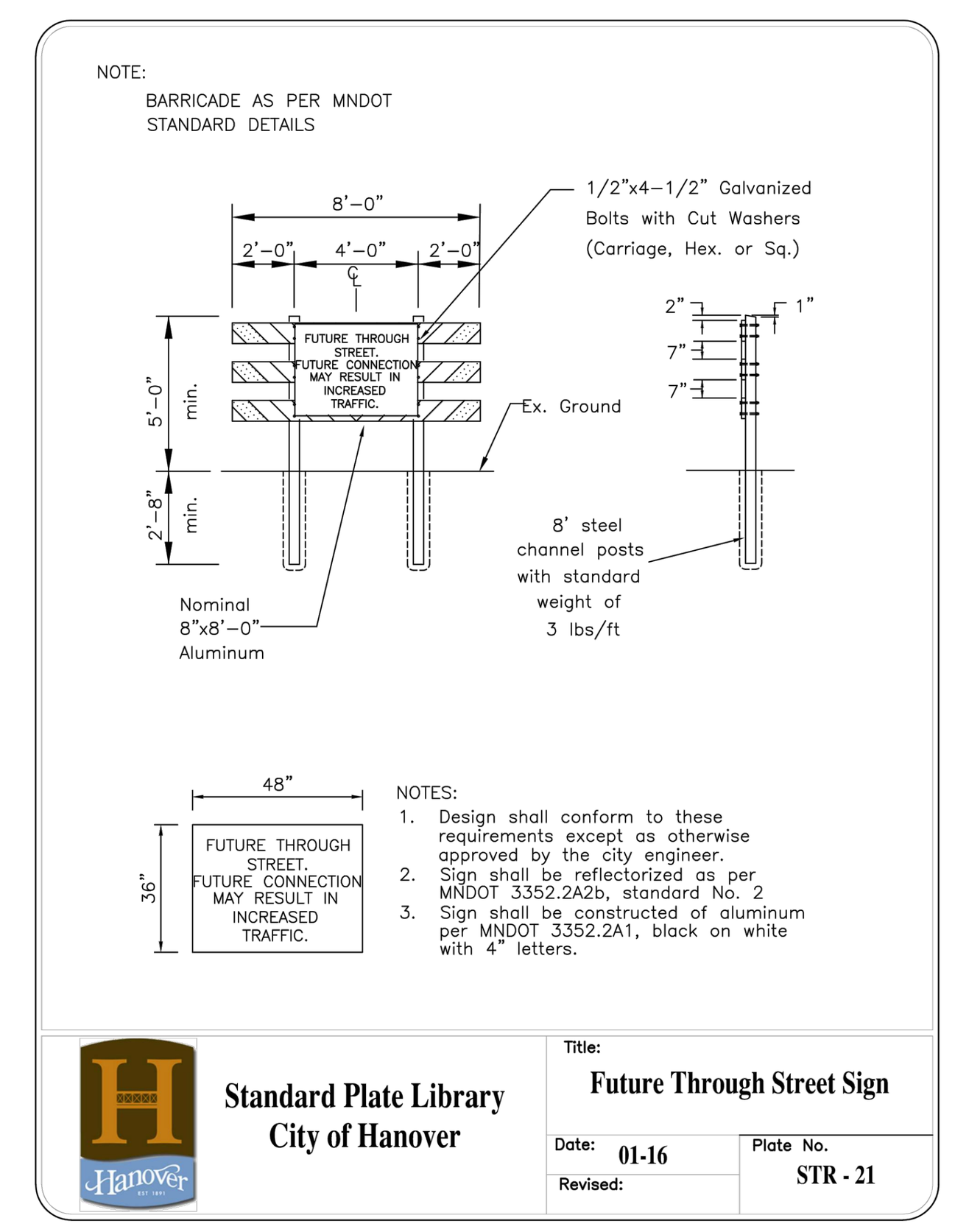


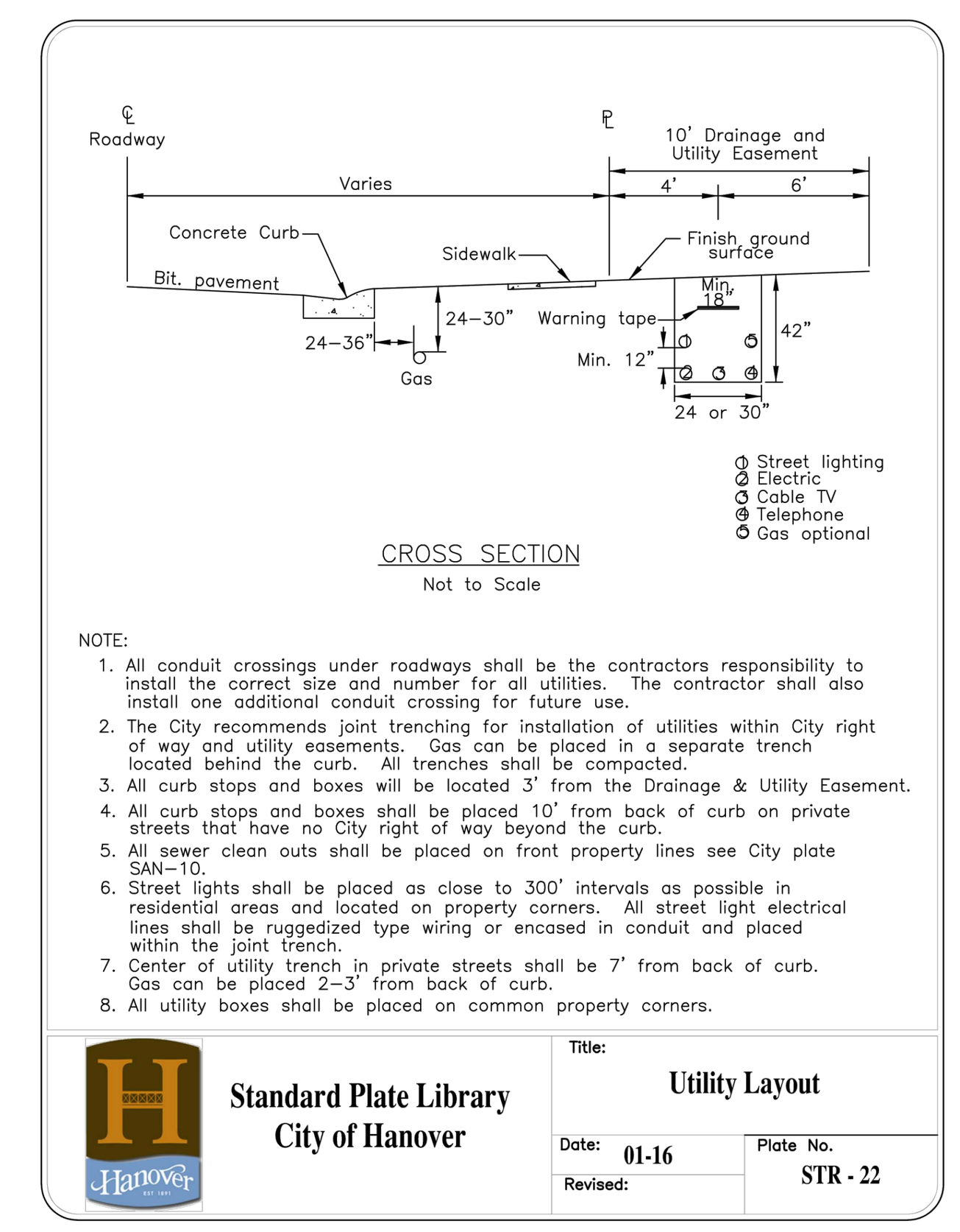


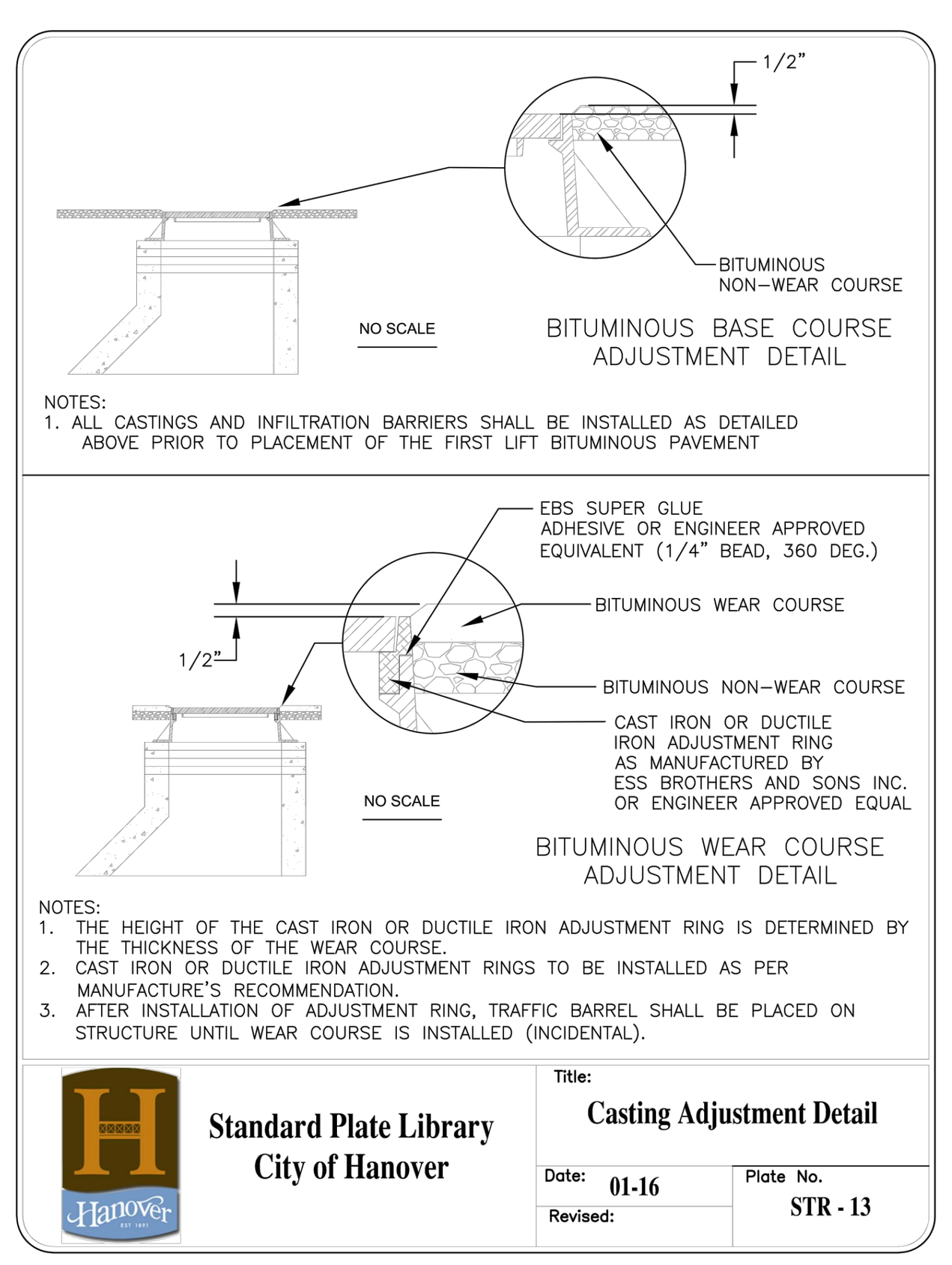


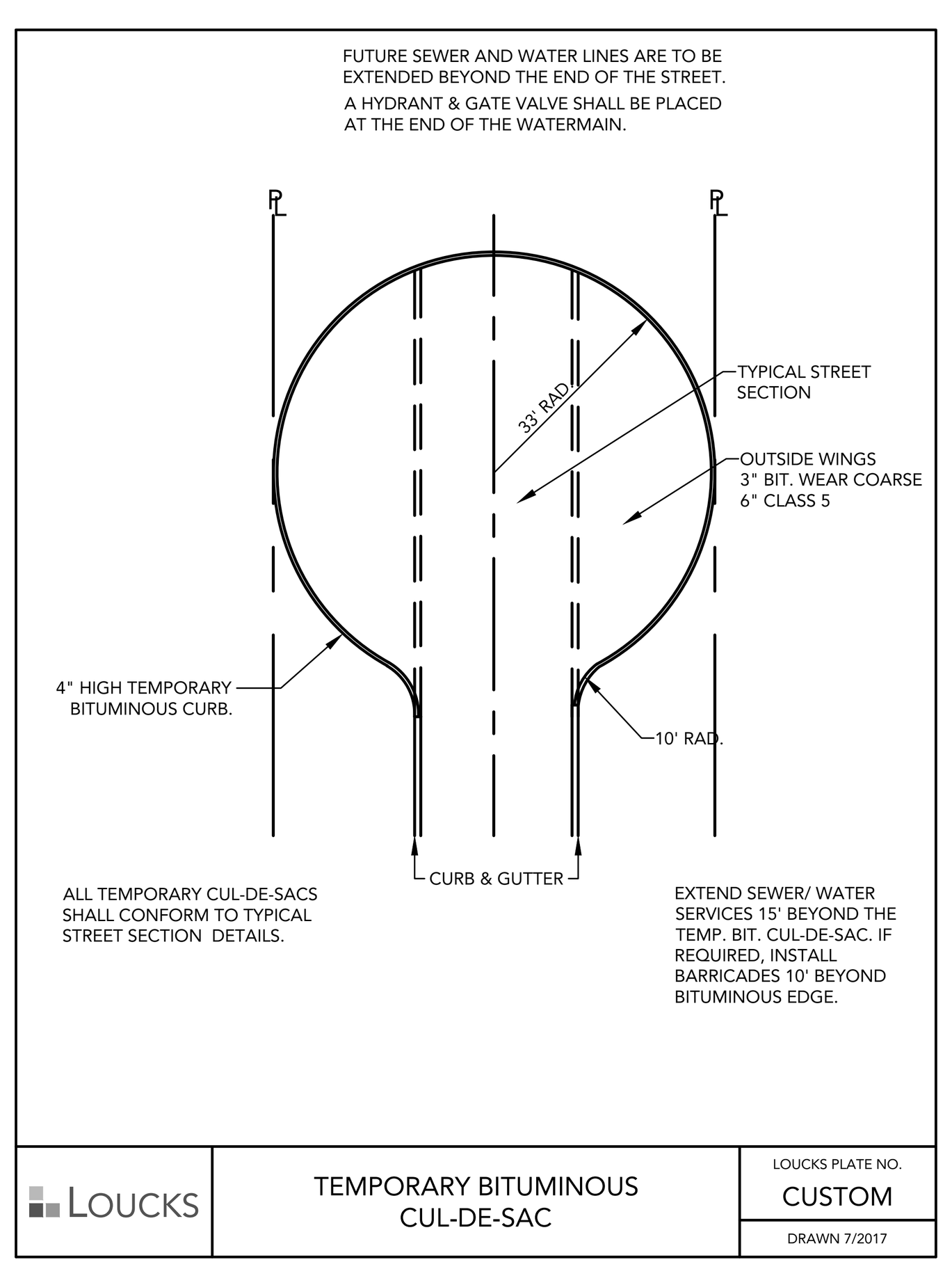




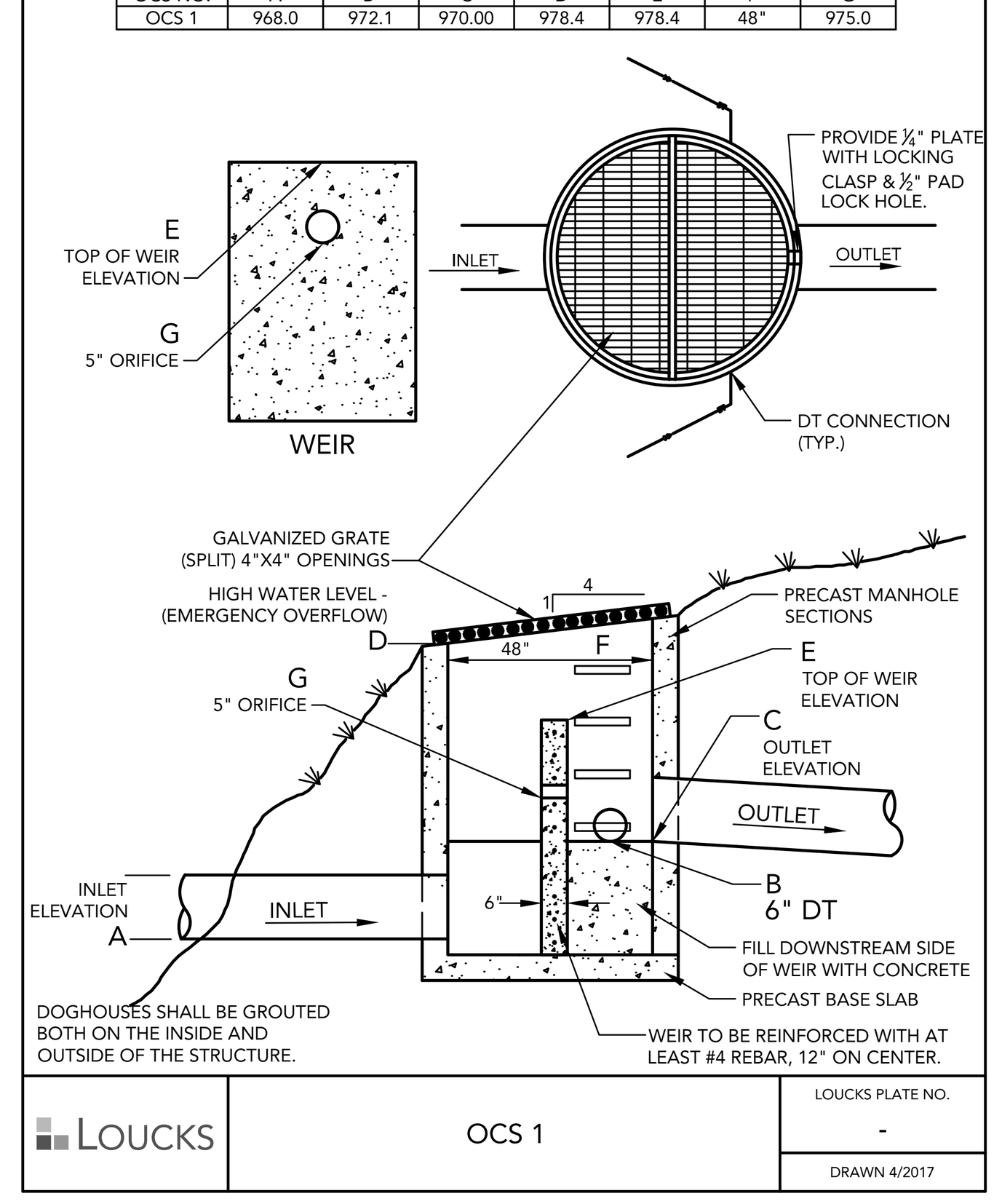


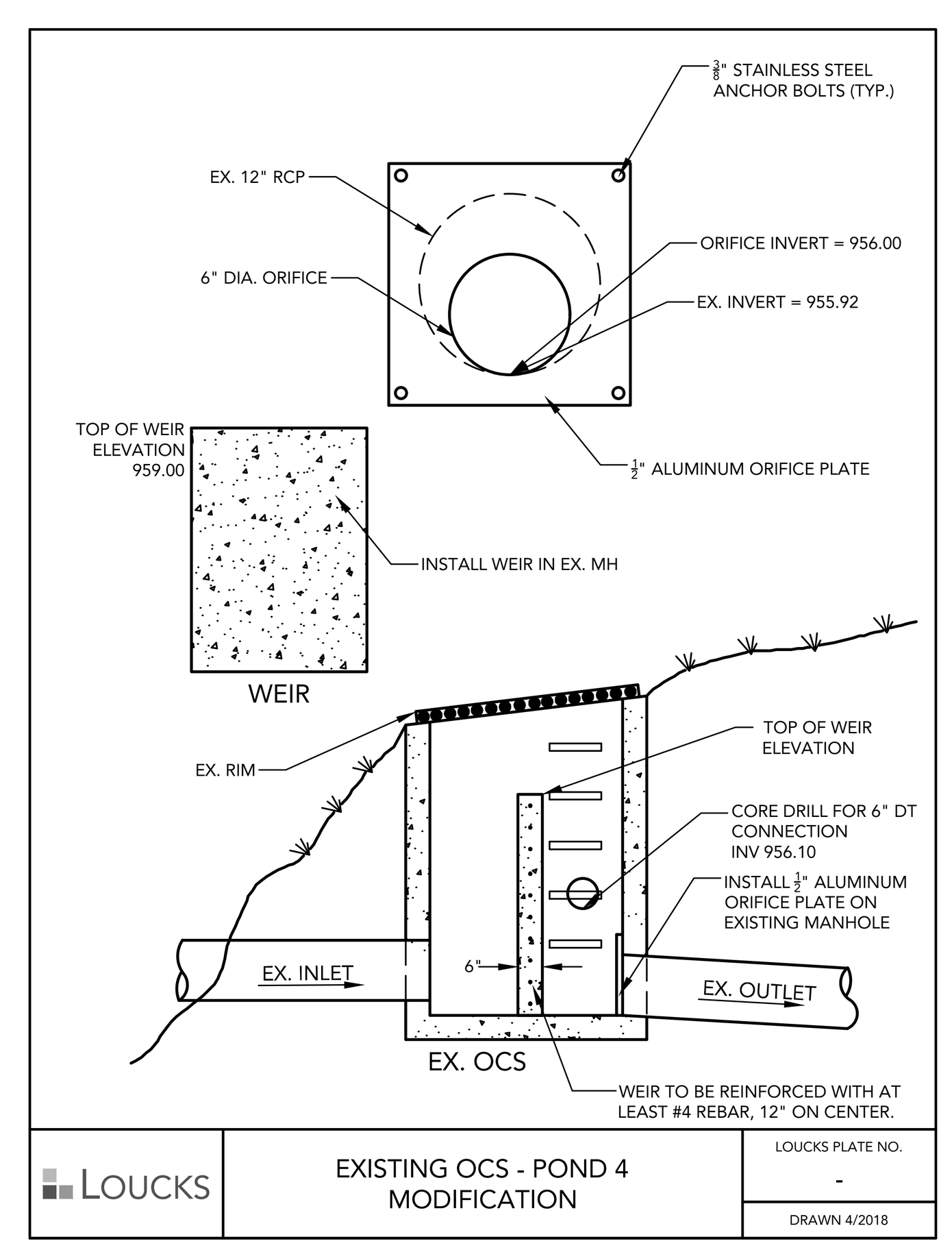




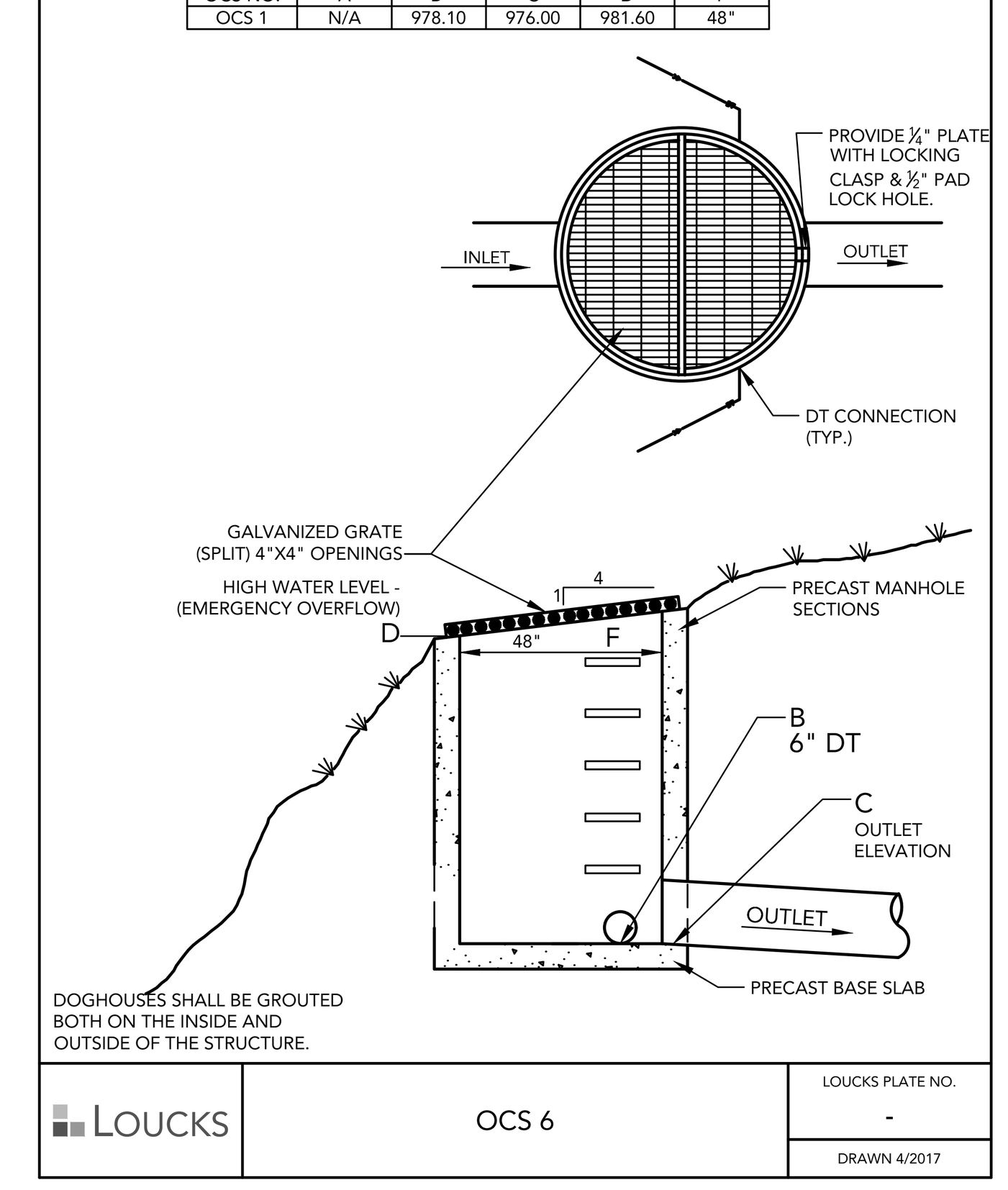


OUTLET CONTROL STRUCTURE ELEVATION TABLE							
OCS NO.	A	B	C	D	E	F	G
OCS 1	968.0	972.1	970.00	978.4	978.4	48"	975.0

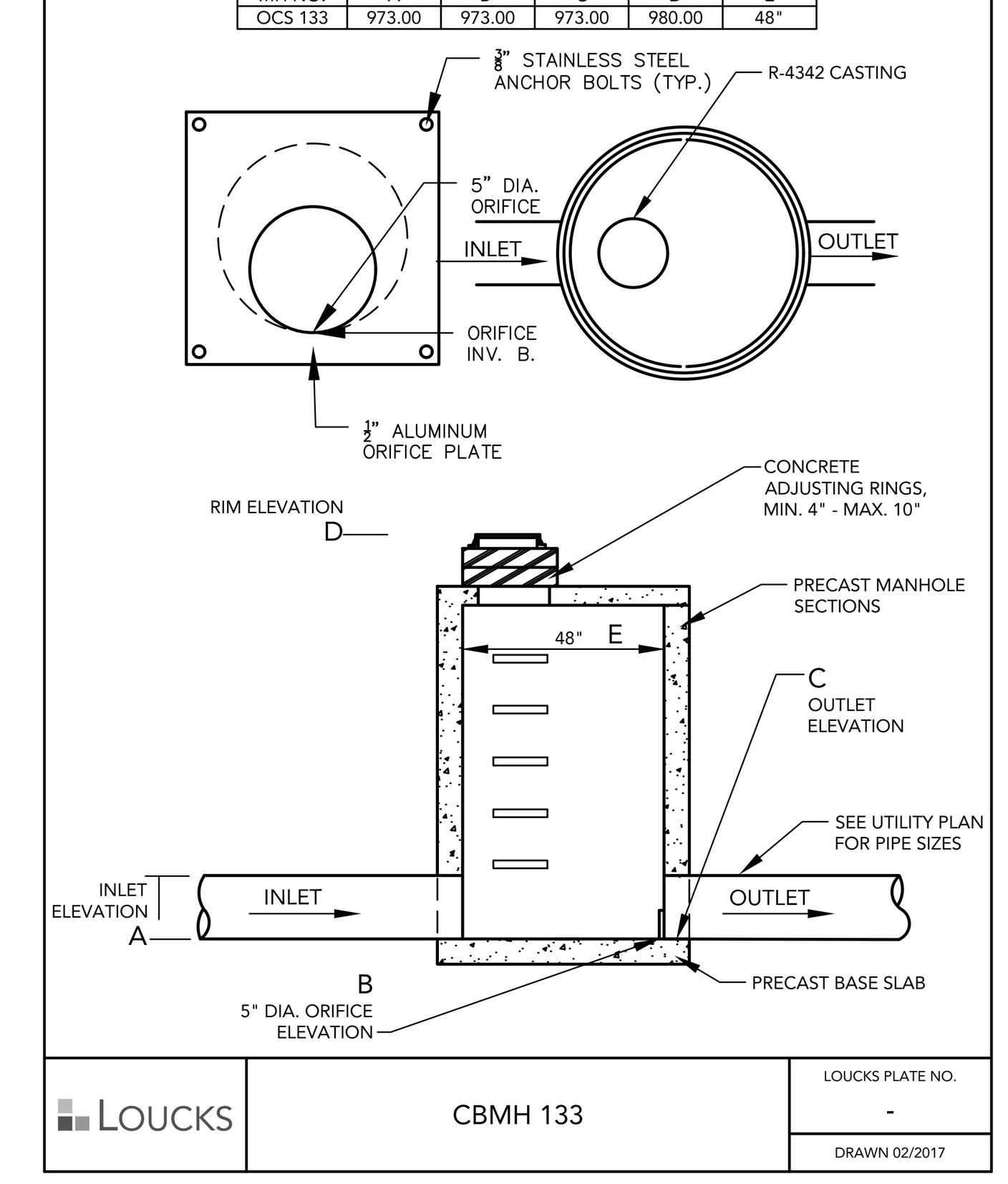




OUTLET CONTROL STRUCTURE ELEVATION TABLE					
OCS NO.	A	B	C	D	F
OCS 1	N/A	978.10	976.00	981.60	48"



CATCH BASIN MANHOLE STRUCTURE ELEVATION TABLE					
MH NO.	A	B	C	D	E
OCS 133	973.00	973.00	973.00	980.00	48"



CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

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Maple Grove, MN 55369
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CADD QUALIFICATION

SUBMITTAL/REVISIONS

04/20/18 CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

Todd W. McLouth - PE
License No. 20383
Date

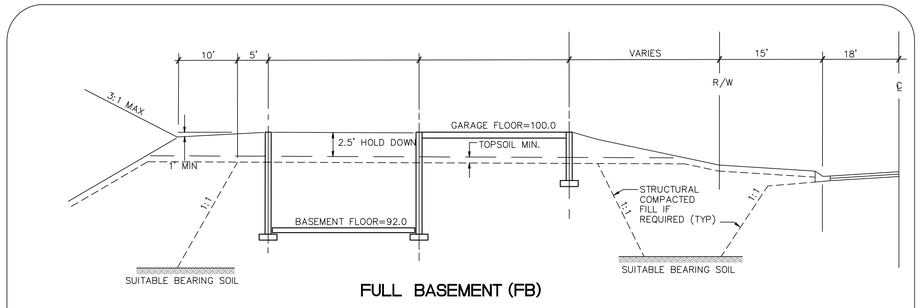
QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

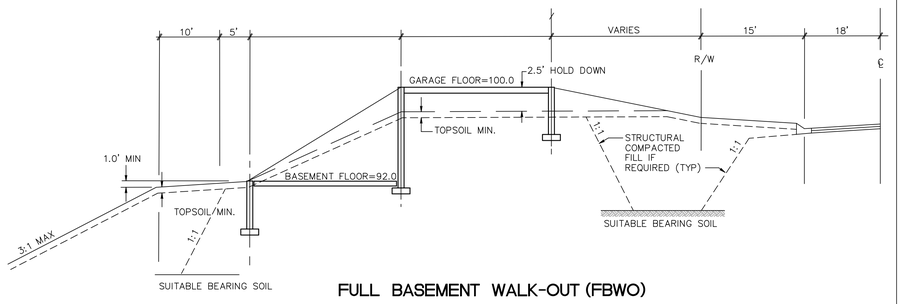
SHEET INDEX

DETAILS

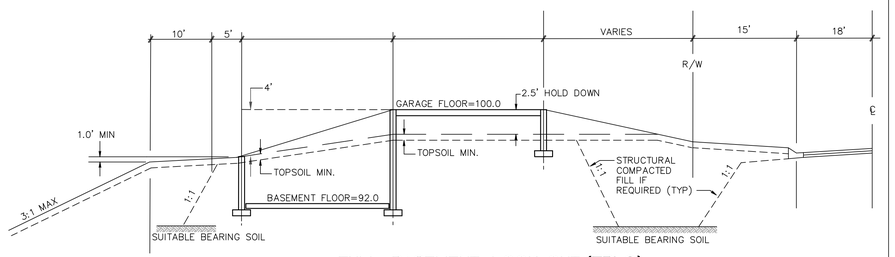
C8-1



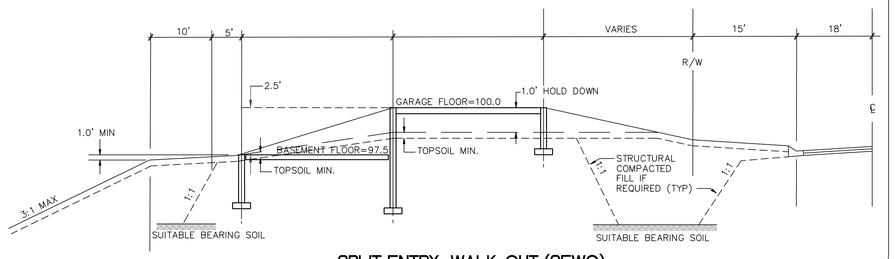
FULL BASEMENT (FB)



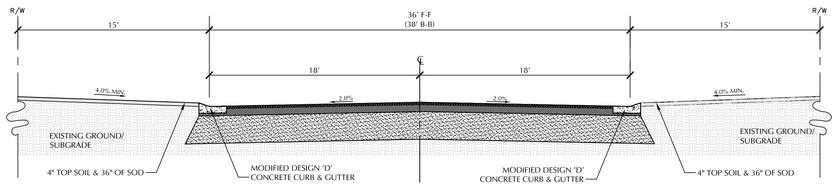
FULL BASEMENT WALK-OUT (FBWO)



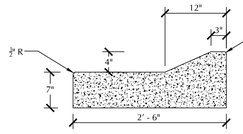
FULL BASEMENT LOOK-OUT (FBLO)



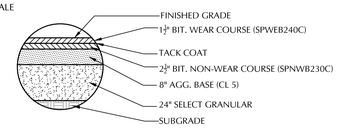
SPLIT ENTRY WALK-OUT (SEWO)



TYPICAL STREET SECTION
NOT TO SCALE



MODIFIED DESIGN 'D' CURB & GUTTER



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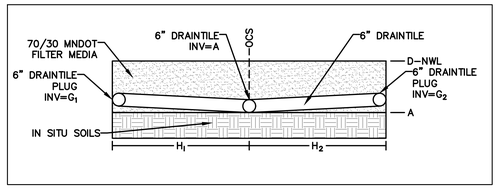

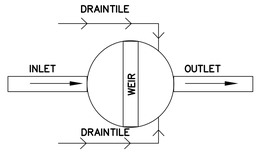

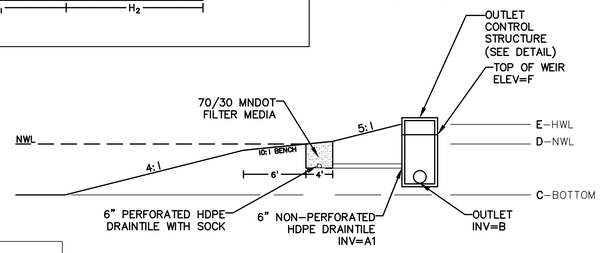

POND & FILTRATION BENCH DETAIL

POND & FILTRATION BENCH ELEVATION TABLE

POND NO	A	A1	B	C	D	E	F	G_1	G_2	H_1	H_2
POND 1	972.60	971.10	970.00	965.00	974.60	978.20	978.40	973.10	973.10	635	502
POND 4	956.60	956.10	955.92	953.00	958.60	962.10	959.00	957.10	957.10	244	245
POND 6	978.60	978.10	976.00	974.00	980.60	981.50	N/A	979.10	979.10	204	144

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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PRELIMINARY

License No. 20383
Date

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

DETAILS
C8-2

Plotted: 04 /18 / 2018 8:27 AM W:\2016\16101A\CADD DATA\CIVIL\ dwg Sheet Files\C8-1 DETAILS

TREE INVENTORY / REPLACEMENT - OVERALL SITE

	TOTAL TREES	TOTAL CAL. IN.
TOTAL SIGNIFICANT TREES ON-SITE	771	9,260.0 CAL. IN.
TREES TO BE SAVED	95	1,268.5 CAL. IN.
TREES TO BE REMOVED	676	7,991.5 CAL. IN.
TOTAL TREES TO BE MITIGATED	676	
PROPOSED POND SLOPE TREES - 12 TREES / ACRE PROPOSED LOT TREES - 2 TREES PER LOT	34 318	
TOTAL PROPOSED TREES	352	

TREE PROTECTION BOUNDARY - INSTALL SNOW FENCING OR POLYETHYLENE LAMINAR SAFETY NETTING AT DRIP LINE OF ALL TREES TO BE SAVED

N

0 100 200

SCALE IN FEET

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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SHEET INDEX

OVERALL TREE PRESERVATION PLAN

L0-1

Plotted: 04 /18 / 2018 11:8 AM W:\2016\16101A\CADD DATA\LANDSCAPE\ dwg Sheet Files - 4-A Addition\\16101A L0-1 Tree Preservation

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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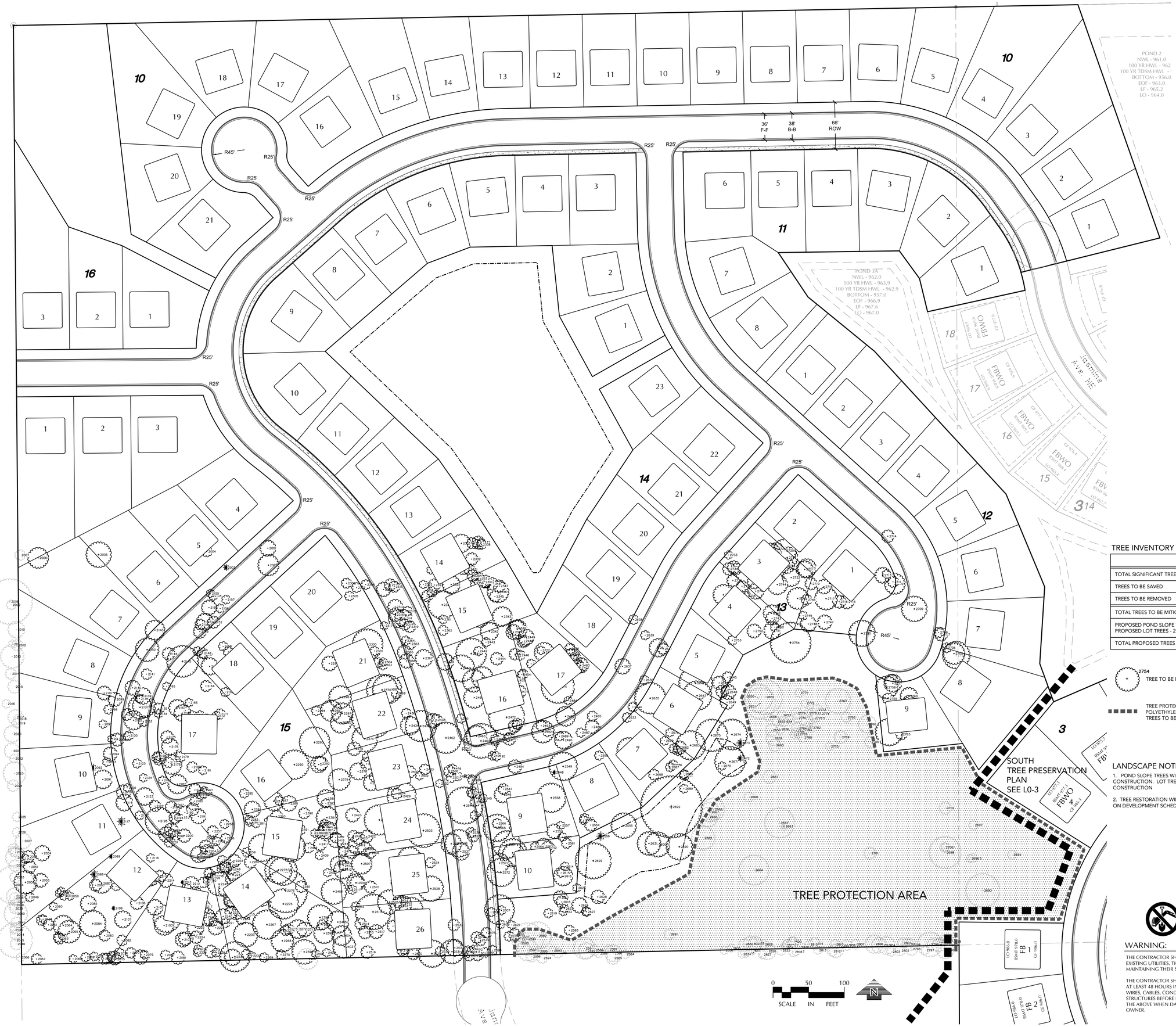

TREE INVENTORY / REPLACEMENT - NORTH

	TOTAL TREES	TOTAL CAL. IN.
TOTAL SIGNIFICANT TREES ON-SITE	771	9,260.0 CAL. IN.
TREES TO BE SAVED	95	1,268.5 CAL. IN.
TREES TO BE REMOVED	676	7,991.5 CAL. IN.
TOTAL TREES TO BE MITIGATED -	676	
PROPOSED POND SLOPE TREES - 12 TREES / ACRE PROPOSED LOT TREES - 2 TREES PER LOT	27 200	
TOTAL PROPOSED TREES - NORTH	227	

2754 TREE TO BE REMOVED - SEE SHEET L0-4

TREE PROTECTION BOUNDARY - INSTALL SNOW FENCING OR POLYETHYLENE LAMINAR SAFETY NETTING AT DRIP LINE OF ALL TREES TO BE SAVED

LANDSCAPE NOTES

1. POND SLOPE TREES WILL BE PLANTED AT TIME OF GRADING AND ROAD CONSTRUCTION. LOT TREES AND SHRUBS WILL BE PLANTED AT TIME OF BUILDING CONSTRUCTION
2. TREE RESTORATION WILL BE APPLIED AT TIME OF PHASED TREE REMOVAL BASED ON DEVELOPMENT SCHEDULE.

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

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SHEET INDEX

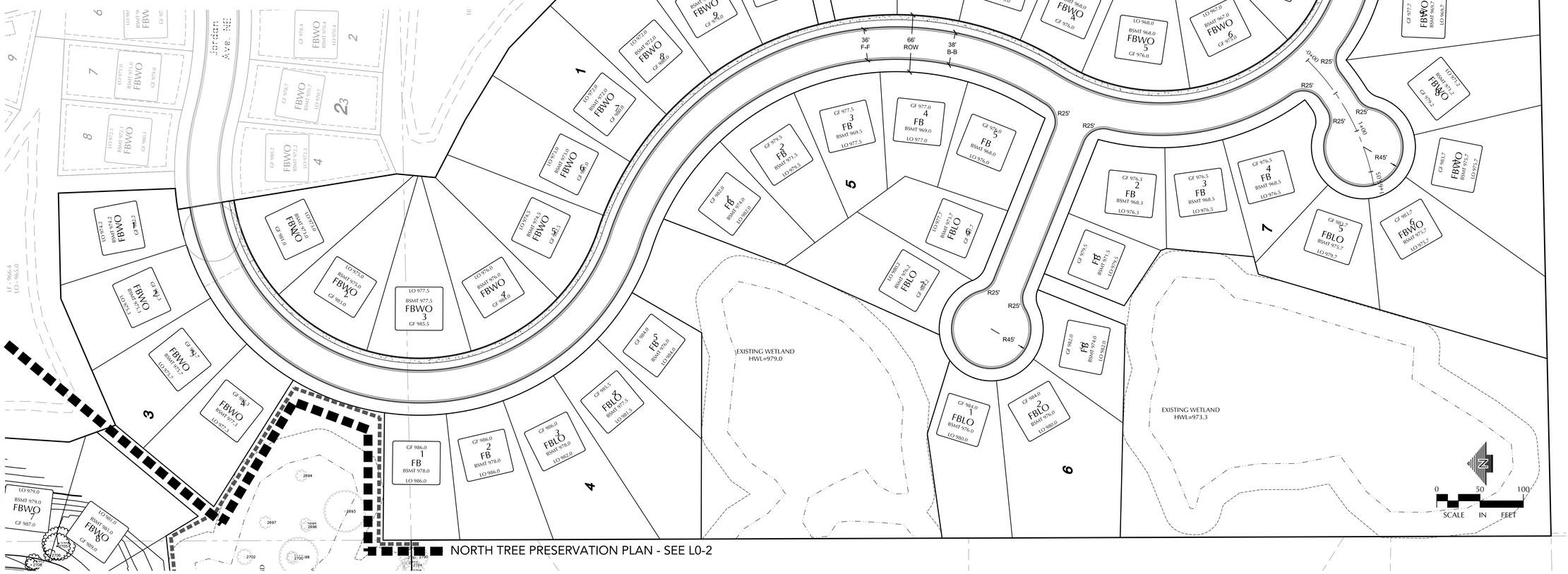
NORTH TREE PRESERVATION PLAN

L0-2

Plotted: 04 / 18 / 2018 1:15 PM W:\2016\16101A\CADD DATA\LANDSCAPE\ dwg Sheet Files - 4 & Addition\16101A L0-2 Tree Preservation

TREE INVENTORY / REPLACEMENT - SOUTH

	TOTAL TREES	TOTAL CAL. IN.
TOTAL SIGNIFICANT TREES ON-SITE	0	0
TREES TO BE SAVED	0	0
TREES TO BE REMOVED	0	0
TOTAL TREES TO BE MITIGATED -	0	
PROPOSED POND SLOPE TREES - 12 TREES / ACRE PROPOSED LOT TREES - 2 TREES PER LOT	7 118	
TOTAL PROPOSED TREES	125	



NORTH TREE PRESERVATION PLAN - SEE L0-2

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CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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04/20/18	CITY SUBMITTAL

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Date

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Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

SOUTH TREE PRESERVATION PLAN

L0-3

Plotted: 04 /18 / 2018 10:56 AM W:\2016\16101A\CADD DATA\LANDSCAPE\..dwg Sheet Files - 4-6 Addition\L16101A L0-2 Tree Preservation

TREE #	SPECIES	CAL. IN.	COND.	STEMS	SPECIMAN	STATUS
2001	Ash, green	14.0	Fair	2		Removed
2002	Elm, American	19.5	Good	1		Removed
2003	Redcedar	6.0	Good	1		Removed
2004	Elm, American	8.5	Good	1		Removed
2005	Maple, silver	24.0	Fair	1		Saved
2006	Maple, silver	19.0	Fair	1		Removed
2007	Elm, American	8.5	Good	1		Removed
2027	Ash, green	14.0	Good	1		Removed
2047	Ironwood	8.5	Fair	1		Removed
2048	Ironwood	6.0	Good	1		Removed
2049	Oak, red	7.0	Good	1		Removed
2051	Elm, American	10.5	Good	1		Removed
2054	Ironwood	13.5	Fair	1		Removed
2055	Basswood	12.0	Good	1		Removed
2056	Basswood	6.0	Good	1		Removed
2057	Basswood	6.0	Good	1		Removed
2058	Ironwood	7.0	Good	2		Removed
2059	Maple, silver	6.0	Good	1		Removed
2060	Ironwood	6.0	Good	1		Removed
2061	Elm, American	9.0	Good	1		Removed
2062	Ironwood	8.0	Good	1		Removed
2063	Ironwood	9.0	Good	1		Removed
2064	Ash, green	18.5	Good	1		Removed
2065	Ash, green	21.0	Good	1		Removed
2067	Maple, sugar	8.5	Good	1		Removed
2068	Ironwood	6.0	Fair	1		Removed
2069	Maple, sugar	7.0	Good	1		Removed
2070	Maple, sugar	6.5	Good	1		Removed
2071	Maple, sugar	9.0	Good	1		Removed
2072	Maple, sugar	9.0	Good	1		Removed
2073	Maple, sugar	8.0	Good	1		Removed
2074	Ash, green	11.5	Good	1		Removed
2075	Hickory, bitternut	8.0	Good	1		Removed
2076	Hickory, bitternut	8.5	Good	1		Removed
2077	Hickory, bitternut	8.5	Good	1		Removed
2078	Hickory, bitternut	12.5	Good	1		Removed
2079	Hickory, bitternut	6.5	Good	1		Removed
2080	Ironwood	7.5	Good	1		Removed
2081	Maple, silver	11.0	Good	1		Removed
2082	Ash, green	8.5	Good	1		Removed
2083	Hickory, bitternut	9.0	Good	1		Removed
2084	Oak, red	25.0	Good	1		Removed
2085	Ash, green	14.0	Good	1		Removed
2086	Ash, green	10.0	Good	1		Removed
2087	Ash, green	18.0	Good	1		Removed
2088	Redcedar	8.0	Good	1		Removed
2089	Redcedar	5.0	Good	1		Removed
2090	Oak, red	8.0	Good	1		Removed
2091	Ash, green	17.0	Good	1		Removed
2092	Redcedar	7.0	Good	1		Removed
2093	Maple, sugar	6.5	Good	1		Removed
2094	Ash, green	12.0	Good	1		Removed
2095	Ash, green	6.5	Good	1		Removed
2096	Ash, green	11.0	Good	1		Removed
2097	Cherry, black	6.0	Good	1		Removed
2098	Ash, green	7.0	Good	1		Removed
2099	Ironwood	12.0	Good	2		Removed
2100	Ash, green	11.5	Fair	1		Removed
2101	Ironwood	12.0	Good	2		Removed
2102	Basswood	13.0	Good	1		Removed
2103	Maple, sugar	18.0	Good	1		Removed
2104	Maple, sugar	26.0	Good	1		Removed
2105	Ash, green	14.0	Good	1		Removed
2106	Maple, sugar	11.0	Good	1		Removed
2107	Ash, green	15.0	Good	1		Removed
2108	Redcedar	4.5	Fair	1		Removed
2109	Maple, sugar	6.5	Good	1		Removed
2110	Hickory, bitternut	12.0	Good	1		Removed
2111	Basswood	12.0	Good	1		Removed
2112	Oak, bur	22.0	Good	1		Removed
2113	Maple, sugar	7.5	Good	1		Removed
2114	Ash, green	7.5	Good	1		Removed
2115	Maple, sugar	10.0	Good	1		Removed
2116	Maple, sugar	6.0	Fair	1		Removed
2117	Redcedar	9.0	Good	1		Removed
2118	Ash, green	15.0	Good	1		Removed
2119	Ash, green	12.5	Good	1		Removed
2120	Ironwood	6.0	Good	1		Removed
2121	Ironwood	6.5	Good	1		Removed
2122	Ironwood	9.0	Good	1		Removed
2123	Ironwood	16.0	Good	1		Removed
2124	Elm, American	6.0	Good	1		Removed
2125	Ash, green	7.0	Good	1		Removed
2126	Ash, green	7.0	Fair	1		Removed
2127	Ironwood	8.0	Fair	1		Removed
2128	Ironwood	7.0	Fair	1		Removed
2129	Ash, green	6.5	Good	1		Removed
2130	Maple, sugar	7.0	Good	1		Removed
2131	Ironwood	9.5	Good	1		Removed
2132	Ash, green	17.5	Good	1		Removed
2133	Maple, sugar	8.5	Good	1		Removed
2134	Ironwood	6.0	Good	1		Removed
2135	Ironwood	9.0	Good	2		Removed
2136	Ash, green	21.5	Good	1		Removed
2137	Ash, green	22.0	Good	1		Removed
2138	Ironwood	6.5	Good	1		Removed
2139	Ash, green	14.5	Good	1		Removed
2140	Ash, green	13.0	Good	1		Removed
2141	Elm, American	8.5	Good	1		Removed
2142	Ash, green	22.0	Good	1		Removed
2143	Ash, green	18.0	Fair	1		Removed
2144	Ironwood	10.5	Good	1		Removed
2145	Ash, green	30.5	Good	1	Yes	Removed
2146	Ironwood	7.0	Good	1		Removed
2147	Ironwood	6.5	Good	1		Removed
2148	Ironwood	8.5	Good	1		Removed
2149	Elm, American	11.0	Good	1		Removed
2150	Elm, American	8.5	Good	1		Removed
2151	Ash, green	15.0	Good	1		Removed
2152	Ash, green	10.0	Good	1		Removed
2153	Elm, American	13.0	Good	1		Removed
2154	Elm, American	7.0	Good	1		Removed
2155	Elm, American	6.0	Good	1		Removed
2156	Ash, green	6.5	Good	1		Removed
2157	Ash, green	6.5	Good	1		Removed
2158	Elm, American	7.0	Good	1		Removed
2159	Cherry, black	8.0	Good	1		Removed
2160	Oak, red	15.5	Good	1		Removed
2161	Redcedar	12.0	Good	1		Removed
2162	Ironwood	6.5	Fair	1		Removed
2163	Boxelder	7.0	Good	1		Removed
2164	Elm, American	9.0	Good	1		Removed
2165	Ironwood	6.0	Good	1		Removed
2166	Ironwood	6.0	Good	1		Removed
2167	Ash, green	15.0	Good	1		Removed
2168	Ash, green	15.0	Good	1		Removed
2169	Ironwood	6.0	Good	1		Removed
2170	Ironwood	6.0	Good	1		Removed
2171	Ash, green	8.0	Good	1		Removed
2172	Ash, green	6.5	Fair	1		Removed
2173	Elm, American	8.0	Good	1		Removed
2174	Elm, American	9.5	Good	1		Removed
2175	Maple, sugar	10.5	Good	1		Removed
2176	Ash, green	15.0	Good	1		Removed
2177	Ironwood	8.0	Fair	1		Removed
2178	Ironwood	18.0	Fair	2		Removed
2179	Ironwood	8.5	Good	1		Removed
2180	Ash, green	8.5	Good	1		Removed
2181	Ash, green	6.5	Good	1		Removed
2182	Ash, green	17.5	Good	1		Removed
2183	Ironwood	6.0	Good	1		Removed
2184	Maple, sugar	10.0	Good	1		Removed
2185	Maple, sugar	7.0	Good	1		Removed
2186	Oak, red	10.5	Good	1		Removed
2187	Oak, red	6.0	Good	1		Removed
2188	Maple, sugar	8.0	Good	1		Removed
2189	Elm, American	7.0	Good	1		Removed
2190	Maple, silver	10.5	Good	1		Removed
2191	Maple, silver	13.0	Good	1		Removed
2192	Ironwood	11.0	Fair	1		Removed
2193	Ash, green	6.0	Good	1		Removed
2194	Basswood	9.5	Good	1		Removed
2195	Ironwood	26.0	Fair	3		Removed
2196	Ash, green	13.5	Good	1		Removed
2197	Ash, green	12.0	Good	1		Removed
2198	Ash, green	6.0	Good	1		Removed
2199	Maple, sugar	8.0	Good	1		Removed
2200	Maple, silver	11.5	Good	1		Removed
2201	Maple, sugar	8.0	Good	1		Removed
2202	Maple, silver	10.5	Good	1		Removed
2203	Ironwood	6.0	Good	1		Removed
2204	Ash, green	11.5	Good	1		Removed
2205	Ash, green	14.5	Good	1		Removed
2206	Elm, American	6.5	Good	1		Removed
2207	Ash, green	7.5	Good	1		Removed
2208	Ash, green	6.5	Good	1		Removed
2209	Basswood	7.0	Good	1		Removed
2210	Ash, green	6.5	Good	1		Removed
2211	Ash, green	8.5	Good	1		Removed
2212	Ash, green	12.5	Good	1		Removed
2213	Redcedar	4.0	Fair	1		Removed
2214	Ironwood	12.0	Fair	3		Removed
2215	Ash, green	9.5	Good	1		Removed
2216	Ash, green	12.5	Good	1		Removed
2217	Ash, green	11.0	Good	1		Removed
2218	Ash, green	16.0	Good	2		Removed
2219	Ash, green	11.0	Fair	1		Removed
2220	Ash, green	6.5	Good	1		Removed
2221	Elm, American	7.0	Good	1		Removed
2222	Ash, green	12.5	Good	1		Removed
2223	Ash, green	15.0	Good	1		Removed
2224	Ash, green	10.5	Fair	1		Removed
2225	Maple, sugar	7.0	Good	1		Removed
2226	Maple, sugar	6.5	Good	1		Removed
2227	Ironwood	10.5	Good	1		Removed
2228	Ironwood	6.5	Good	1		Removed
2229	Basswood	14.5	Good	1		Removed
2230	Basswood	29.0	Good	1		Saved
2231	Maple, sugar	8.0	Good	1		Saved
2232	Maple, sugar	6.0	Good	1		Removed
2233	Maple, sugar	23.0	Fair	1		Removed
2234	Ash, green	8.5	Good	1		Removed
2235	Ash, green	7.0	Good	1		Removed
2236	Ash, green	7.5	Good	1		Removed
2237	Ash, green	8.0	Good	1		Removed
2238	Ash, green	8.5	Good	1		Removed
2239	Ash, green	10.5	Good	1		Removed
2240	Ash, green	13.5	Good	1		Removed
2241	Ash, green	9.5	Good	1		Removed
2242	Maple, sugar	6.0	Good	1		Removed
2243	Basswood	12.5	Fair	1		Removed
2244	Ash, green	13.0	Good	1		Removed
2245	Ash, green	22.0	Good	1		Removed
2246	Maple, sugar	8.5	Fair	1		Removed
2247	Ash, green	10.5	Good	1		Removed
2248	Ash, green	8.0	Good	1		Removed
2249	Ash, green	6.0	Good	1		Removed
2250	Maple, silver	9.5	Good	1		Removed
2251	Ash, green	10.0	Good	1		Removed
2252	Ash, green	6.0	Good	1		Removed
2253	Ash, green	11.0	Good	1		Removed
2254	Elm, American	7.0	Good	1		Removed
2255	Maple, sugar	6.5	Good	1		Removed
2256	Elm, American	7.5	Fair	1		Removed
2257	Oak, red	9.0	Good	1		Removed
2258	Elm, American	7.0	Good	1		Removed
2259	Ash, green	7.0	Good	1		Removed
2260	Ash, green	10.0	Good	1		Removed
2261	Ironwood	7.0	Good	1		Removed
2262	Ironwood	6.5	Good	1		Removed
2263	Ironwood	10.0	Good	1		Removed
2264	Ironwood	9.0	Fair	1		Removed
2265	Ash, green	7.0	Good	1		Removed
2266	Ash, green	6.5	Good	1		Removed
2267	Ash, green	28.0	Good	1		Removed
2268	Maple, sugar	21.0	Fair	1		Saved
2269	Maple, sugar	7.0	Good	1		Removed
2270	Maple, sugar	7.5	Good	1		Removed
2271	Maple, sugar	13.0	Good	1		Removed
2272	Maple, sugar	17.0	Good	1		Removed
2273	Maple, sugar	8.5	Good	1		Removed
2274	Maple, sugar	8.0	Fair	1		Removed
2275	Oak, white	29.0	Good	1		Removed
2276	Oak, red	43.0	Good	1	Yes	Removed
2277	Maple, sugar	27.0	Fair	1		Removed
2278	Maple, sugar	26.0	Good	1		Removed
2279	Maple, sugar	26.0	Good	1		Removed
2280	Ironwood	6.5	Good	1		Removed
2281	Elm, American	6.5	Good	1		Removed
2282	Elm, American	6.0	Good	1		Removed
2283	Maple, sugar	6.5	Fair	1		Removed
2284	Ash, green	14.5	Good	1		Removed
2285	Cherry, black	7.0	Fair	1		Removed
2286	Ash, green	17.5	Good	1		Removed
2287	Ash, green	7.0	Good	1		Removed
2288	Ash, green	13.5	Good	1		Removed
2289	Basswood	6.5	Good	1		Removed
2290	Maple, sugar	28.0	Good	1		Removed
2291	Ash, green	14.5	Good	1		Removed
2292	Ash, green	12.0	Good	1		Removed
2293	Basswood	29.5	Fair	1		Removed
2294	Ironwood	7.5	Good	1		Removed
2295	Maple, sugar	19.5	Good	1		Removed
2296	Maple, sugar	19.5	Fair	1		Removed
2297	Maple, sugar	19.5	Good	1		Removed
2298	Oak, bur	21.0	Good	1		Removed
2299	Ash, green	13.0	Fair	1		Removed
2300	Oak, white	29.5	Good	1		Removed
2301	Crabapple	7.0	Good	1		Removed
2302	Ironwood	8.0	Good	1		Removed
2303	Ironwood	7.5	Good	1		Removed
2304	Ironwood	6.0	Good	1		Removed
2305	Aspen	7.0	Good	1		Removed
2306	Aspen	8.0	Good	1		Removed
2307	Aspen	7.5	Good	1		Removed
2308	Aspen	7.5	Good	1		Removed
2309	Oak, red	12.5	Good	1		Removed
2310	Ironwood	10.0	Good	2		Removed
2311	Ironwood	9.0	Fair	1		Removed
2312	Ash, green	13.0	Good	1		Removed
2313	Ironwood	7.5	Good	1		Removed
2314	Ash, green	15.5	Good	1		Removed
2315	Ash, green	16.0	Good	1		Removed
2316	Ash, green	11.5	Good	1		Removed
2317	Ironwood	6.0	Good	1		Removed
2318	Ironwood	9.0	Good	1		Removed
2319	Ironwood	9.5	Good	1		Removed
2320	Aspen	9.0	Good	1		Removed
2321	Aspen	8.0	Good	1		Removed
2322	Aspen	6.0	Good	1		Removed
2323	Aspen	10.0	Good	1		Removed
2324	Oak, red	27.0	Good	1		Removed
2325	Ironwood	16.0	Fair	2		Removed
2326	Aspen	7.0	Good	1		Removed
2327	Aspen	11.5	Good	1		Removed
2328	Aspen	6.0	Good	1		Removed
2329	Aspen	12.5	Good	1		Removed
2330	Aspen	11.5	Good	1		Removed
2331	Aspen	9.0	Good	1		Removed
2332	Aspen	10.5	Fair	1		Removed
2333	Ash, green	16.5	Fair	4		Removed
2334	Ash, green	9.0	Good	2		Removed
2335	Aspen	6.0	Good	1		Removed
2336	Ash, green	11.0	Fair	2		Removed
2337	Aspen	6.0	Good	1		Removed
2338	Aspen	7.5	Good	1		Removed
2339	Oak, red	17.5	Good	1		Removed
2340	Ash, green	13.5	Good	1		Removed
2341	Hickory, bitternut	13.0	Good	1		Removed
2342	Elm, Siberian	16.5	Good	1		Removed
2343	Ironwood	18.0	Good	1		Removed
2344	Hickory, bitternut	18.5	Fair	1		Removed
2345	Ironwood	9.0	Good	1		Removed
2346	Ash, green	20.0	Good	1		Removed
2347	Aspen	10.0	Good	1		Removed
2348	Aspen	10.5	Good	1		Removed
2349	Aspen	8.0	Good	1		Removed
2350	Aspen	10.5	Good	1		Removed
2351	Aspen	9.5	Good	1		Removed
2352	Aspen	6.0	Good	1		Removed
2353	Aspen	10.5	Good	1		Removed
2354	Aspen	9.5	Good	1		Removed
2355	Ironwood	9.5	Good	1		Removed
2356	Aspen	6.5	Good	1		Removed
2357	Aspen	6.0	Good	1		Removed
2358	Aspen	9.0	Good	1		Removed
2359	Aspen	6.0	Good	1		Removed
2360	Aspen	7.5	Good	1		Removed
2361	Elm, red	6.5	Good	1		Removed
2362	Elm, red	8.0	Good	1		Removed
2363	Ironwood	9.0	Good	1		Removed
2364	Ironwood	7.0	Good	1		Removed
2365	Elm, American	12.0	Good	1		Removed
2366	Ironwood	12.5	Good	1		Removed
2367	Ash, green	15.5	Good	1		Removed
2368	Elm, Siberian	8.5	Good	1		Removed
2369	Basswood	28.0	Good	1		Removed
2370	Oak, red	30.0	Good	1	Yes	Removed
2371	Elm, Siberian	7.0	Good	1		Removed
2372	Basswood	40.5	Good	1	Yes	Removed
2373	Elm, red	8.0	Good	1		Removed
2374	Maple, sugar	24.5	Good	1		Removed
2375	Ash, green	11.5	Good	1		Removed
2376	Ash, green	6.5	Good	1		Removed
2377	Ash, green	10.5	Good	1		Removed
2378	Ash, green	15.0	Good	1		Removed
2379	Ash, green	20.0	Good	1		Removed
2380	Ash, green	16.0	Good	1		Removed
2381	Ash, green	20.0	Good	1		Removed
2382	Maple, sugar	6.0	Good	1		Removed
2383	Ash, green	6.5	Good	1		Removed
2384	Maple, sugar	10.5	Good	1		Removed
2385	Maple, sugar	9.0	Good	1		Removed
2386	Ash, green	8.5	Good	1		Removed
2387	Hickory, bitternut	9.5	Good	1		Removed
2388	Maple, sugar	6.0	Good	1		Removed
2389	Maple, sugar	6.0	Good	1		Removed
2390	Ash, green	9.0	Good	1		Removed
2391	Hickory, bitternut	8.5	Good	1		Removed
2392	Ironwood	8.0	Good	1		Removed
2393	Ash, green	10.0	Good	1		Removed
2394	Oak, white	27.0	Good	1		Removed
2395	Elm, American	9.5	Good	1		Removed
2396	Maple, sugar	23.5	Good	1		Removed
2397	Maple, sugar	8.0	Fair	1		Removed
2398	Oak, white	19.0	Fair	1		Saved
2399	Oak, white	23.0	Good	1		Removed
2401	Maple, sugar	6.0	Good	1		Removed
2402	Ironwood	6.0	Good	1		Removed
2403	Oak, white	21.5	Good	1		Removed
2404	Maple, sugar	18.0	Good	1		Removed
2405	Maple, sugar	20.5	Good	1		Removed
2406	Maple, sugar	24.0	Good	1		Removed
2407	Ironwood	6.0	Good	1		Removed
2408	Basswood	14.0	Good	1		Removed
2409	Ironwood	6.5	Good	1		Removed
2410	Ironwood	8.0	Good	1		Removed
2411	Oak, red	11.0	Good	1		Removed
2412	Ash, green	17.0	Fair	1		Removed
2413	Maple, sugar	7.0	Good	1		Removed
2414	Elm, American	11.0	Good	1		Removed
2415	Maple, sugar	7.0	Good	1		Removed
2416	Maple, sugar	6.0	Good	1		Removed
2417	Ash, green	8.5	Fair	1		Removed
2418	Basswood	13.0	Good	1		Removed
2419	Oak, red	16.0	Good	1		Removed
2420	Maple, sugar	10.0	Good	1		Removed
2421	Hickory, bitternut	9.0	Fair	1		Removed
2422	Ironwood	10.5	Fair	1		Removed
2423	Ash, green	12.0	Good	1		Removed
2424	Maple, sugar	29.0	Fair	1		Removed
2425	Maple, sugar	13.5	Good	1		Removed
2426	Elm, American	8.0	Good	1		Removed
2427	Maple, sugar	23.0	Good	1		Removed
2428	Elm, American	8.5	Good	1		Removed
2429	Maple, sugar	28.0	Good	1		Removed
2430	Elm, American	10.0	Good	1		Removed
2431	Elm, American	12.5	Good	1		Removed
2432	Elm, American	6.0	Fair	1		Removed
2433	Hickory, bitternut	8.5	Good	1		Removed
2434	Ash, green	17.0	Good	1		Removed
2435	Basswood	30.0	Fair	1	Yes	Removed
2436	Ironwood	7.5	Fair	1		Removed
2437	Ash, green	12.5	Good	1		Removed
2438	Ash, green	9.0	Good	1		Removed
2439	Ironwood	15.0	Fair	1		Removed
2440	Maple, sugar	25.5	Fair	1		Removed
2441	Basswood	29.5	Good	1		Removed
2442	Basswood	7.0	Fair	1		Removed
2443	Elm, Siberian	7.0	Good	1		Removed
2444	Hickory, bitternut	10.5	Good	1		Removed
2445	Ash, green	9.5	Good	1		Removed
2446	Hickory, bitternut	7.5	Good	1		Removed
2447	Elm, red	9.5	Good	1		Removed
2448	Hickory, bitternut	9.5	Good	1		Removed
2449	Ash, green	14.0	Good	1		Removed
2450	Hickory, bitternut	6.0	Good	1		Removed
2451	Ash, green	18.0	Good	1		Removed
2452	Elm, American	7.0	Good	1		Removed
2453	Elm, American	8.0	Good	1		Removed
2454	Elm, American	6.5	Good	1		Removed
2455	Hickory, bitternut	7.0	Good	1		Removed
2456	Hickory, bitternut	14.0	Fair	2		Removed
2457	Ash, green	8.0	Fair	1		Removed
2458	Maple, sugar	20.0	Good	1		Removed
2459	Maple, sugar	21.0	Good	1		Removed
2460	Maple, sugar	19.5	Good	1		Removed
2461	Hickory, bitternut	7.0	Good	1		Removed
2462	Maple, sugar	30.0	Fair	1	Yes	Removed
2463	Oak, white	19.5	Good	1		Removed
2464	Oak, red	33.5	Good	1	Yes	Removed
2465	Elm, American	7.0	Good	1		Removed
2466	Ironwood	7.5	Good	1		Removed
2467	Ash, green	10.5	Good	1		Removed
2468	Ironwood	6.5	Good	1		Removed
2469	Ash, green	10.0	Good	1		Removed
2470	Ironwood	7.0	Good	1		Removed
2471	Ironwood	8.5	Good	1		Removed
2472	Oak, red	35.0	Good	1	Yes	Removed
2473	Ash, green	11.0	Good	1		Removed
2474	Oak, red	32.0	Good	1	Yes	Removed
2475	Ironwood	9.5	Fair	1		Removed
2476	Ash, green	8.5	Good	1		Removed
2477	Ash, black	9.5	Good	1		Removed
2478	Ash, black	16.5	Good	1		Removed
2479	Ash, black	8.5	Good	1		Removed
2480	Ash, black	9.5	Good	1		Removed
2481	Ash, black	11.0	Good	1		Removed
2482	Ash, black	9.0	Good	1		Removed
2483	Hickory, bitternut	13.5	Good	1		Removed
2484	Elm, American	6.0	Fair	1		Removed
2485	Ash, green	8.0	Good	1		Removed
2486	Ash, green	12.0	Good	1		Removed
2487	Ash, green	7.0	Good	1		Removed
2488	Ironwood	18.0	Fair	2		Removed
2489	Hickory, bitternut	7.0	Good	1		Removed
2490	Ash, green	16.0	Good	1		Removed
2491	Hickory, bitternut	6.0	Good	1		Removed
2492	Ash, green	21.0	Good	1		Removed
2493	Hickory, bitternut	8.5	Good	1		Removed
2494	Elm, American	11.5	Fair	1		Removed
2495	Elm, American	7.0	Good	1		Removed
2496	Elm, American	6.5	Good	1		Removed
2497	Hickory, bitternut	7.5	Good	1		Removed
2498	Elm, American	6.5	Good	1		Removed
2499	Elm, American	7.0	Good	1		Removed
2500	Basswood	9.0	Good	1		Removed
2501	Elm, American	8.0	Good	1		Removed
2502	Hickory, bitternut	6.0	Good	1		Removed
2503	Oak, red	32.5	Fair	1	Yes	Removed
2504	Maple, sugar	22.5	Good	1		Removed
2505	Maple, sugar	12.0	Fair	1		Removed
2506	Hickory, bitternut	9.0	Good	1		Removed
2507	Ash, green	19.0	Good	1		Removed
2508	Ash, green	16.0	Fair	1		Removed
2509	Ash, green	12.0	Good	1		Removed
2510	Maple, red	10.0	Good	1		Removed
2511	Ironwood	7.0	Good	1		Removed
2512	Ironwood	7.0	Good	1		Removed
2513	Oak, white	34.5	Good	1	Yes	Removed
2514	Elm, American	9.5	Good	1		Removed
2515	Ash, green	11.0	Fair	1		Removed
2516	Maple, sugar	10.5	Good	1		Removed
2517	Hackberry	12.0	Good	1		Removed
2518	Maple, sugar	8.0	Good	1		Removed
2519	Ironwood	7.5	Good	1		Removed
2520	Maple, sugar	10.0	Good	1		Removed
2521	Maple, sugar	22.0	Good	1		Removed
2522	Maple, sugar	15.5	Good	1		Removed
2523	Maple, sugar	15.0	Good	1		Removed
2524	Maple, sugar	11.0	Fair	1		Removed
2525	Basswood	9.5	Good	1		Removed
2526	Maple, sugar	23.0	Good	1		Removed
2527	Basswood	13.5	Good	1		Removed
2528	Maple, sugar	24.0	Fair	1		Removed
2529	Basswood	26.0	Good	1		Removed
2530	Ironwood	8.0	Good	1		Removed
2531	Basswood	22.5	Good	1		Removed
2532	Basswood	15.0	Good	1		Removed
2533	Basswood	9.5	Fair	1		Removed
2534	Elm, American	8.0	Good	1		Removed
2535	Maple, sugar	19.0	Good	1		Removed
2536	Oak, red	26.0	Good	1		Removed
2537	Maple, sugar	15.5	Good	1		Removed
2538	Elm, American	9.5	Good	1		Removed
2539	Hickory, bitternut	8.0	Good	1		Removed
2540	Hickory, bitternut	6.5	Good	1		Removed
2541	Basswood	36.0	Fair	2		Removed
2542	Elm, red	7.5	Good	1		Removed
2543	Hickory, bitternut	6.5	Good	1		Removed
2544	Maple, sugar	9.0	Good	1		Removed
2545	Hickory, bitternut	6.5	Good	1		Removed
2546	Ash, green	14.5	Fair	1		Removed
2547	Hickory, bitternut	8.5	Good	1		Removed
2548	Redcedar	4.5	Good	1		Removed
2549	Basswood	27.0	Good	1		Removed
2550	Ash, green	7.0	Good	1		Removed
2551	Ash, green	16.5	Good	1		Removed
2552	Basswood	7.5	Good	1		Removed
2553	Basswood	6.5	Good	1		Removed
2554	Ash, green	10.0	Good	1		Removed
2555	Oak, bur	24.0	Good	1		Removed
2556	Redcedar	8.5	Good	1		Removed
2557	Ash, green	6.0	Good	1		Removed
2558	Maple, silver	28.0	Fair	1		Removed
2559	Elm, American	12.5	Good	1		Removed
2560	Ash, green	6.5	Good	1		Removed
2561	Maple, sugar	8.0	Good	1		Removed
2562	Hickory, bitternut	11.0	Good	1		Removed
2563	Ash, green	14.5	Good	1		Removed
2564	Elm, American	6.5	Good	1		Removed
2565	Ash, green	26.0	Fair	1		Removed
2566	Elm, American	7.5	Fair	1		Removed
2567	Ash, green	26.5	Good	1		Removed
2568	Maple, silver	27.0	Fair	1		Removed
2569	Ash, green	21.0	Good	1		Removed
2570	Elm, American	8.0	Good	1		Removed
2571	Maple, silver	17.6	Good	1		Removed
2572	Maple, silver	27.0	Fair	1		Removed
2573	Elm, American	7.0	Good	1		Removed
2574	Ash, green	9.5	Good	1		Removed
2575	Hickory, bitternut	9.5	Good	1		Removed
2576	Hackberry	8.5	Good	1		Saved
2577	Ash, green	7.5	Good	1		Removed
2578	Elm, American	10.0	Good	1		Saved
2579	Hickory, bitternut	7.0	Good	1		Saved
2580	Oak, red	9.5	Good	1		Saved
2581	Oak, white	31.0	Good	1	Yes	Saved
2582	Oak, bur	26.5	Good	1		Saved
2583	Ash, green	8.0	Good	1		Removed
2587	Ash, black	6.5	Good	1		Removed
2589	Ash, green	8.5	Good	1		Saved
2590	Ash, green	14.5	Good	1		Saved
2591	Maple, silver	20.0	Fair	1		Saved
2592	Ash, green	8.0	Fair	1		Saved
2593	Ash, green	7.0	Good	1		Removed
2595	Elm, American	7.0	Good	1		Removed
2597	Ash, green	20.0	Good	1		Saved
2598	Ironwood	7.5	Good	1		Removed
2599	Maple, sugar	8.0	Good	1		Removed
2600	Hickory, bitternut	8.5	Good	1		Removed
2601	Maple, sugar	6.5	Fair	1		Removed
2602	Hickory, bitternut	6.5	Good	1		Removed
2603	Elm, American	7.5	Good	1		Removed
2604	Ironwood	9.5	Fair	1		Removed
2605	Hickory, bitternut	8.0	Good	1		Saved
2606	Maple, sugar	28.5	Good	1		Removed
2607	Elm, American	7.0	Fair	1		Removed
2608	Ash, green	7.5	Good	1		Removed
2609	Ash, green	8.0	Good	1		Removed
2610	Ash, green	6.5	Good	1		Removed
2611	Maple, sugar	6.0	Good	1		Removed
2612	Basswood	14.5	Fair	2		Removed
2613	Ash, green	13.5	Good	1		Removed
2614	Ironwood	6.5	Good	1		Removed
2615	Ironwood	6.5	Good	1		Removed
2616	Oak, red	17.5	Good	1		Removed
2617	Basswood	12.0	Good	1		Saved
2618	Basswood	10.0	Good	1		Saved
2619	Ash, green	7.0	Good	1		Removed
2620	Hickory, bitternut	6.5	Good	1		Removed
2621	Ash, green	6.0	Good	1		Removed
2622	Ash, green	6.5	Good	1		Removed
2623	Ash, green	6.0	Good	1		Removed
2624	Maple, sugar	13.5	Good	1		Removed
2625	Ironwood	6.0	Good	1		Saved
2626	Ironwood	7.0	Good	1		Removed
2627	Ash, green	7.0	Good	1		Removed
2628	Hickory, bitternut	11.5	Good	1		Removed
2629	Oak, white	35.0	Good	1	Yes	Removed
2630	Basswood	23.5	Fair	1		Removed
2631	Oak, white	22.0	Good	1		Removed
2632	Ash, green	23.0	Fair	1		Removed
2633	Elm, American	7.5	Good	1		Removed
2634	Elm, American	7.5	Good	1		Removed
2635	Maple, sugar	30.0	Fair	1	Yes	Removed
2636	Elm, American	7.0	Good	1		Removed
2637	Elm, American	13.5	Good	1		Removed
2638	Elm, American	7.5	Good	1		Removed
2639	Elm, American	7.0	Good	1		Removed
2640	Ash, green	16.5	Good	1		Removed
2641	Ash, green	9.5	Good	1		Removed
2642	Maple, sugar	32.5	Good	1	Yes	Removed
2643	Oak, red	28.0	Fair	1		Removed
2644	Ash, green	11.5	Good	1		Removed
2645	Elm, American	9.0	Good	1		Removed
2646	Maple, sugar	10.5	Fair	1		Removed
2647	Elm, American	6.5	Good	1		Removed
2648	Ash, green	13.0	Good	1		Removed
2649	Elm, American	12.0	Good	1		Removed
2650	Maple, silver	27.0	Fair	1		Saved
2651	Maple, silver	30.0	Good	1	Yes	Saved
2652	Maple, silver	34.0	Fair	1	Yes	Saved
2653	Ash, green	7.5	Good	1		Saved
2654	Ash, green	8.5	Good	1		Saved
2655	Ash, green	6.5	Good	1		Saved
2656	Ash, green	7.5	Fair	1		Saved
2657	Ash, green	10.5	Good	1		Saved
2658	Ash, green	6.5	Fair	1		Saved
2659	Ash, green	12.5	Good	1		Saved
2660	Ash, green	10.5	Good	1		Saved
2661	Elm, American	11.5	Good	1		Saved
2662	Ash, green	29.0	Good	1		Saved
2663	Redcedar	10.0	Good	2		Saved
2664	Ash, green	29.0	Good	1		Saved
2665	Maple, red	22.0	Good	1		Saved
2666	Maple, sugar	18.0	Good	1		Saved
2667	Maple, sugar	18.0	Good	1		Saved
2668	Maple, sugar	21.0	Fair	1		Saved
2669	Ash, green	8.0	Good	1		Removed
2670	Elm, American	6.0	Good	1		Removed
2671	Basswood	29.0	Fair	1		Removed
2672	Redcedar	6.5	Fair	1		Saved
2673	Redcedar	8.0	Good	1		Removed
2674	Maple, sugar	29.5	Fair	1		Removed
2675	Oak, red	31.0	Good	1	Yes	Removed
2676	Ash, green	6.5	Good	1		Removed
2677	Hickory, bitternut	6.0	Good	1		Removed
2678	Ash, green	6.0	Good	1		Removed
2679	Ash, green	6.5	Good	1		Removed
2680	Basswood	7.5	Good	1		Removed
2681	Maple, sugar	7.5	Good	1		Removed
2682	Maple, red	11.0	Good	1		Removed
2683	Oak, red	28.0	Good	1		Removed
2684	Hickory, bitternut	7.5	Good	1		Removed
2685	Elm, American	6.5	Good	1		Removed
2686	Ash, green	7.5	Good	1		Removed
2687	Elm, American	7.0	Good	1		Removed
2688	Hickory, bitternut	8.5	Good	1		Removed
2689	Oak, red	6.5	Good	1		Removed
2690	Oak, white	25.0	Good	1		Saved
2691	Ash, green	8.5	Good	1		Removed
2692	Basswood	62.0	Fair	5		Saved
2693	Ash, green	33.0	Good	1	Yes	Saved
2694	Ash, green	7.0	Good	1		Removed
2695	Elm, American	7.0	Good	1		Saved
2696	Ash, green	6.0	Good	1		Saved
2697	Ash, green	7.5	Good	1		Saved
2698	Maple, silver	31.0	Fair	1	Yes	Saved
2699	Ash, green	6.5	Fair	1		Saved
2700	Ash, green	7.0	Good	1		Saved
2701	Elm, American	10.0	Good	1		Saved
2702	Ash, green	10.5	Good	1		Saved
2703	Ash, green	6.0	Fair	1		Removed
2704	Ash, green	26.0	Fair	5		Removed
2705	Ash, green	20.0	Fair	4		Removed
2706	Elm, American	7.5	Good	1		Removed
2707	Ash, green	11.0	Fair	2		Removed
2708	Ash, green	8.0	Fair	1		Removed
2709	Ash, green	24.0	Fair	5		Removed
2710	Ash, green	19.0	Fair	3		Removed
2711	Ash, green	9.0	Fair	2		Removed
2712	Ash, green	6.0	Good	1		Removed
2713	Elm, American	14.0	Fair	1		Removed
2714	Willow	10.5	Good	1		Removed
2715	Maple, red	12.0	Fair	1		Removed
2716	Elm, American	11.0	Good	1		Removed
2717	Ash, green	21.0	Good	1		Removed
2718	Elm, American	12.5	Good	1		Removed
2719	Ironwood	10.0	Good	1		Removed
2720	Ash, green	17.0	Good	1		Removed
2721	Ash, green	15.0	Good	1		Removed
2722	Ash, green	16.0	Good	1		Removed
2723	Ironwood	13.5	Good	1		Removed
2724	Ash, green	19.5	Good	1		Removed
2725	Ash, green	21.5	Good	1		Removed
2726	Ash, green	10.5	Good	1		Removed
2727	Ash, green	8.5	Fair	1		Removed
2728	Ash, black	17.5	Fair	1		Removed
2729	Ironwood	6.5	Good	1		Removed
2730	Hickory, bitternut	8.0	Good	1		Removed
2731	Ironwood	9.0	Good	1		Removed
2732	Ironwood	11.0	Fair	1		Removed
2733	Ash, green	6.0	Good	1		Removed
2734	Ash, green	10.5	Good	1		Removed
2735	Ironwood	10.0	Good	1		Removed
2736	Ash, green	19.0	Good	1		Removed
2737	Basswood	12.0	Good	2		Removed
2738	Ironwood	6.0	Good	1		Removed
2739	Ironwood	9.0	Good	2		Removed
2740	Ironwood	12.0	Good	1		Removed
2741	Basswood	14.0	Good	1		Removed
2742	Ash, green	15.0	Good	1		Removed
2743	Ironwood	11.0	Good	1		Removed
2744	Ash, green	18.5	Good	1		Removed
2745	Ash, green	20.0	Good	1		Removed
2746	Elm, red	8.5	Good	1		Removed
2747	Ironwood	12.5	Good	1		Removed
2748	Ash, green	14.0	Good	1		Removed
2749	Elm, red	6.5	Good	1		Removed
2750	Ironwood	6.5	Good	1		Removed
2751	Maple, sugar	15.0	Fair	1		Removed
2752	Ash, green	12.0	Good	1		Removed
2753	Elm, American	7.5	Good	1		Removed
2754	Oak, red	40.0	Fair	1	Yes	Removed
2755	Ash, green	25.0	Good	1		Removed
2756	Ironwood	11.5	Good	1		Removed
2757	Maple, sugar	16.0	Good	1		Removed
2758	Ash, green	21.0	Good	1		Removed
2759	Ironwood	9.0	Good	1		Removed
2760	Ash, green	15.5	Good	1		Removed
2761	Elm, American	7.0	Good	1		Removed
2762	Ironwood	9.0	Good	1		Removed
2763	Ironwood	9.0	Good	1		Removed
2764	Maple, sugar	26.0	Good	1		Removed
2765	Ash, green	9.0	Good	1		Saved
2766	Elm, American	16.0	Good	1		Saved
2767	Oak, white	24.0	Good	1		Saved
2768	Elm, American	8.0	Good	1		Saved
2769	Elm, American	11.0	Good	1		Saved
2770	Ash, green	6.0	Fair	1		Saved
2771	Ash, green	7.0	Good	1		Saved
2772	Ash, green	6.0	Good	1		Saved
2773	Elm, American	8.5	Good	1		Saved
2774	Ash, green	7.0	Good	1		Saved
2775	Ash, green	6.5	Good	1		Saved
2776	Ash, green	6.0	Good	1		Saved
2777	Ash, green	9.0	Good	1		Saved
2778	Ash, green	6.5	Good	1		Saved
2779	Ash, green	8.5	Good	1		Saved
2780	Ash, green	8.0	Good	1		Saved
2781	Ash, green	7.5	Good	1		Saved
2782	Ash, green	6.5	Good	1		Saved
2783	Ash, green	9.0	Good	1		Saved
2784	Ash, green	11.0	Good	1		Saved
2785	Ash, green	6.5	Good	1		Saved
2786	Ash, green	6.0	Good	1		Saved
2787	Ash, green	6.5	Good	1		Saved
2788	Elm, American	7.5	Good	1		Saved
2789	Cherry, black	6.5	Fair	1		Saved
2791	Oak, bur	8.5	Fair	1		Saved
2792	Oak, red	6.0	Fair	1		Saved
2793	Basswood	6.5	Good	1		Saved
2794	Basswood	11.5	Good	1		Saved
2795	Oak, red	12.0	Good	1		Saved
2796	Oak, red	23.5	Good	1		Removed
2799	Oak, red	10.0	Fair	1		Saved
2800	Basswood	9.0	Good	1		Saved
2801	Ash, green	8.0	Good	1		Removed
2804	Basswood	16.0	Good	1		Saved
2805	Basswood	13.5	Good	1		Saved
2806	Elm, American	16.5	Good	1		Saved
2807	Ash, green	7.5	Good	1		Saved
2808	Ash, green	8.5	Good	1		Saved
2809	Oak, bur	6.5	Good	1		Saved
2810	Oak, bur	7.5	Good	1		Removed
2814	Ash, green	10.0	Good	1		Saved
2815	Elm, American	6.5	Fair	1		Saved
2816	Oak, bur	8.5	Good	1		Saved

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

LOUCKS
PLANNING
CIVIL ENGINEERING
LAND SURVEYING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL
7200 Hemlock Lane, Suite 300
Maple Grove, MN 55369
763.424.5505
www.loucksinc.com

CADD QUALIFICATION

SUBMITTAL/REVISIONS

04/20/18 CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

Todd W. McLouth - PE

License No. 20383

Date

QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

TREE INVENTORY

L0-4

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

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11413 ASHBURY CIRCLE N.
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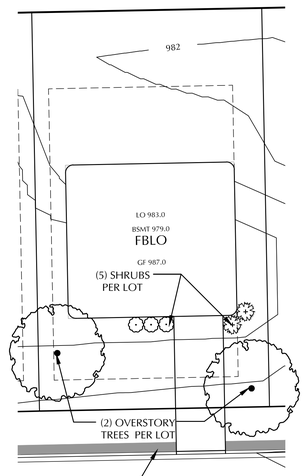


TYPICAL LOT LANDSCAPE PLAN

LANDSCAPE LEGEND

- SIDE SLOPE TREES
- NATIVE SEED MIX - MNDOT MIX 33-261
- 36" SOD STRIP ALONG NEW CURBS OVER 4" DEPTH TOPSOIL

LANDSCAPE NOTES

1. POND SLOPE TREES WILL BE PLANTED AT TIME OF GRADING AND ROAD CONSTRUCTION. LOT TREES AND SHRUBS WILL BE PLANTED AT TIME OF BUILDING CONSTRUCTION
2. TREE RESTORATION WILL BE APPLIED AT TIME OF PHASED TREE REMOVAL BASED ON DEVELOPMENT SCHEDULE.

PLANTING REQUIREMENTS - NORTH		TOTAL REQ'D	TOTAL PROPOSED
POND SLOPE TREES - 12 TREES PER 1 ACRE	2.21 ACRE	27	27
LOT TREES - 2 PER LOT	100 LOTS	200	200
LOT SHRUBS - 5 PER LOT	100 LOTS	500	500

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CADD QUALIFICATION

SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

License No. 20383
Date

QUALITY CONTROL

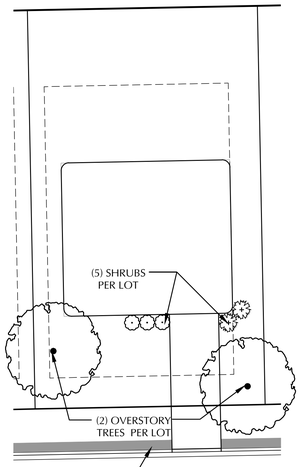
Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

NORTH LANDSCAPE PLAN

L1-1

Plotted: 04 /18 / 2018 10:13 AM W:\2016\16101A\CADD DATA\LANDSCAPE\ dwg Sheet Files - 4-4 Additional\L16101A L1-1 Landscape Plan



TYPICAL LOT LANDSCAPE PLAN

LANDSCAPE LEGEND

SIDE SLOPE TREES

NATIVE SEED MIX - MNDOT MIX 33-261

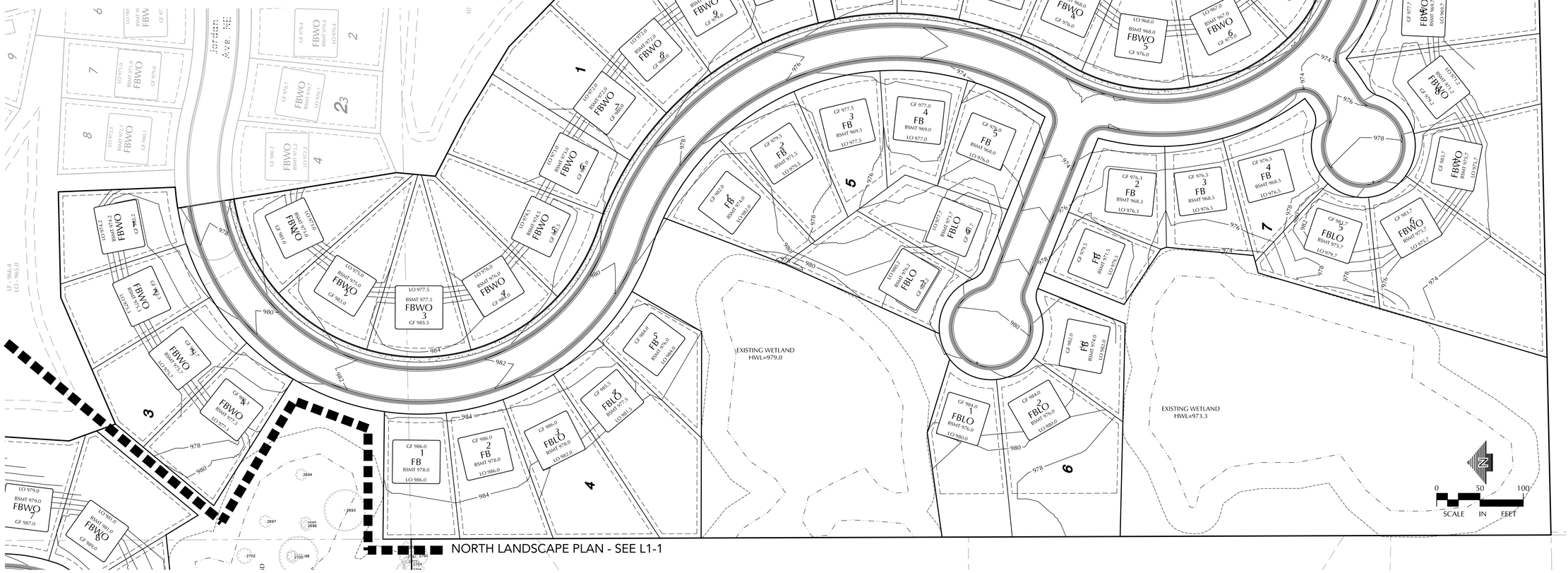
36" SOD STRIP ALONG NEW CURBS
OVER 4" DEPTH TOPSOIL

LANDSCAPE NOTES

1. POND SLOPE TREES WILL BE PLANTED AT TIME OF GRADING AND ROAD CONSTRUCTION. LOT TREES AND SHRUBS WILL BE PLANTED AT TIME OF BUILDING CONSTRUCTION

2. TREE RESTORATION WILL BE APPLIED AT TIME OF PHASED TREE REMOVAL BASED ON DEVELOPMENT SCHEDULE.

PLANTING REQUIREMENTS - SOUTH		TOTAL REQ'D	TOTAL PROPOSED
POND SLOPE TREES - 12 TREES PER 1 ACRE	0.53 ACRE	7	7
LOT TREES - 2 PER LOT	59 LOTS	118	118
LOT SHRUBS - 5 PER LOT	59 LOTS	295	295



NORTH LANDSCAPE PLAN - SEE L1-1

CALL BEFORE YOU DIG!
Gopher State One Call
TWIN CITY AREA: 651-454-0002
TOLL FREE: 1-800-252-1166

WARNING:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CALLING FOR LOCATIONS OF ALL EXISTING UTILITIES. THEY SHALL COOPERATE WITH ALL UTILITY COMPANIES IN MAINTAINING THEIR SERVICE AND / OR RELOCATION OF LINES.

THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL AT 651-454-0002 AT LEAST 48 HOURS IN ADVANCE FOR THE LOCATIONS OF ALL UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. THE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE WHEN DAMAGED DURING CONSTRUCTION AT NO COST TO THE OWNER.

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
FAX (612) 566-1525

LOUCKS
PLANNING
CIVIL ENGINEERING
LAND SURVEYING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL
7200 Hemlock Lane, Suite 300
Maple Grove, MN 55369
763.424.5505
www.loucksinc.com

CADD QUALIFICATION

CADD files prepared by the Consultant for this project are instruments of the Consultant professional services for use solely with respect to this project. These CADD files shall not be used on other projects, for additions to this project, or for completion of this project by others without written approval by the Consultant. Under the same conditions, no portion of them may be furnished by any party of the CADD drawing files for information and reference only. All intentional or unintentional revisions, additions, or deletions to these CADD files shall be made at the full risk of that party making such revisions, additions or deletions and that party shall hold harmless and indemnify the Consultant from any & all responsibilities, claims, and liabilities.

SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

License No. 20383
Date

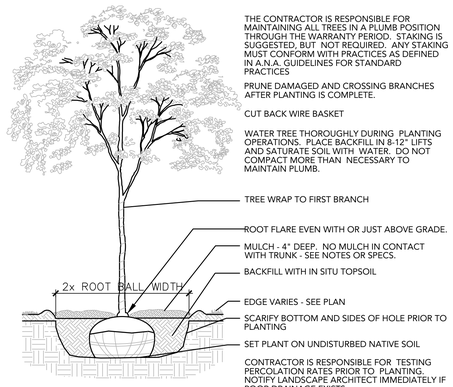
QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

SHEET INDEX

SOUTH LANDSCAPE PLAN

L1-2



THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL TREES IN A PLUMB POSITION THROUGH THE WARRANTY PERIOD. STAKING IS SUGGESTED, BUT NOT REQUIRED. ANY STAKING MUST CONFORM WITH PRACTICES AS DEFINED IN A.N.A. GUIDELINES FOR STANDARD PRACTICES

PRUNE DAMAGED AND CROSSING BRANCHES AFTER PLANTING IS COMPLETE.

CUT BACK WIRE BASKET

WATER TREE THOROUGHLY DURING PLANTING OPERATIONS. PLACE BACKFILL IN 8-12" LIFTS AND SATURATE SOIL WITH WATER. DO NOT COMPACT MORE THAN NECESSARY TO MAINTAIN PLUMB.

TREE WRAP TO FIRST BRANCH

ROOT FLARE EVEN WITH OR JUST ABOVE GRADE.

MULCH - 4" DEEP. NO MULCH IN CONTACT WITH TRUNK - SEE NOTES OR SPECS.

BACKFILL WITH IN SITU TOPSOIL

EDGE VARIES - SEE PLAN

SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING

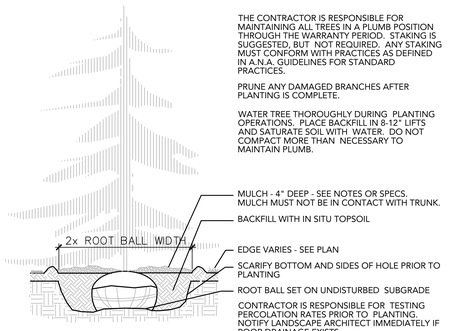
SET PLANT ON UNDISTURBED NATIVE SOIL

CONTRACTOR IS RESPONSIBLE FOR TESTING PERCOLATION RATES PRIOR TO PLANTING. NOTIFY LANDSCAPE ARCHITECT IMMEDIATELY IF POOR DRAINAGE EXISTS.

1 L2-1 DECIDUOUS TREE PLANTING DETAIL

SCALE: 1/2" = 1'-0"

Deciduous Tree.DWG



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PRUNE ANY DAMAGED BRANCHES AFTER PLANTING IS COMPLETE.

WATER TREE THOROUGHLY DURING PLANTING OPERATIONS. PLACE BACKFILL IN 8-12" LIFTS AND SATURATE SOIL WITH WATER. DO NOT COMPACT MORE THAN NECESSARY TO MAINTAIN PLUMB.

MULCH - 4" DEEP - SEE NOTES OR SPECS. MULCH MUST NOT BE IN CONTACT WITH TRUNK.

BACKFILL WITH IN SITU TOPSOIL

EDGE VARIES - SEE PLAN

SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING

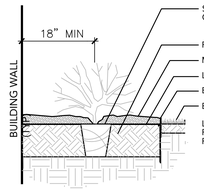
ROOT BALL SET ON UNDISTURBED SUBGRADE

CONTRACTOR IS RESPONSIBLE FOR TESTING PERCOLATION RATES PRIOR TO PLANTING. NOTIFY LANDSCAPE ARCHITECT IMMEDIATELY IF POOR DRAINAGE EXISTS.

2 L2-1 CONIFEROUS TREE PLANTING DETAIL

SCALE: 1/2" = 1'-0"

Coniferous Tree.DWG



SHRUBS TO BE PLACED SO THAT TOP OF CONTAINER SITS FLUSH WITH PROPOSED GRADE.

PLANTING SOIL - SEE NOTES OR SPEC.

MULCH - 3" DEPTH - SEE NOTES OR SPEC.

LANDSCAPE FABRIC - SEE NOTES OR SPEC.

EDGING MATERIAL - SEE NOTES OR SPEC.

EDGE VARIES - REFER TO PLAN

LOOSEN ROOTS OF ALL CONTAINERIZED PLANTS. SCARIFY BOTTOM AND SIDES OF HOLE PRIOR TO PLANTING

3 L2-1 SHRUB PLANTING DETAIL

SCALE: 3/4" = 1'-0"

PLANT LIST

KEY	QTY	COMMON NAME	SCIENTIFIC NAME	SIZE	COMMENTS
		SIDE SLOPE TREES - 29 TOTAL			
RB	20	RIVER BIRCH	Betula nigra	2-1/2" CAL B.B.	H 40-50' W 30-40'
SW	14	SWAMP WHITE OAK	Quercus bicolor	2-1/2" CAL B.B.	H 50-60' W 40-50'

LOT PLANT MATERIAL NOTES:

IN ORDER TO ENCOURAGE SPECIES VARIETY AND TO PERMIT HOMEOWNERS TO SELECT THEIR OWN LANDSCAPING, THE CITY WILL NOT REQUIRE THE HOMEOWNERS TO SELECT PLANTS FROM A SPECIFIC PLANT LIST. THE FOLLOWING LIST IS A SUGGESTION OF THE TYPES OF PLANT MATERIAL THAT MAY BE SELECTED BY THE HOMEOWNER.

THE CITY REQUIRES THAT EACH LOT HAVE TWO TREES AND FIVE SHRUBS IN THE FRONT YARD AND THAT THE ENTIRE LOT BE SODDED.

		LOT TREES			
		IMPERIAL HONEYLOCUST	Gleditsia triacanthos inermis 'Impcole'	2-1/2" CAL B.B.	H 30-35' W 30-35'
		RED SUNSET MAPLE	Malus 'Prairie Rose'	2-1/2" CAL B.B.	H 45' W 35'
		NORTHERN PIN OAK	Quercus ellipsoidalis	2-1/2" CAL B.B.	H 40-50' W 30-35'
		GREENSPIRE LINDEN	Tilia cordata 'Greenspire'	2-1/2" CAL B.B.	H 40-50' W 30-35'
		AUSTRIAN PINE	Pinus nigra	8' B.B.	H 50-60' W 30-35'
		COLORADO BLUE SPRUCE	Picea pungens	8' B.B.	H 40-60' W 15-30'
		BLACK HILLS SPRUCE	Picea glauca densata	8' B.B.	H 30-40' W 20-30'
		CONIFEROUS SHRUBS			
		SEA GREEN JUNIPER	Juniperus chinensis 'Sea Green'	#5 CONT	H 4-6' W 3-5'
		SCANDIA JUNIPER	Juniperus sabina 'Scandia'	#5 CONT	H 18" W 3-5'
		TAUNTON YEW	Taunton x media 'Taunton'	#5 CONT	H 3' W 3-4'
		PRINCE OF WALES JUNIPER	Juniperus horizontalis 'Prince of Wales'	#5 CONT	H 6" W 5-6'
		DECIDUOUS SHRUBS			
		NEON FLASH SPIREA	Spirea japonica 'Neon Flash'	#5 CONT	H 3' W 3-5'
		TOR SPIREA	Spirea betulifolia 'Tor'	#5 CONT	H 3' W 3'
		LITTLE PRINCESS SPIREA	Spirea japonica 'Little Princess'	#5 CONT	H 2-3' W 3'
		DWARF EUROPEAN VIBURNUM	Viburnum opulus 'Nanum'	#5 CONT	H 24" W 2-3'
		AUTUMN MAGIC CHOKEBERRY	Aronia melanocarpa 'Autumn Magic'	#5 CONT	H 5-7' W 2-4'
		RED GNOME DOGWOOD	Cornus alba siberica 'Red Gnome'	#5 CONT	H 3-4' W 4-5'
		DWARF BUSH HONEYSUCKLE	Diervilla lonicera	#5 CONT	H 3-4' W 3'
		ALPINE CURRANT	Ribes alphinum	#5 CONT	H 3-5' W 5-6'

GENERAL NOTES

CONTRACTOR SHALL VISIT SITE PRIOR TO SUBMITTING BID. HE SHALL INSPECT SITE AND BECOME FAMILIAR WITH EXISTING CONDITIONS RELATING TO THE NATURE AND SCOPE OF WORK.

VERIFY LAYOUT AND ANY DIMENSIONS SHOWN AND BRING TO THE ATTENTION OF THE LANDSCAPE ARCHITECT ANY DISCREPANCIES WHICH MAY COMPROMISE THE DESIGN AND/OR INTENT OF THE PROJECT'S LAYOUT.

ASSURE COMPLIANCE WITH ALL APPLICABLE CODES AND REGULATIONS GOVERNING THE WORK OR MATERIALS SUPPLIED.

CONTRACTOR SHALL PROTECT ALL EXISTING ROADS, CURBS/GUTTERS, TRAILS, TREES, LAWNS AND SITE ELEMENTS DURING PLANTING OPERATIONS. ANY DAMAGE TO SAME SHALL BE REPAIRED AT NO COST TO THE OWNER.

CONTRACTOR SHALL VERIFY ALIGNMENT AND LOCATION OF ALL UNDERGROUND AND ABOVE GRADE UTILITIES AND PROVIDE THE NECESSARY PROTECTION FOR SAME BEFORE CONSTRUCTION / MATERIAL INSTALLATION BEGINS (MINIMUM 10' - 0" CLEARANCE).

ALL UNDERGROUND UTILITIES SHALL BE LAID SO THAT TRENCHES DO NOT CUT THROUGH ROOT SYSTEMS OF ANY EXISTING TREES TO REMAIN.

EXISTING CONTOURS, TRAILS, VEGETATION, CURB/GUTTER AND OTHER EXISTING ELEMENTS BASED UPON INFORMATION SUPPLIED TO LANDSCAPE ARCHITECT BY OTHERS. CONTRACTOR SHALL VERIFY ANY AND ALL DISCREPANCIES PRIOR TO CONSTRUCTION AND NOTIFY LANDSCAPE ARCHITECT OF SAME.

THE ALIGNMENT AND GRADES OF THE PROPOSED WALKS, TRAILS AND/OR ROADWAYS ARE SUBJECT TO FIELD ADJUSTMENT REQUIRED TO CONFORM TO LOCALIZED TOPOGRAPHIC CONDITIONS AND TO MINIMIZE TREE REMOVAL AND GRADING. ANY CHANGE IN ALIGNMENT MUST BE APPROVED BY LANDSCAPE ARCHITECT.

LANDSCAPE INSTALLATION

COORDINATE THE PHASES OF CONSTRUCTION AND PLANTING INSTALLATION WITH OTHER CONTRACTORS WORKING ON SITE.

NATIVE SEED MIX SHALL BE INSTALLED PER MNDOT SPECS AT 35 LBS/ACRE. ALL SEEDED AREAS SHALL BE COVERED WITH MNDOT TYPE 1 MULCH IMMEDIATELY AFTER SEEDING.

WHERE SOD ABUTS HARD SURFACES, FINISHED GRADE OF SOD SHALL BE HELD 1" BELOW SURFACE ELEVATION OF HARD SURFACE.

SOD A 3' WIDE STRIP ALONG ALL NEW CURBS. SOD SHALL BE PLACED OVER 4" OF TOPSOIL AND SHALL HAVE STAGGERED JOINTS.

NO PLANTING WILL BE INSTALLED UNTIL COMPLETE GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.

ALL PLANT MATERIAL SHALL COMPLY WITH THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, AMERICAN ASSOCIATION OF NURSERYMEN. UNLESS NOTED OTHERWISE, ALL SHRUBS SHALL HAVE AT LEAST 5 CANES AT THE SPECIFIED MINIMUM SHRUB HEIGHT OR WIDTH. BOULEVARD AND OVERSTORY TREES SHALL BEGIN BRANCHING NO LOWER THAN 5' ABOVE FINISHED GRADE.

PLAN TAKES PRECEDENCE OVER PLANT SCHEDULE IF DISCREPANCIES IN QUANTITIES EXIST. SPECIFICATIONS TAKE PRECEDENCE OVER NOTES.

NO PLANT MATERIAL SUBSTITUTIONS WILL BE ACCEPTED UNLESS APPROVAL IS REQUESTED OF THE LANDSCAPE ARCHITECT BY THE LANDSCAPE CONTRACTOR PRIOR TO THE SUBMISSION OF A BID AND/OR QUOTATION.

ALL PROPOSED PLANTS SHALL BE LOCATED AND STAKED AS SHOWN ON PLAN. ADJUSTMENTS IN LOCATION OF PROPOSED PLANT MATERIALS MAY BE NEEDED IN FIELD. SHOULD AN ADJUSTMENT BE ADVISED, THE LANDSCAPE ARCHITECT MUST BE NOTIFIED.

ALL PLANT MATERIALS SHALL BE FERTILIZED UPON INSTALLATION WITH A 27-3-3 SLOW RELEASE FERTILIZER MIXED IN WITH THE PLANTING SOIL PER THE MANUFACTURER'S INSTRUCTIONS. PLANTS MAY BE TREATED FOR SUMMER AND FALL INSTALLATION WITH AN APPLICATION OF GRANULAR 27-3-3 AT 6 OZ PER 2.5" CALIPER PER TREE AND 3 OZ PER SHRUB WITH AN ADDITIONAL APPLICATION OF 27-3-3 THE FOLLOWING SPRING IN THE TREE SAUCER.

ALL PLANTS TO BE INSTALLED AS PER PLANTING DETAILS. REMOVE ALL FLAGGING AND LABELS FROM PLANTS.

WRAPPING MATERIAL SHALL BE CORRUGATED PVC PIPING 1" GREATER IN CALIPER THAN THE TREE BEING PROTECTED OR QUALITY, HEAVY, WATERPROOF CREPE PAPER MANUFACTURED FOR THIS PURPOSE. WRAP ALL DECIDUOUS TREES PLANTED IN THE FALL PRIOR TO 12-1 AND REMOVE ALL WRAPPING AFTER 5-1.

ALL SHRUB BED MASSINGS NOT SHOWN TO RECEIVE ROCK MULCH SHALL RECEIVE 3" DEEP SHREDDED HARDWOOD MULCH AND FIBER MAT WEED BARRIER.

ALL TREES TO RECEIVE 4" DEEP SHREDDED HARDWOOD MULCH WITH NO MULCH IN DIRECT CONTACT WITH TREE TRUNK.

SPREAD GRANULAR PRE EMERGENT HERBICIDE (PREEN OR EQUAL) PER MANUFACTURER'S RECOMMENDATIONS UNDER ALL MULCHED AREAS.

IF THE LANDSCAPE CONTRACTOR IS CONCERNED OR PERCEIVES ANY DEFICIENCIES IN THE PLANT SELECTIONS, SOIL CONDITIONS OR ANY OTHER SITE CONDITION WHICH MIGHT NEGATIVELY AFFECT PLANT ESTABLISHMENT, SURVIVAL OR GUARANTEE, HE MUST BRING THESE DEFICIENCIES TO THE ATTENTION OF THE LANDSCAPE ARCHITECT PRIOR TO PROCUREMENT AND/OR INSTALLATION.

CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR THE OWNER ACCEPTANCE INSPECTION OF ALL LANDSCAPE AND SITE IMPROVEMENTS.

CONTRACTOR IS RESPONSIBLE FOR ON-GOING MAINTENANCE OF ALL NEWLY INSTALLED MATERIALS UNTIL TIME OF OWNER ACCEPTANCE. ANY ACTS OF VANDALISM OR DAMAGE WHICH MAY OCCUR PRIOR TO OWNER ACCEPTANCE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL PROVIDE THE OWNER WITH A MAINTENANCE PROGRAM INCLUDING, BUT NOT NECESSARILY LIMITED TO, PRUNING, FERTILIZATION AND DISEASE/PEST CONTROL.

CONTRACTOR SHALL GUARANTEE NEW PLANT MATERIAL THROUGH ONE CALENDAR YEAR FROM THE DATE OF OWNER ACCEPTANCE.

WARRANTY (ONE FULL GROWING SEASON) FOR LANDSCAPE MATERIALS SHALL BEGIN ON THE DATE OF ACCEPTANCE BY THE LANDSCAPE ARCHITECT AFTER THE COMPLETION OF PLANTING OF ALL LANDSCAPE MATERIALS. NO PARTIAL ACCEPTANCE WILL BE CONSIDERED.

UNLESS NOTED OTHERWISE THE APPROPRIATE DATES FOR SPRING PLANT MATERIAL INSTALLATION AND SEED/SOD PLACEMENT IS FROM THE TIME GROUND HAS THAWED TO JUNE 15.

FALL SODDING IS GENERALLY ACCEPTABLE FROM AUGUST 15 - NOVEMBER 1. FALL DECIDUOUS PLANTING FROM THE FIRST FROST UNTIL NOVEMBER 15. PLANTING OUTSIDE THESE DATES IS NOT RECOMMENDED. ANY ADJUSTMENT MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.

LANDSCAPE CONTRACTOR SHALL ESTABLISH TO HIS SATISFACTION THAT SOIL AND COMPACTION CONDITIONS ARE ADEQUATE TO ALLOW FOR PROPER DRAINAGE AT AND AROUND THE BUILDING SITE.

CROW RIVER HEIGHTS WEST FUTURE ADD.

HANOVER, MN

BACKES COMPANIES
11413 ASHBURY CIRCLE N.
CHAMPLIN, MN 55316
PHONE: (612) 369-7750
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www.loucksinc.com

SUBMITTAL/REVISIONS

04/20/18	CITY SUBMITTAL

PROFESSIONAL SIGNATURE

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.

PRELIMINARY

Licensed Professional Engineer - Thomas W. McLouth - PE
License Number 20383
Date

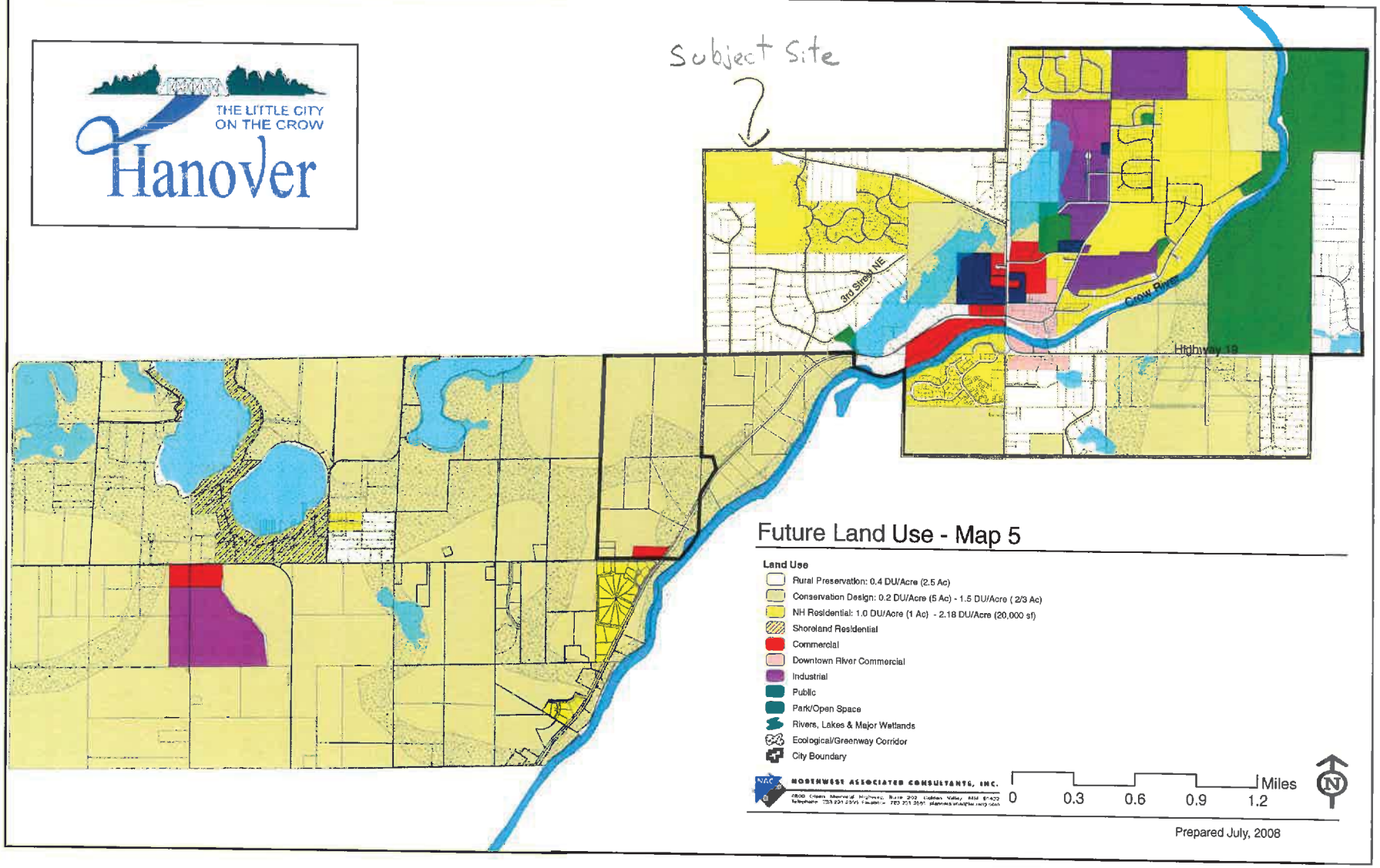
QUALITY CONTROL

Loucks Project No.	16101A
Project Lead	TWM
Drawn By	ZHW
Checked By	TWM
Review Date	04/02/18

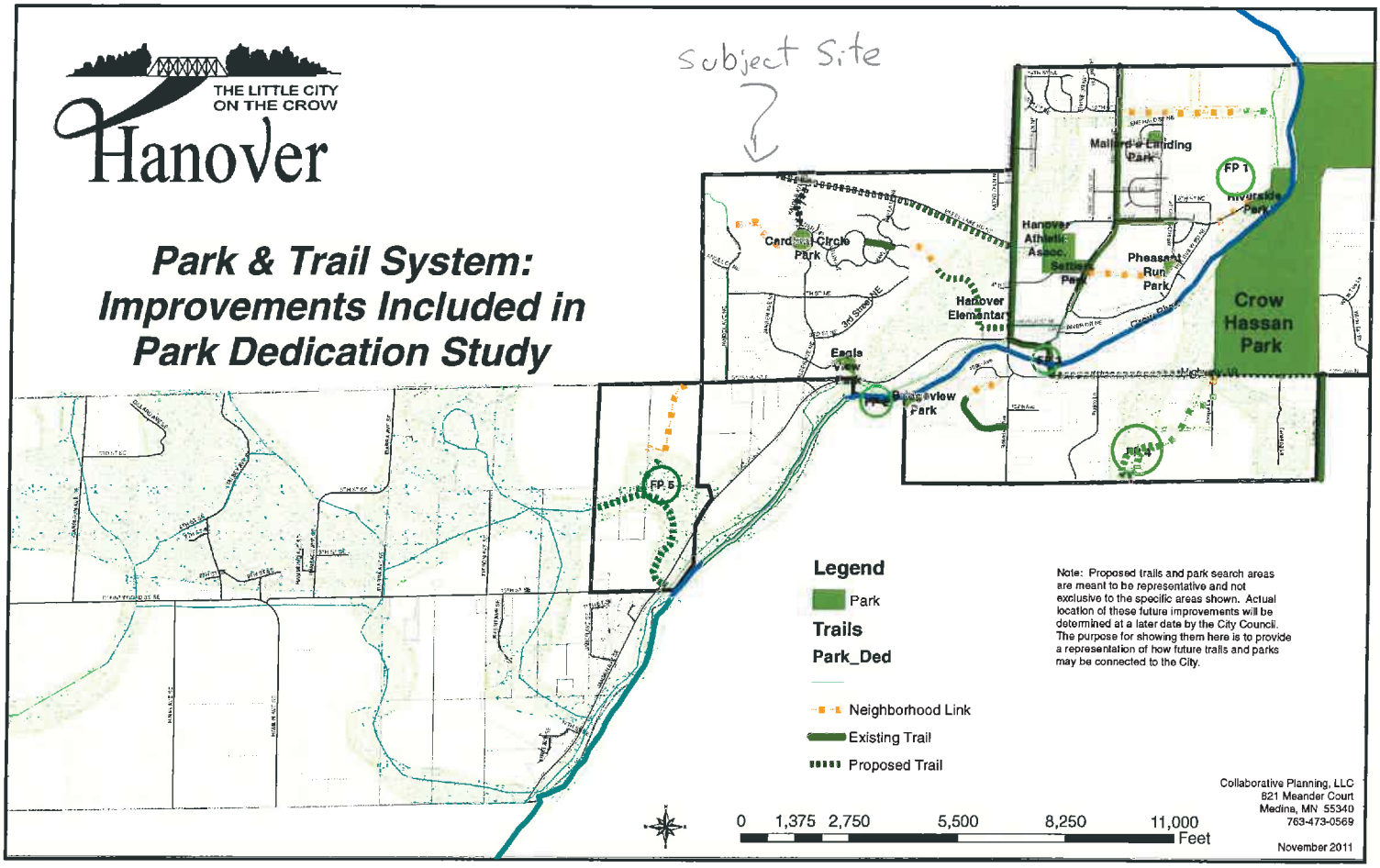
SHEET INDEX

LANDSCAPE DETAILS

L2-1



ATTACHMENT 4



ATTACHMENT 5

GEOTECHNICAL EXPLORATION
CROW RIVER HEIGHTS HOUSING DEVELOPMENT
HANOVER, MINNESOTA
GME PROJECT NO. 8416

ATTACHMENT 6

GME CONSULTANTS, INC.
CONSULTING ENGINEERS
14000 21st Ave. No. / Minneapolis, MN 55447
Phone (612) 559-1859 / Fax (612) 559-0720

August 23, 1999

Mr. Tony Emmerich
Semler Construction, Inc.
10738 Hanson Boulevard
Coon Rapids, Minnesota 55433

GME Project No. 8416

RE: Geotechnical exploration for the proposed Crow River Heights Housing Development Subdivision on the Mills property at Beebe Lake Road Northeast (CSAH 34) near Kadler Avenue Northeast in Hanover, Minnesota

Dear Mr. Emmerich:

Following your acceptance of our proposal of May 20, 1999, we have completed our geotechnical exploration. Enclosed please find the results of our field exploration and our report. This report is the work product defined in our proposal.

We have enjoyed working with you on this phase of the development. If you have questions regarding this report or if we can be of further assistance, please contact us.

Sincerely,

GME CONSULTANTS, INC.

Tammy A. Landers, P.E.
Project Engineer

cc: Mr. Larry Olson, P.E.
LSJ Engineering, Inc.

TAL:smc
W:\TAL\8416 DTR.smc

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GEOTECHNICAL EXPLORATION
CROW RIVER HEIGHTS HOUSING DEVELOPMENT
HANOVER, MINNESOTA
GME PROJECT NO. 8416

GME CONSULTANTS, INC.

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A Geotechnical Engineering Report Is Based On A Unique Set Of Project-Specific Factors
Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

Subsurface Conditions Can Change
A geotechnical engineering report based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts. Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

Most Geotechnical Findings Are Professional Judgments
Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A Report's Recommendations Can Only Be Preliminary
The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

Geotechnical Services Are Performed For Specific Purposes And Persons
Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

Geoenvironmental Concerns Are Not At Issue
Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated, you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

A Geotechnical Engineering Report Is Subject To Misinterpretation
Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them, and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be familiar with geotechnical concerns, none knows as much about them as a competent geotechnical engineer.

Boring Logs Should Not Be Separated From The Report
Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes, and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use. (If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. In other words, while a contractor may gain important knowledge from a report prepared for another party, the contractor would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geotechnical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

Read Responsibility Clauses Closely
Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

Rely On The Geotechnical Engineer For Additional Assistance
Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE for a complimentary directory of ASFE publications.

ASFE THE ASSOCIATION OF ENGINEERING FIRMS PRACTICING IN THE GEOSCIENCES

8811 COLESVILLE ROAD/SUITE G106/SILVER SPRING, MD 20910
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INTRODUCTION

The Mills property covers about 209 acres. It will be subdivided into 519 lots for single family homes. The preliminary grading plan for the development indicates that the buildings will have full or walkout basements. Structures of the type proposed have masonry bearing walls to grade or first floor level, and wood frame construction above. These buildings typically have wall loads of about 1 to 2 kips per lineal foot, with maximum column loads under 50 kips. Homes with masonry chimneys may have heavier concentrated loads at these points.

Paved municipal streets will be constructed throughout the subdivision. The infrastructure will be located under the streets or within the street right-of ways.

The preliminary grading plan indicates that some cutting and filling will be required to prepare the site.

SCOPE OF WORK

The purposes of this report are to describe the soil and groundwater conditions encountered in our subsurface exploration; to review and evaluate these conditions with respect to the proposed project; and

to present recommendations for feasible methods of foundation and earthwork design and construction. The elements of our scope of work are described below.

- Drill and sample 20 Standard Penetration borings
- Install six piezometers for long-term groundwater monitoring
- Perform laboratory testing and visual/manual classification of the recovered soil samples
- Prepare the geotechnical report

FIELD EXPLORATION

We drilled 20 borings for this project, as shown on the enclosed Soil Boring Location Diagram. We recommended the number and depths of the borings; the borings were staked in the field by a survey crew from Midwest Land Surveyors, Inc. Midwest's survey crew also determined surface elevations of the borings referenced to National Geodetic Vertical Datum (NGVD). Before we drilled, we contacted Gopher State One Call to locate public underground utilities.

We drilled the borings with a BK 51HD rig mounted on a Bombardier tracked carrier. We drilled with hollow stem augers fitted with a removable center plug and sampled by the split barrel method (ASTM: D

1586). Our crew kept field logs noting the methods of drilling and sampling, along with Standard Penetration values, preliminary soil classifications, and observed groundwater levels. Representative portions of recovered soil samples were sealed in jars to reduce moisture loss, and returned to our laboratory for examination, testing and final classification by a Geotechnical Engineer.

We installed PVC piezometers in six of the borings. The locations of the piezometers are noted on the Soil Boring Location Diagram. We measured the groundwater depths at the time of installation and on July 26, 1999. The groundwater depths observed are shown on the boring logs along with the top of riser elevation.

We backfilled the boreholes with cuttings to comply with current Minnesota Department of Health regulations.

LABORATORY TESTING

The laboratory testing was initiated by a Geotechnical Engineer examining each of the recovered samples to determine the major and minor soil components, while also noting the color, degree of saturation, and lenses or seams found in the samples. The Engineer

directed that selected samples be tested for moisture content; the results of these tests are shown on the respective logs.

The Engineer visually/manually classified each sample based on texture and plasticity in accordance with the Unified Soil Classification System. The capital letter symbols in parentheses following the written soil descriptions on the boring logs are the estimated group symbols based on this system. A chart describing this classification system is included in the Appendix of this report. The Engineer grouped the soils by type into the strata as shown on the boring logs. The stratification line shown on the logs are approximate; *in situ*, the transition between soil types may be gradual or abrupt in the horizontal or vertical directions.

We will discard the soil samples from this program 30 days after the date of this report. If you wish to have the samples retained beyond this time, we ask that you please advise us.

SITE CONDITIONS

Topography/Surface Features

At the time of our field exploration, the site was undeveloped and wooded in some areas. The site is generally rolling and has several wetlands in low-lying, poorly drained areas.

The site has rolling hills and generally slopes from the west at about elevation 996 feet to the east where it ranges from 940 to 960 feet. The northern edge of the site drops in elevation to meet Beebe Lake Road Northeast at its closest proximity of the site sloping from 970 to 926 feet down toward the east.

Soil Conditions

The soil conditions found in the borings are shown on the logs in the Appendix. The conditions that we describe and discuss in this report are pertinent only at the boring locations and under the environment at the time of our field exploration. If different conditions are found during construction, it is necessary that you contact us so that our recommendations can be reviewed.

Based on the Minnesota Department of Natural Resources (DNR) Atlas for this area, the predominant soil types consist of Des Moines lobe clayey glacial drift underlain by Superior lobe clay till with buried sand and gravel deposits of variable thicknesses. Low-lying, poorly drained areas have accumulated surficial deposits of alluvial silt and organics.

Of our 20 borings drilled for this project, we encountered silt and clay organic topsoil in 18 of the borings, ranging in thickness from 0.5 to 2 feet. In borings 1 and 14, we encountered silty sand and sandy clay fill over the topsoil to depths of 2 and 3 feet, respectively. The fill was loose with N-values of 2 to 4, and laboratory moisture contents within the clay fill of 18%.

In boring 14, located in a low-lying area at the northeast corner of the site, we found peat and organic silt beneath the fill to a depth of 9 feet. These organic soils were very soft with an N-value of 2, and moisture contents of 80% to 159%. In our opinion, these soils are highly compressible and would settle substantially under the weight of new fill and buildings.

Beneath the organic silt in boring 14, and below the topsoil in our other borings, we encountered the predominant naturally-occurring sandy clay till with interbedded lenses of sand and gravel to the termination depths of our borings at 15 feet. The upper surface of the clay till was generally firm to stiff with N-values of 5 to 10, becoming stiff to very stiff with depth. The moisture contents generally ranged from 15% to 20%, with higher moistures encountered at the surface or near sand lenses.

Groundwater

We encountered groundwater while drilling in six of the 20 borings, at depths of 2 to 14 feet, corresponding to elevations of 926.6 to 976.7 feet. Piezometers were installed in six of the borings, 1, 4, 7, 10, 17, and 20. On July 26, 1999, we found groundwater in piezometers 7 and 10, at elevations 953.2 and 946.4 feet, respectively. The other piezometers were dry to elevations 931.6 to 970.6 feet. The highest water level measured was in piezometer 1 on June 29, 1999 at an elevation of 976.7 feet.

Lake Wilhelm is located directly north of County Road 34, north of the west half of the site, and has an average summer water elevation of 951 feet. There is a Crow River backwater wetland area

approximately 1/2 mile southeast of the site, which has an average summer water elevation of 895 feet. There appears to be a groundwater gradient to the east and southeast toward the Crow River.

It is our opinion that groundwater encountered at higher elevations while drilling, such as in boring 1, is perched. Perched groundwater develops when water infiltrating downward and moving laterally through the soil within sand lenses or layers is restricted from the flow vertically by less permeable soil such as clay and silt.

The hydrostatic and perched groundwater levels will vary in elevation seasonally and annually, depending on local amounts of precipitation, evaporation, surface runoff and infiltration.

ENGINEERING REVIEW AND RECOMMENDATIONS

Discussion

The engineering recommendations made in this report are based on our understanding of the project. The recommendations are valid solely for the project described herein. If any changes in the nature, location, floor elevation, or design of the buildings are made, the opinions and recommendations contained in this report shall not be

considered valid unless we review these changes and modify or verify them in writing.

After proper site preparation, to include removal of topsoil, existing fill, soft clay and organic soils, and placement of compacted fill to form the building pads, it is our opinion that the houses may be supported on conventional spread footing foundations.

Backfill in utility trenches should be properly moisture conditioned and compacted to form a suitable subgrade for the streets within the subdivision. Details of our recommendations for site preparation in building and pavement areas, and foundation recommendations are presented in the following report sections.

Site Preparation

The surficial topsoil, vegetation, and trees should be removed from the building pads. There should be sufficient lateral oversizing of the stripping to permit proper construction of the building pads.

The following table gives our recommended subcut depths to remove unsuitable soils.

ESTIMATED MINIMUM DEPTHS OF SUBCUT			
Boring No.	Surface Elevation (ft.)	Recommended Minimum Subcut Depth (ft.)	Approximate Elevation of Subcut (ft.)
B-1/P-1	984.6	3.5	981.1
B-2	988.7	0.7	988
B-3	973.9	2	971.9
B-4/P-4	963.9	0.7	963.2
B-5	962.7	1.5	961.2
B-6	979.5	0.7	978.8
B-7/P-7	961.5	2.0	959.5
B-8	963.4	0.5	963.0
B-9	951.8	1.5	950.3
B-10/P-10	954.8	0.6	954.2
B-11	961.9	0.6	961.3
B-12	962.1	0.5	961.5
B-13	963.7	2.0	961.7
B-14	928.6	11 to 13	917.5 to 915.5
B-15	964.7	0.5	964.2
B-16	959.1	- -	grade to subfloor
B-17/P-17	956.8	2	954.8
B-18	951.1	2	949.8
B-19	950.0	7	943
B-20/P-20	946.1	- -	grade to subfloor

The actual depths and lateral extent of unsuitable soils will vary between borings, may be deeper or shallower than found at the borings, and should be determined by a Geotechnical Engineer or Engineering Technician at the time of the construction. Subcut zones should also have adequate lateral oversizing so that new compacted fill is placed within the zone extending at an angle no less than 1 unit horizontal:1 unit vertical from the bottom of the footing elevation to the bottom of the excavation. Where organic soils are being subcut, such as in the area of boring 14, the oversizing should be extended to 1.5 horizontal to 1 vertical.

The excavated non-organic soils could be re-used as fill. These soils should be moisture conditioned to within 2% above or below their optimum moisture content, as determined by the Standard Proctor compaction test. The contractor should anticipate discing and drying before the clay could be used as fill.

We recommend that the total thickness of clay fill, including fill placed in subcut areas, be limited to 10 feet. The purpose for this limitation is that clay fill, even when well compacted at or near optimum moisture content, can settle due to hydro-compression. Areas requiring more than 10 feet of fill should have sand or silty sand within the lower portion of the fill.

The fill should be placed in loose lifts about 6 to 8 inches thick, and compacted to at least 98% of the maximum Standard Proctor dry density (ASTM: D 698).

Foundation Recommendations

After the site has been prepared as described, the buildings may be supported on conventional spread footing foundations. The exterior footings for heated portions of the buildings should bear at least 4 feet below final outside grade for protection from frost penetration.

The bottom of footings in basement areas should bear at least 16 inches below the top of the floor slab, provided that the footings are not subjected to freezing conditions during or after construction.

The bottom of footings for unheated attached garages, including the common wall between the garage and the main part of the house, as well as for footings supporting decks, overhangs, canopies, or screen walls, should be embedded at least 5 feet below final grade, because deeper frost penetration can occur away from the heated building. We also recommend that insulation, which can be a material such as 1/2 inch bead board, be applied to all sides of foundation walls for unheated garages, to prevent adfreezing of backfill soil.

At the recommended depths of embedment, we anticipate the foundations would bear on stiff clay or silt, or on compacted fill. We recommend that these foundations be proportioned for a maximum net allowable design bearing pressure of 2,000 pounds per square foot. This refers to the pressure that may be transmitted to the bearing stratum in excess of the pressure from the surrounding depth of overburden. The factor of safety with respect to the soil bearing capacity for this design would exceed 3.

We recommend that continuous footings have a minimum width of 20 inches, and isolated column footings have a minimum width of 30 inches, to avoid excessively narrow footings. For this design, we estimate that maximum building settlement should be on the order of 1 inch or less, with differential settlement about half this amount, provided that the bearing soils are not soft, wet, frozen or disturbed at the time of construction.

For the silty and clayey soils found on this site, it is very important that the foundation bearing soils not be permitted to freeze before or after construction of the footings and before the buildings are heated. The contractors should have appropriate insulating material on the site, such as insulation blankets or straw and plastic sheeting to protect foundation bearing soils from freezing. We strongly recommend that this provision be made a part of the specifications.

Basement Wall Backfill and Design

The lowest floor or basement elevations should be designed to provide adequate separation of slabs from observed water levels. We recommend a minimum of 3 feet vertical separation. However, for FHA or HUD housing, a 4 foot vertical separation is required. We have

reviewed the Preliminary Grading Plan provided dated July 26, 1999. Proposed lowest floor elevations in the area of B-1, B-7, B-13 and B-19, should be reviewed and adjusted accordingly. If the construction schedule permits, we recommend that the piezometers be left in place to observe for water levels during other times of the year.

We recommend that a perimeter drain system be installed around the outside of the basement walls, connected to sump pumps in the buildings from which water can be pumped out. The backfill above the drainpipes and extending laterally 18 inches from the walls should not be the excavated clay or silt. Rather, it should be free-draining granular soil having less than 7% passing the No. 200 sieve. Such soil was not found in our borings, and would have to be imported.

The backfill should be placed in loose lifts about 6 inches thick, and should be compacted with manually-operated vibratory plate compactors to at least 93% of the maximum Standard Proctor dry density. Large towed or self-propelled vibratory compactors should not be allowed within 4 feet of the new basement walls, because this equipment can damage the basement walls.

We recommend that a high quality dampproofing be applied to the basement walls. Dampproofing is intended to prevent the passage of water vapor through the walls, but not fluid water. Thus, it is important that a proper perimeter drain system be installed.

The upper 18 inches of backfill around each building should be a compacted low permeability soil such as the clay or silt encountered on the site, sloped to provide positive drainage away from the houses.

Floor Slabs

We recommend that a vapor barrier be installed under floor slabs of the buildings to reduce the potential for the upward migration of water vapor from the soil into and through the concrete slabs. Water vapor migrating upward through the slabs can damage floor coverings such as tile, carpeting, or wood and cause excessive humidity in the basements. The provisions for a vapor barrier should be included in the specifications for all of the home builders on this site.

Underground Utilities

Perched and hydrostatic water should be anticipated when installing utilities. The water levels observed in our borings and piezometers were highly variable due to the presence of water in sand lenses within the clay soils. Utilities and backfill should not be placed in standing water.

Fill may consist of on-site non-organic clay soils if moisture conditioned to within 2% above or below the optimum moisture content. Backfill should be placed in 6 to 8 inch loose lifts compacted to at least 95% of the Standard Proctor dry density. Within 3 feet of the pavement subgrade, compaction should be increased to 100%.

Pavement Subgrade

The topsoil and vegetation should be removed from the pavement areas. Fill needed to reach design grade may consist of clay that has been moisture conditioned to within 2% of the optimum moisture content. Most of the on-site soils are wetter than their optimum moisture content, and discing/drying should be expected. If this is not practical due to weather or schedule, then the on-site soils could be

blended with a drying agent such as Class C fly ash or hydrated lime, or dry fill could be imported.

Before placement of the aggregate base, we recommend that the subgrade be test rolled with a fully loaded tandem-axle truck. Soft of loose soils detected during the test roll should be scarified and recompacted, or replaced with new compacted fill.

Based on a clay and clayey silt subgrade, we recommend that the streets in the subdivision be designed using a Stabilometer value (R-value) of 10. We recommend placing a geofabric over the top of the subgrade prior to placement of the select granular base course, to reduce the potential for fouling (mixing) of the base with the underlying fine grained soils. Fouling of the base course reduces its effectiveness and contributes to premature pavement failure.

An alternative to the geofabric would be to include a 12 inch thick sand subbase layer between the base aggregate and the subgrade. The sand should meet the gradation requirements of Mn/DOT Section 3149.2.B2, C or G, modified to have less than 5% passing the No. 200 sieve. The sand would require adequate drainage by sloping and/or installation of finger drains tied into the storm system.

CONSTRUCTION CONSIDERATIONS

Groundwater

We encountered groundwater in several of our borings for this project. It is likely that excavations for basements or utilities on the site will encounter sand lenses, perched and/or hydrostatic groundwater. Provisions should be made for dewatering excavations before fill or concrete placement.

Water that enters excavations for buildings or utilities from groundwater seepage, surface runoff, or precipitation should be promptly pumped out. The contractors should not allow water to stand ponded over the foundation or subgrade soils, as this would soften or disturb them.

The contractors should not be permitted to place compacted fill or concrete into standing water or over softened soils in an attempt to displace these materials. This technique can trap the softened zones under the building causing excessive post-construction settlement even if the softened soil is only a few inches thick.

Equipment Selection/Soil Disturbance

The soil types at this site can be easily disturbed by construction equipment, especially when the soils are saturated or during freeze/thaw conditions. It is the earthwork contractor's responsibility to choose equipment and work procedures that will not unduly disturb the subgrade soils. The contractor should also route construction traffic away from foundation soils, subgrade, and areas of pavements and slabs, to avoid soil disturbance.

If the equipment the contractor selects causes rutting or pumping, it is his responsibility to switch to other types of equipment. The responsibility to properly select construction equipment to avoid disturbing soils on the site lies solely with the contractor. A note to this effect should be included in the project specifications.

Winter Construction

The soils encountered at the site are not conducive to winter construction and we recommend that this be avoided. Only unfrozen fill and backfill should be used. Placement of fill and/or foundation concrete must not be permitted on frozen soil, nor should

bearing soils under footings or slabs be allowed to freeze after concrete is placed, because excessive post-construction settlement could occur as the frozen soils thaw.

Construction Safety

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

The responsibility to provide safe working conditions on the site, for earthwork, building construction, or any associated operations, is not borne in any manner by GME Consultants, Inc.

Construction Testing

We strongly recommend that the Owner retain the services of a geotechnical engineering firm at the time of earthwork construction, to provide experienced personnel to observe and test the base soils and the degree of compaction of fill.

Exposed soils in excavations should be tested by means of hand augering and with a Static Cone Penetrometer (SCP). The concrete used for the foundations and floor slabs should be tested, and reinforcing steel placement should be observed for compliance with the design, in accordance with the requirements of the 1997 Uniform Building Code, Chapter 17, Section 1701. We would be pleased to provide the necessary field observation, monitoring, and testing services.

A representative number of field density tests should be taken in controlled fill, to aid in judging its suitability. Proposed fill materials should be submitted to a laboratory for Standard Proctor compaction tests, and tests to check compliance with our recommendations and project specifications.

GENERAL QUALIFICATIONS

This report has been prepared based on the soil and groundwater conditions found in our borings and the available design data provided by LSJ Engineering, Inc. If there are any changes in size, scope, elevations, structural loads, use or nature of the buildings from those outlined in the Introduction of this report, or if our understanding of the project is incomplete or incorrect, it is

necessary that you contact us so we can review our recommendations to determine if they are applicable. Because of the preliminary nature of the grading plan provided as of the date of this report, we request that when the final grading plan is available, we be provided a copy for review with respect to our recommendations.

We determined the soil and groundwater conditions at 20 soil boring and six piezometer locations on the site. The conditions that we describe and discuss in this report are pertinent only at the boring locations and under the environment at the time of our field exploration. Variations in the subsurface conditions were encountered, and it is likely that additional variations exist that could not be determined from our site reconnaissance or from our borings. No warranty, express or implied, is presented in this report with respect to the soil and groundwater conditions on this site.

STANDARD OF CARE

The recommendations contained in this report represent our professional opinions. The soil testing and geotechnical engineering services performed for this project have been conducted in a manner consistent with that level of skill and care ordinarily

exercised by other members of the profession currently practicing in this area, under similar budgetary and time constraints. No other warranty, express or implied, is made.

Prepared by: Tammy A. Landers, P.E.
Project Engineer

Reviewed by: Charles M. Allgood, Jr., P.E.
Senior Project Engineer

TAL:smc
w:\TAL\8416 DTR.smc

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 Professional Engineer under the laws of the State of Minnesota

Tammy A. Landers

Date: 8/23/99 Reg. No. 26855

APPENDIX

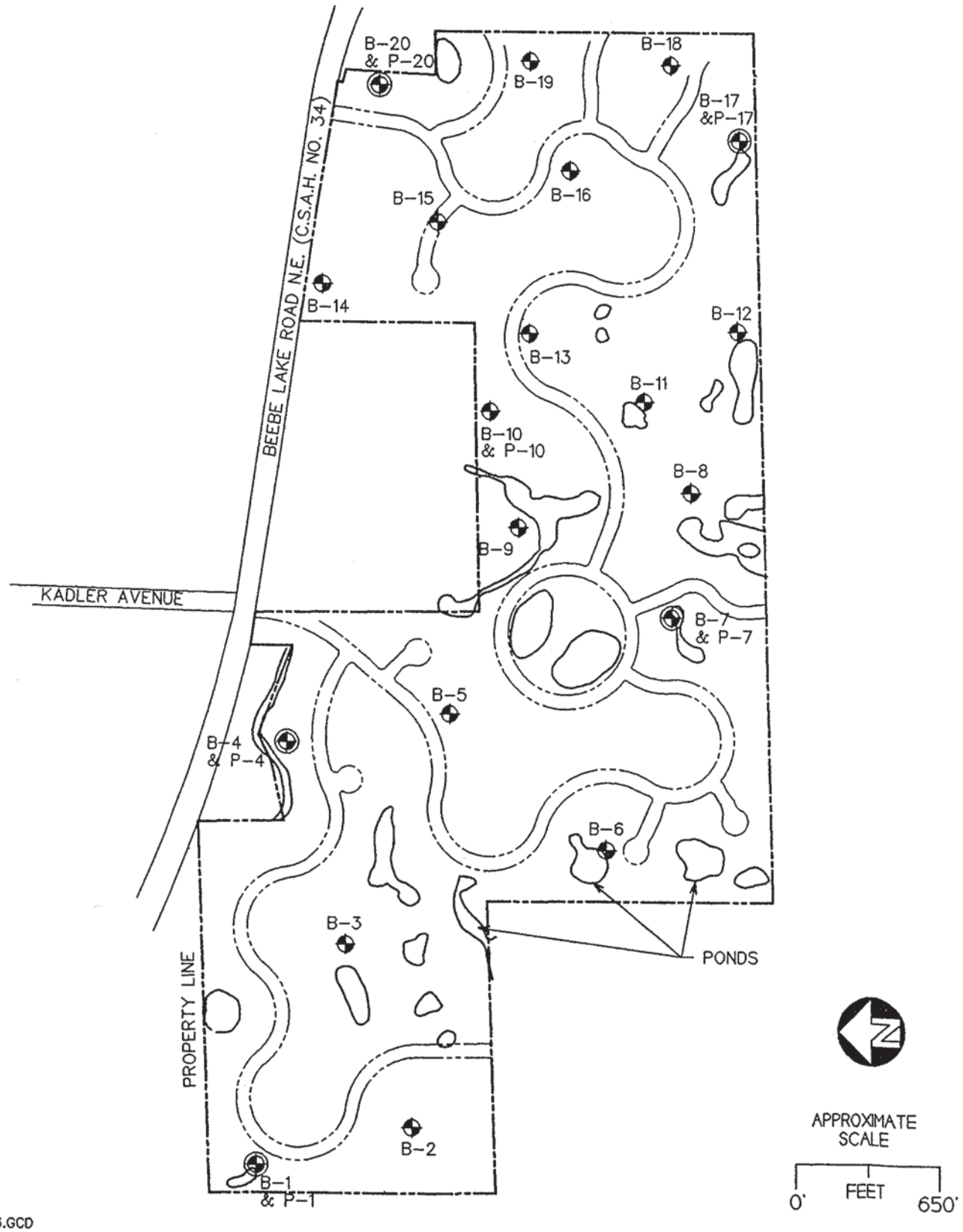
SOIL BORING LOCATION DIAGRAM

GENERAL NOTES

SOIL BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

SPECIAL NOTES REGARDING PLACEMENT OF COMPACTED FILL SOILS



8416.GCD

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SOIL BORING LOCATION DIAGRAM

CROW RIVER HEIGHTS
HANOVER, MINNESOTA

VJL	CMA	JULY 99	GME Project No. 8416

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SL : SS with Liner
SS : Split Spoon — 1⅜" I.D., 2" O.D., unless otherwise noted
ST : Shelby Tube — 2" O.D., unless otherwise noted
PA : Power Auger
DB : Diamond Bit — NX: BX: AX
AS : Auger Sample
JS : Jar Sample
VS : Vane Shear
OS : Osterberg Sampler — 3" Shelby Tube
HS : Hollow Stem Auger
WS : Wash Sample
FT : Fish Trail
RB : Rock Bit
BS : Bulk Sample
PM : Pressuremeter test — in situ

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL : Water Level
WCI : Wet Cave In
DCI : Dry Cave In
WS : While Sampling
WD : While Drilling
BCR : Before Casing Remvoal
ACR : After Casing Removal
AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In previous soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence of ground water elevations must be sought.

GRADATION DESCRIPTION & TERMINOLOGY

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive, and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency, and their plasticity.

Major Component Of Sample	Size Range	Descriptive Term(s) (Of Components Also Present in Sample)	Percent of Dry Weight
Boulders	Over 8 in. (200mm)	Trace	1 — 9
Cobbles	8 in. to 3 in. (200mm to 75mm)	Little	10 — 19
Gravel	3 in. to #4 sieve (75mm to 2mm)	Some	20 — 34
Sand	#4 to #200 sieve (2mm to .074mm)	And	35 — 50
Silt	Passing #200 sieve (0.074mm to 0.005mm)		
Clay	Smaller than 0.005mm		

CONSISTENCY OF COHESIVE SOILS:

Unconfined Comp. Strength, Qu, tsf	Consistency
< 0.25	Very Soft
0.25 — 0.49	Soft
0.50 — 0.99	Medium (Firm)
1.00 — 1.99	Stiff
2.00 — 3.99	Very Stiff
4.00 — 8.00	Hard
> 8.00	Very Hard

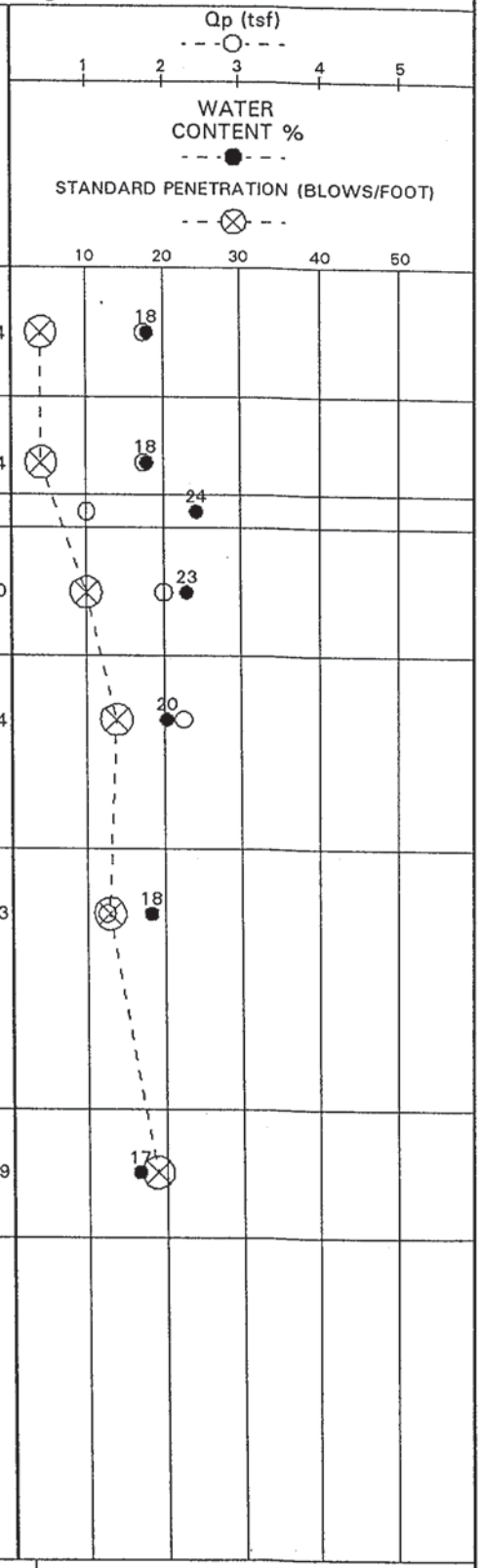
RELATIVE DENSITY OF GRANULAR SOILS:

N — Blows/ft.	Relative Density
0 — 3	Very Loose
4 — 9	Loose
10 — 29	Medium Dense
30 — 49	Dense
50 — 80	Very Dense
80 +	Extremely Dense

LOG OF BORING B- 1 & P- 1

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 984.6		
	1SS		2.0	Brown SILTY SANDY CLAY, trace gravel - soft - (CL) (FILL)		4
	2SS		3.5	Dark brown CLAYEY SILT WITH ORGANICS - soft - (ML-OL)		4
			4.0	Brown and gray SILTY CLAY, trace sand - (CL)		
5	3SS		6.0	Gray CLAYEY SILT - stiff - (ML)		10
	4SS	▽	9.0	Brown and gray SILTY CLAY, trace sand - stiff - (CL)		14
10	5SS	▼	13.0	Gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		13
15	6SS			Brown and gray SILTY CLAY WITH SAND, trace gravel - very stiff - (CL)		19
				End of boring at 15 feet Hollow stem auger used full depth Piezometer installed to 14 feet Top of riser elevation = 985.7 feet		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling
W.L. ▼	10 feet after HSA removal
▽	7.9' after piezometer install
Boring caved at 14 feet after HSA removal	

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BORING STARTED	6/29/99		
BORING COMPLETED	6/29/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

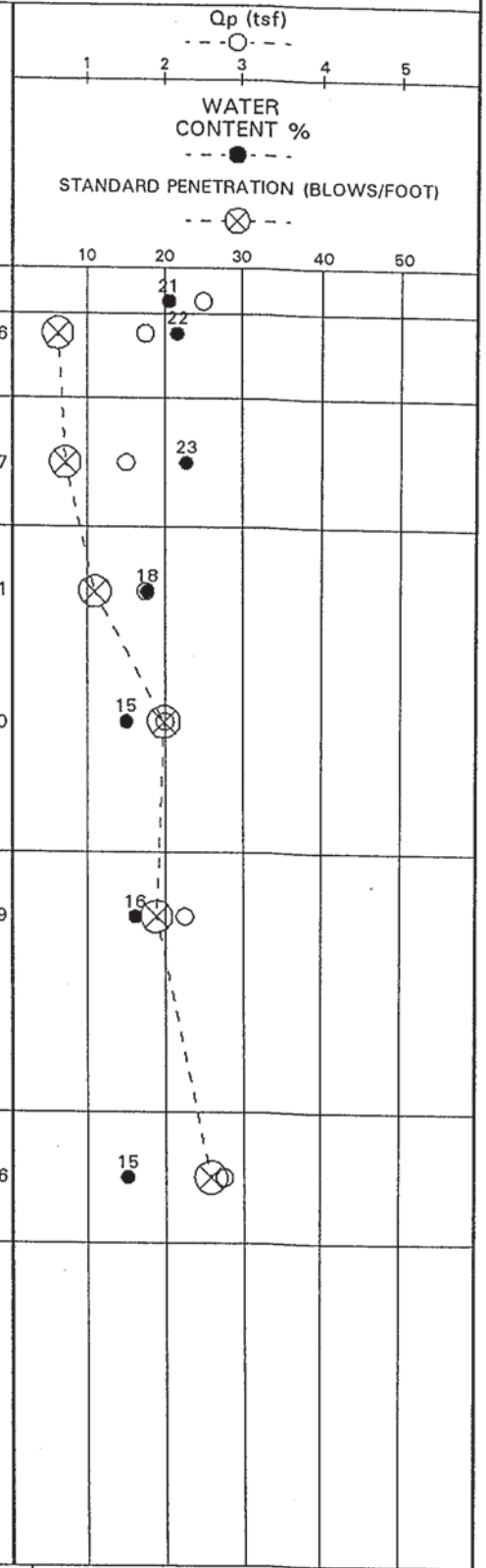
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 2

PROJECT: Crow River Heights
SITE: Beebe Lake Road & James Avenue NE, Hanover, Minnesota
CLIENT: Semler Construction, Inc.
ARCHITECT-ENGINEER: LSJ Engineering, Inc.

SURFACE ELEVATION: 988.7

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		0.7	Brown and dark brown SILTY CLAY, trace organics - (CL-OL) (Topsoil)		6
			2.0	Gray brown SILTY CLAY - firm - (CL)		
	2SS		4.0	Brown SILTY SANDY CLAY, trace gravel - firm - (CL)		7
5	3SS			Brown and gray SILTY SANDY CLAY, trace gravel - stiff to very stiff - (CL)		11
	4SS		9.0			20
10	5SS			Gray brown SILTY CLAY WITH SAND, trace gravel - very stiff - (CL)		19
			13.0			
15	6SS			Gray brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		26
				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 12.2 feet after HSA removal

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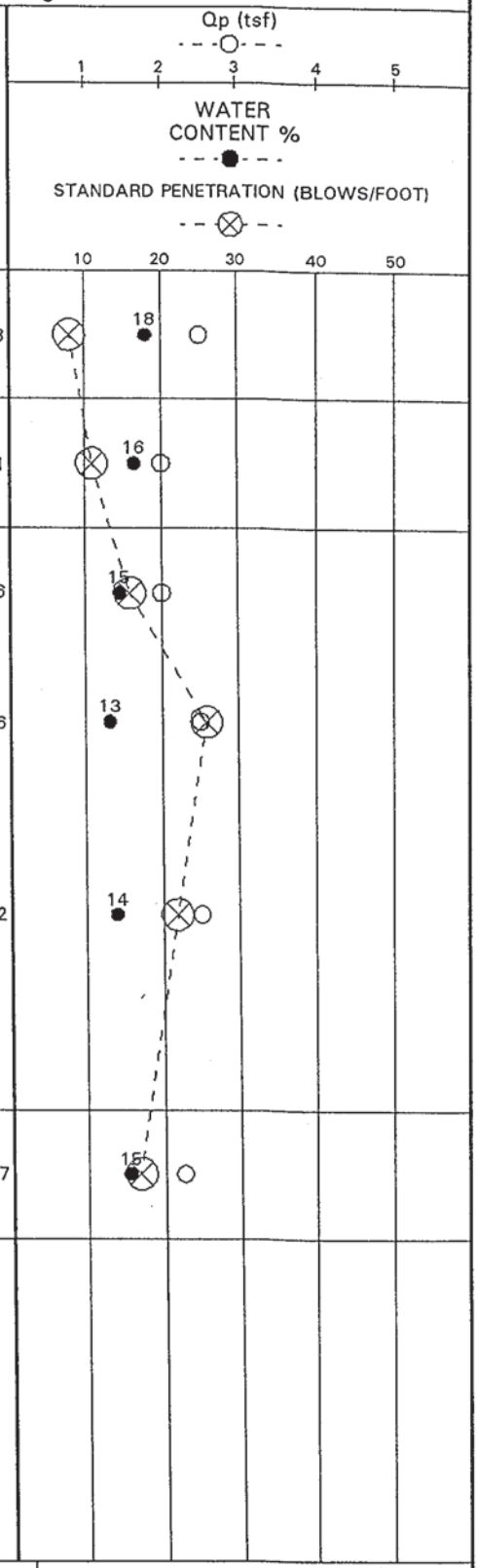
BORING STARTED	6/28/99		
BORING COMPLETED	6/28/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 3

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 973.9		
	1SS		2.0	Brown and dark brown SILTY SANDY CLAY, trace organics - stiff - (CL-OL) (Topsoil)		8
	2SS		4.0	Brown and gray SILTY CLAY WITH SAND, trace gravel - stiff - (CL)		11
5	3SS			Brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		16
	4SS					26
10	5SS					22
	6SS		13.0	Gray SILTY SANDY CLAY, trace gravel, sand seam - very stiff - (CL)		17
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 13 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	6/25/99		
BORING COMPLETED	6/25/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

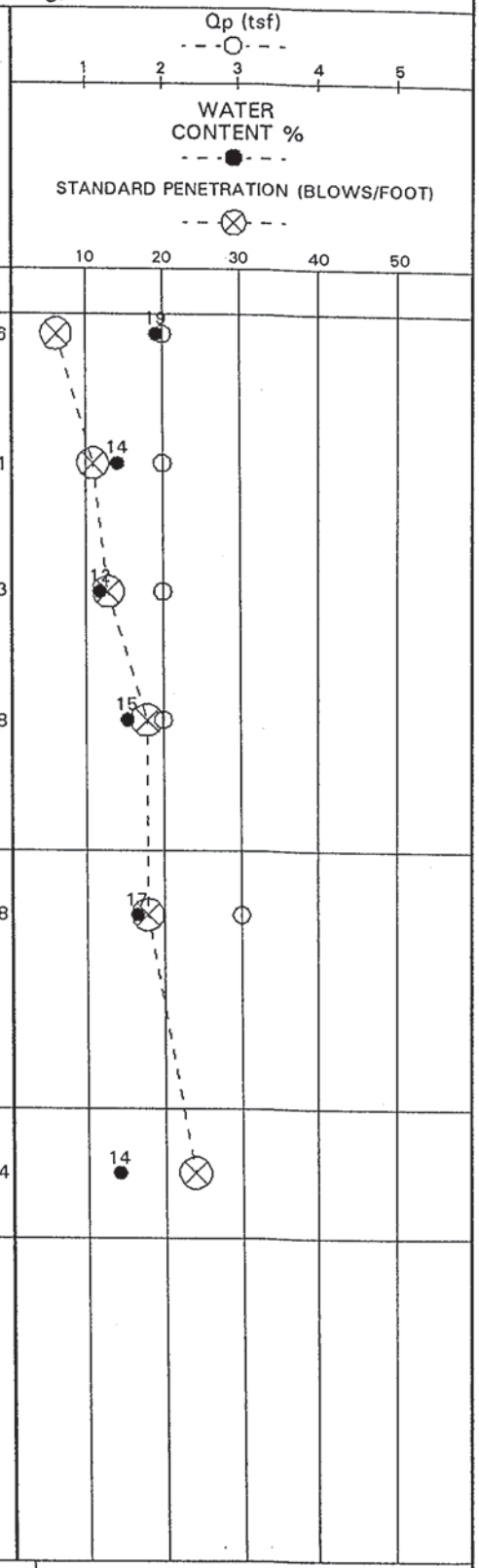
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 4 & P- 4

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 963.9

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
			0.7	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		
	1SS			Brown SILTY CLAY WITH SAND - firm to very stiff - (CL)		6
	2SS					11
5	3SS					13
	4SS					18
			9.0			
10	5SS			Brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		18
			13.0			
	6SS			Brown SILTY SANDY CLAY - very stiff - (CL)		24
15				End of boring at 15 feet Hollow stem auger used full depth Piezometer installed to 13 feet Top of riser elevation = 966.4 feet		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 13.2 feet after HSA removal

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Minneapolis, Minnesota 55447
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BORING STARTED	6/28/99		
BORING COMPLETED	6/28/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

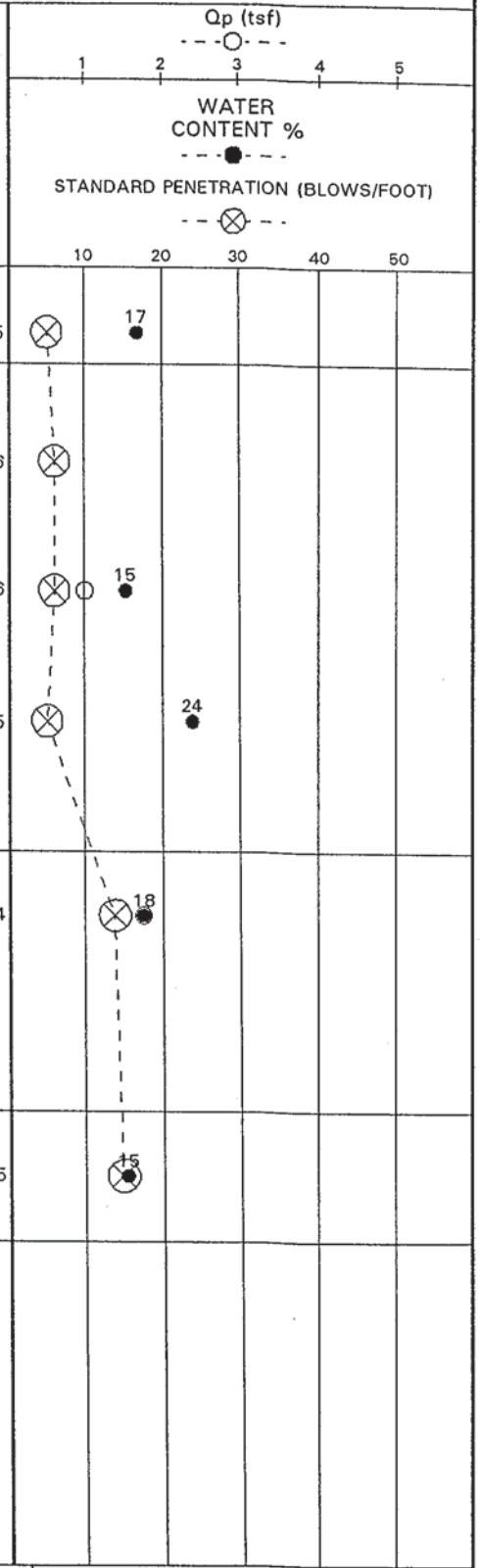
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 5

PROJECT: Crow River Heights
SITE: Beebe Lake Road & James Avenue NE, Hanover, Minnesota
CLIENT: Semler Construction, Inc.
ARCHITECT-ENGINEER: LSJ Engineering, Inc.

SURFACE ELEVATION: 962.7

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		1.5	Dark brown CLAYEY SILT WITH ORGANICS - firm - (ML-OL) (Topsoil)		5
	2SS			Brown and gray SILTY SANDY CLAY, trace gravel - firm - (CL)		6
5	3SS					6
	4SS		9.0			5
10	5SS		13.0	Brown SILTY CLAY WITH SAND, trace gravel - stiff - (CL)		14
	6SS			Brown SILTY SANDY CLAY, trace gravel - stiff - (CL)		15
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS

W.L. Groundwater not encountered
W.L. while drilling or after
W.L. HSA removal

Boring caved at 13 feet after HSA removal

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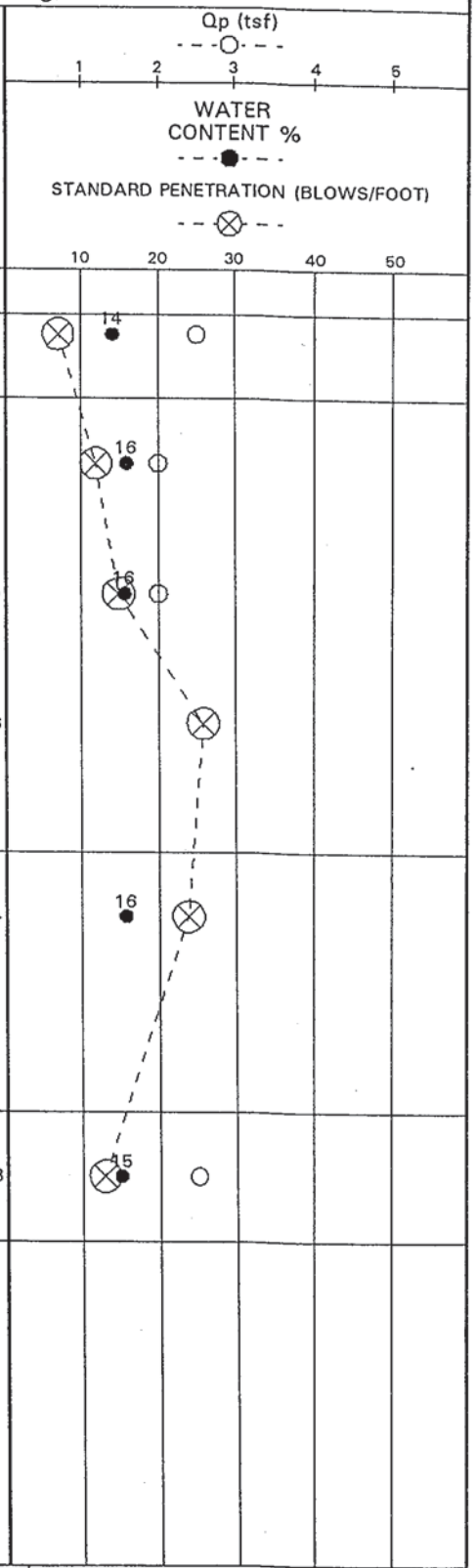
BORING STARTED	6/25/99
BORING COMPLETED	6/25/99
RIG	BK51HD
DRILLER	BM
DRAWN	KMB
APPROVED	CMA
JOB #	8416
SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 6

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 979.5		
	1SS		0.7	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		7
			2.0	Brown SILTY SANDY CLAY, trace gravel - firm - (CL)		
	2SS			Brown SILTY CLAY WITH SAND, trace gravel - stiff to very stiff - (CL)		12
5	3SS					15
	4SS					26
			9.0			
10	5SS			Gray brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		24
			13.0			
	6SS			Gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		13
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 14 feet after HSA removal

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Minneapolis, Minnesota 55447
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BORING STARTED	6/28/99		
BORING COMPLETED	6/28/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

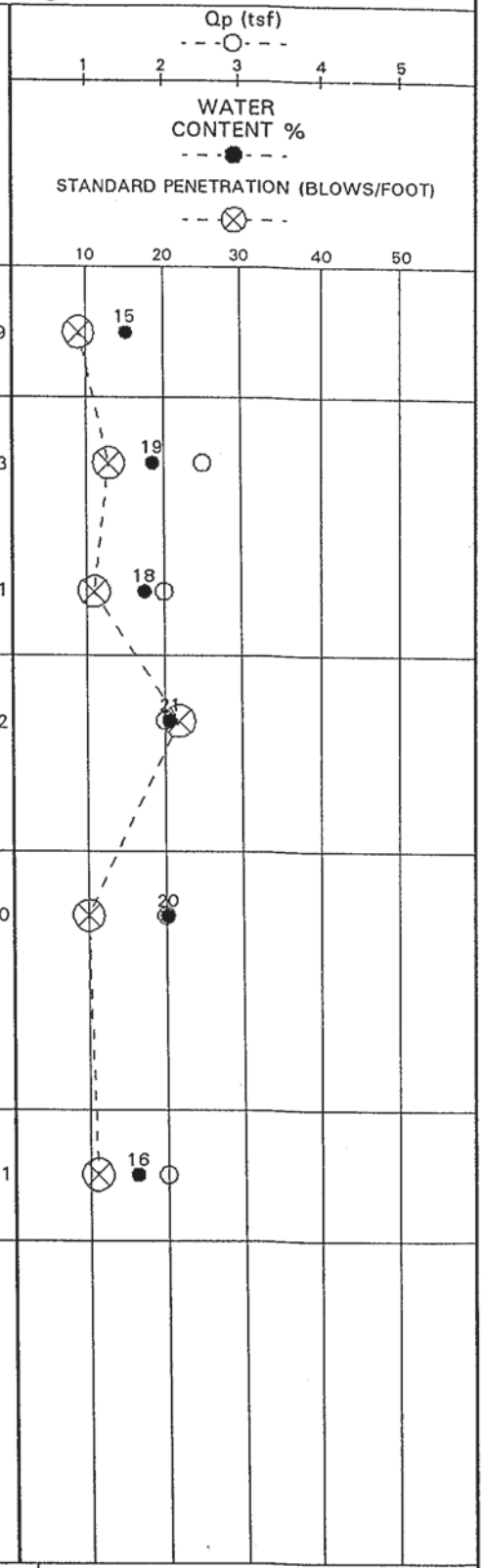
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 7 & P- 7

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 961.5

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		2.0	Brown SANDY SILT WITH ORGANICS - loose - (ML-OL) (Topsoil)		9
	2SS			Brown SILTY CLAY WITH SAND, trace gravel - stiff - (CL)		13
5	3SS		6.0			11
	4SS	▽		Brown and gray SILTY CLAY WITH SAND, trace gravel, sand seams - very stiff - (CL)		22
		▽	9.0			
10	5SS			Gray SILTY CLAY WITH SAND, trace gravel - stiff - (CL)		10
		▼	13.0			
	6SS			Gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		11
15				End of boring at 15 feet Hollow stem auger used full depth Piezometer installed to 12.5 feet Top of riser elevation = 964.0 feet		



WATER LEVEL OBSERVATIONS
W.L. ▽ 9 feet while drilling
W.L. ▼ 12 feet after HSA removal
W.L. ▽ 8.3 feet, 953.2 feet 7/26/99

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Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/1/99		
BORING COMPLETED	7/1/99		
RIG	BK-51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

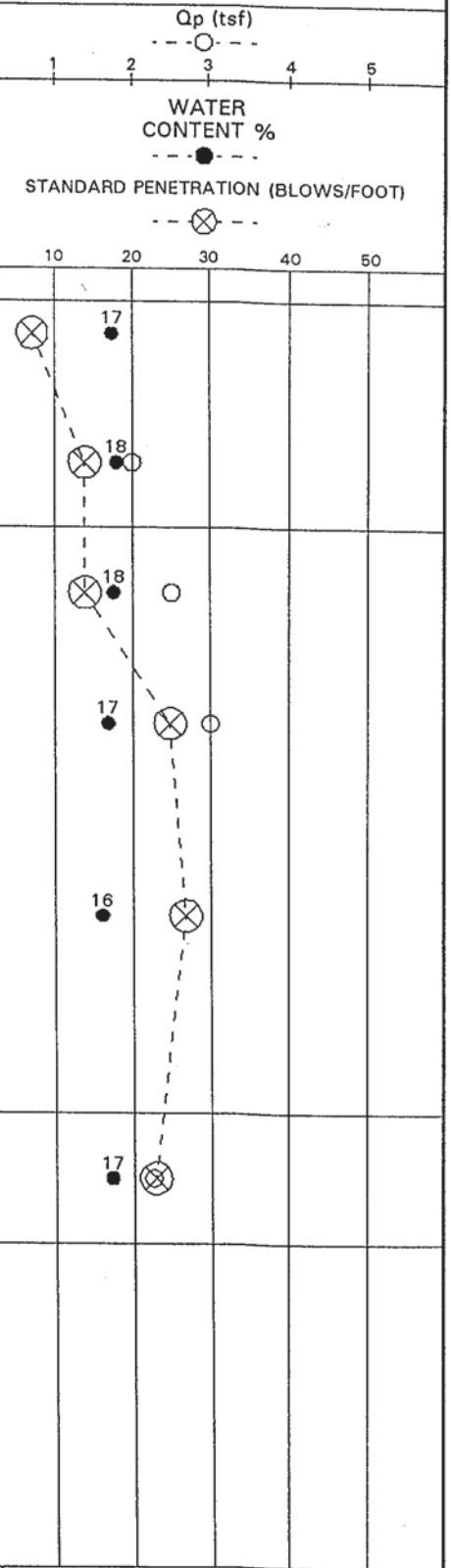
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 8

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 963.4

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
			0.5	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		
	1SS			Brown SILTY SANDY CLAY, trace gravel, sand seams - firm to stiff - (CL)		7
	2SS		4.0			14
5	3SS			Brown SILTY SANDY CLAY, trace gravel - stiff to very stiff - (CL)		14
	4SS					25
10	5SS					27
			13.0			
	6SS			Gray SILTY SANDY CLAY, trace gravel - very stiff - (CL)		23
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 12.3 feet after HSA removal

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Minneapolis, Minnesota 55447
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BORING STARTED	7/1/99		
BORING COMPLETED	7/1/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

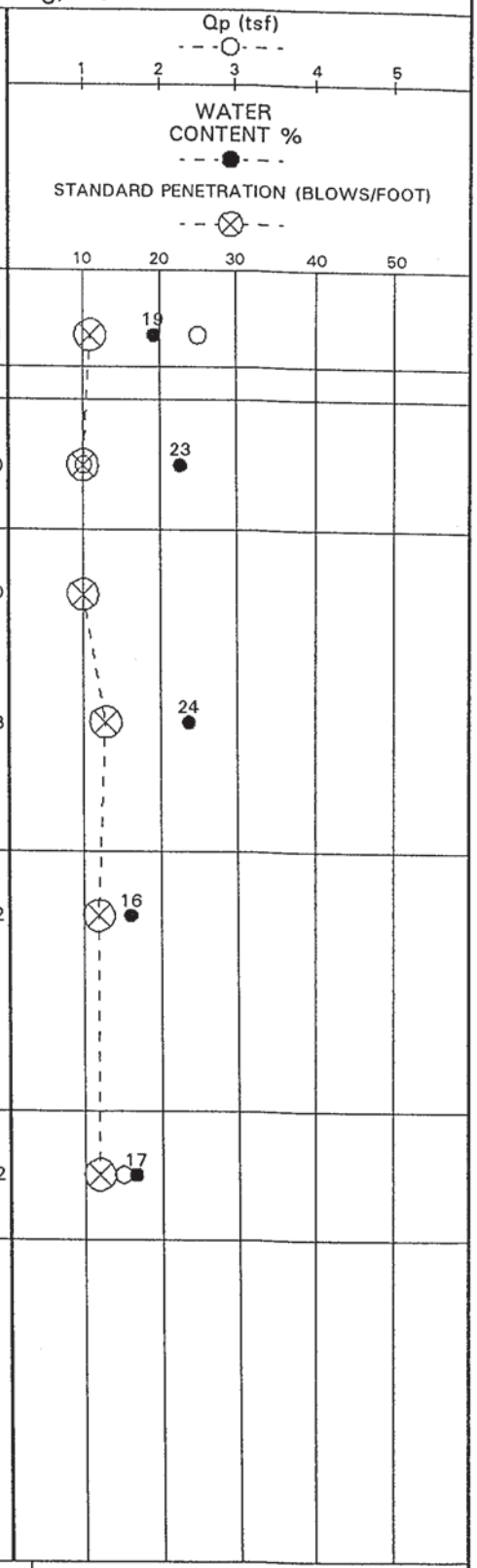
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B- 9

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 951.8

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		1.5	Dark brown CLAYEY SILT WITH ORGANICS - stiff - (ML-OL) (Topsoil)		11
			2.0	Brown SILTY CLAY, trace sand - (CL)		
	2SS		4.0	Brown fine SILTY SAND, trace gravel - medium dense - damp - (SM)		10
5	3SS			Gray brown SILTY CLAY, trace sand, roots, sand seams - stiff - (CL)		10
	4SS		9.0			13
10	5SS			Brown SANDY SILT, trace clay - medium dense - (ML)		12
			13.0			
	6SS			Gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		12
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 13.3 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

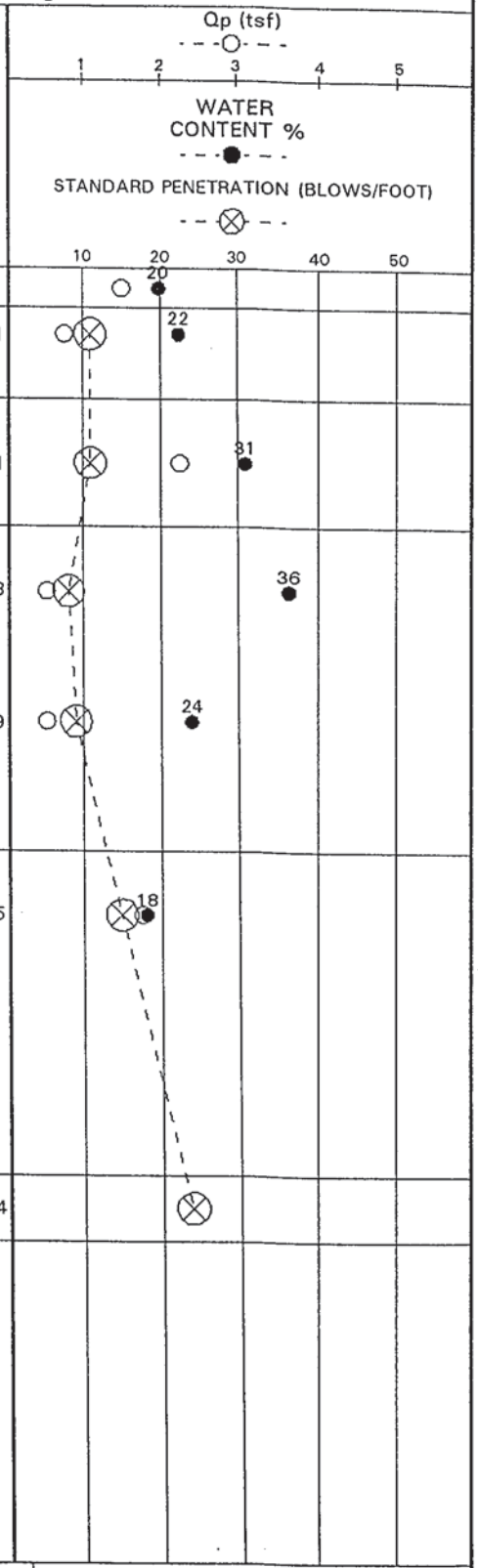
BORING STARTED	6/28/99		
BORING COMPLETED	6/28/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-10 & P-10

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 954.8		
	1SS		0.6	Dark brown SANDY SILT WITH ORGANICS - (ML-OL) (Topsoil)		11
			2.0	Brown SILTY SANDY CLAY, trace gravel - stiff - (CL)		
	2SS		4.0	Gray SILTY CLAY - stiff - (CL)		11
5	3SS			Gray and brown SILTY CLAY, trace sand - stiff - (CL)		8
	4SS	▽	9.0			9
10	5SS			Gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		15
		▼	14.0			
15	6SS			Gray fine to medium SILTY SAND, trace clay, gravel - medium dense - wet - (SM)		24
				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings Piezometer installed to 14 feet Top of riser elevation = 955.8 feet		



WATER LEVEL OBSERVATIONS
W.L. ▽ 14 feet while drilling
W.L. ▼ 14 feet after HSA removal
W.L. ▽ 8.4 feet, 946.4 feet 7/26/99
Boring caved at 14 feet after HSA removal

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Minneapolis, Minnesota 55447
(612) 559-1859

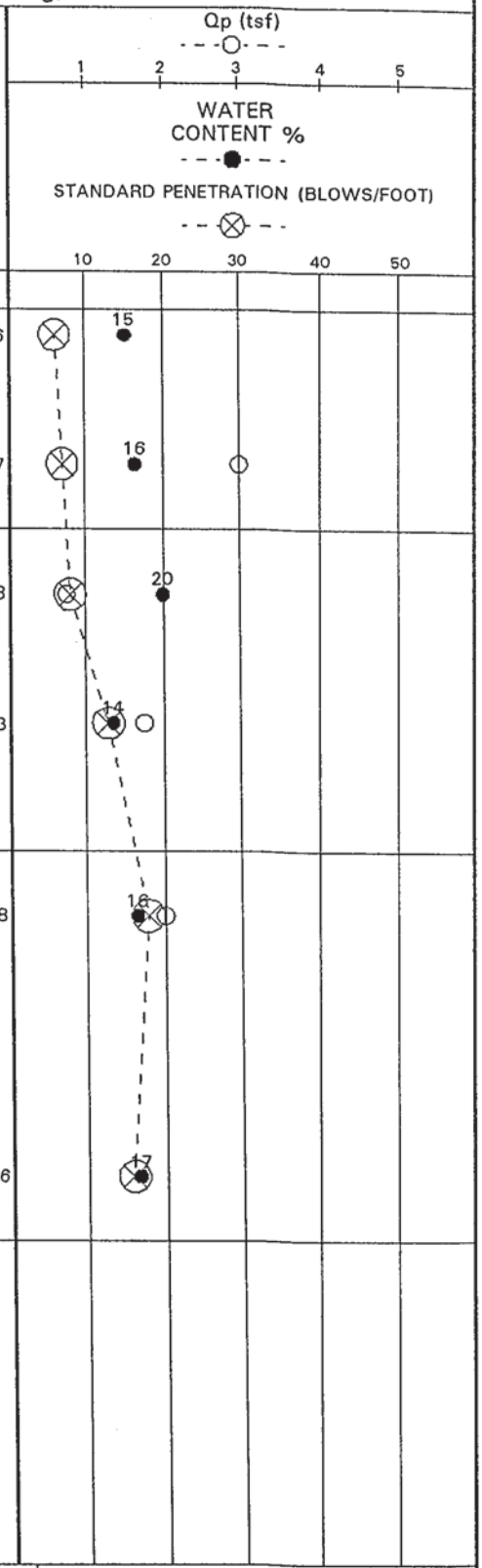
BORING STARTED	7/5/99		
BORING COMPLETED	7/5/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-11

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 961.9		
			0.6	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		
	1SS			Brown SILTY CLAY WITH SAND, trace gravel - firm - (CL)		6
	2SS		4.0			7
5	3SS			Brown SILTY SANDY CLAY, trace gravel - stiff - (CL)		8
	4SS		9.0			13
10	5SS			Brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		18
	6SS					16
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 13.5 feet after HSA removal

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Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/1/99		
BORING COMPLETED	7/1/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

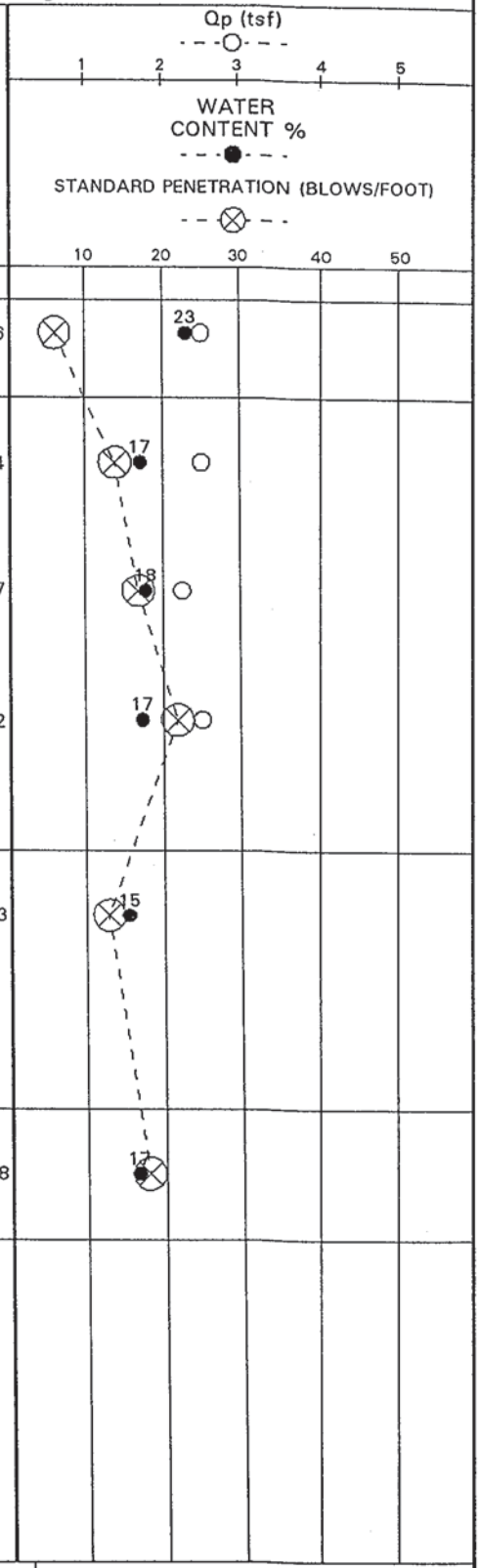
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-12

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 962.1

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		0.5	Dark brown SANDY SILT WITH ORGANICS - (ML-OL) (Topsoil)		6
			2.0	Brown SILTY SANDY CLAY, trace gravel - firm - (CL)		
	2SS			Brown SILTY CLAY WITH SAND, trace gravel - stiff to very stiff - (CL)		14
5	3SS					17
	4SS		9.0			22
10	5SS			Brown SILTY SANDY CLAY, trace gravel, sand seams - stiff - (CL)		13
			13.0			
	6SS			Brown SILTY CLAYEY SAND, trace gravel - medium dense - damp - (SC)		18
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 12.8 feet after HSA removal

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Minneapolis, Minnesota 55447
(612) 559-1859

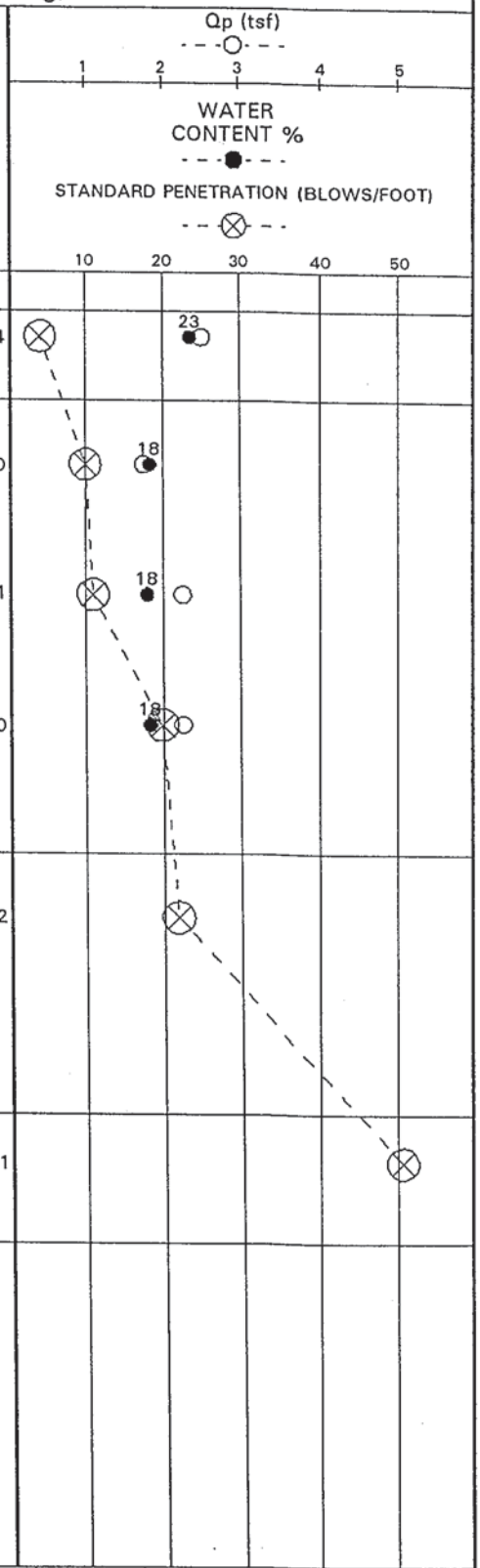
BORING STARTED	7/6/99
BORING COMPLETED	7/6/99
RIG BK51HD	DRILLER BM
DRAWN KMB	APPROVED CMA
JOB # 8416	SHEET 1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-13

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 963.7		
	1SS		0.6	Dark brown SANDY SILT WITH ORGANICS - (ML-OL) (Topsoil)		4
			2.0	Brown SILTY CLAY WITH SAND, trace gravel - soft - (CL)		
	2SS			Brown SILTY SANDY CLAY, trace gravel - stiff to very stiff - (CL)		10
5	3SS					11
	4SS					20
			9.0			
10	5SS			Brown fine SAND, trace silt - moist - (SP)		22
		▽	13.0			
	6SS			Brown fine to coarse SAND WITH GRAVEL, trace silt - dense - wet - (SP)		51
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	▽ 13 feet while drilling
W.L.	
W.L.	

Boring caved at 12.6 feet after HSA removal

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BORING STARTED	7/6/99
BORING COMPLETED	7/6/99
RIG BK51HD	DRILLER BM
DRAWN KMB	APPROVED CMA
JOB # 8416	SHEET 1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-14

PROJECT: Crow River Heights
SITE: Beebe Lake Road & James Avenue NE, Hanover, Minnesota
CLIENT: Semler Construction, Inc.
ARCHITECT-ENGINEER: LSJ Engineering, Inc.

SURFACE ELEVATION: 928.6

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS	▽	1.0	Black fine SILTY SAND, trace organics - (SM-OL) (Topsoil) (FILL)		6
			3.0	Brown fine to medium SILTY SAND, trace gravel - loose - moist to wet - (SM) (FILL)		
	2SS			Dark brown sapric PEAT - soft - (Pt)		2
5	3SS		6.0			2
	4SS		9.0	Gray ORGANIC SILT - soft - (OL)		2
10	5SS			Gray SILTY SANDY CLAY, trace gravel - soft to stiff - (CL)		3
	6SS					9
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		

Qp (tsf): 1 2 3 4 5
WATER CONTENT %
STANDARD PENETRATION (BLOWS/FOOT): 10 20 30 40 50

Water content %: 33, 87, 159, 80, 24, 21

WATER LEVEL OBSERVATIONS
W.L. ▽ 2 feet while drilling
W.L.
W.L.

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Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/6/99
BORING COMPLETED	7/6/99
RIG	BK51HD
DRILLER	BM
DRAWN	KMB
APPROVED	CMA
JOB #	8416
SHEET	1 of 1

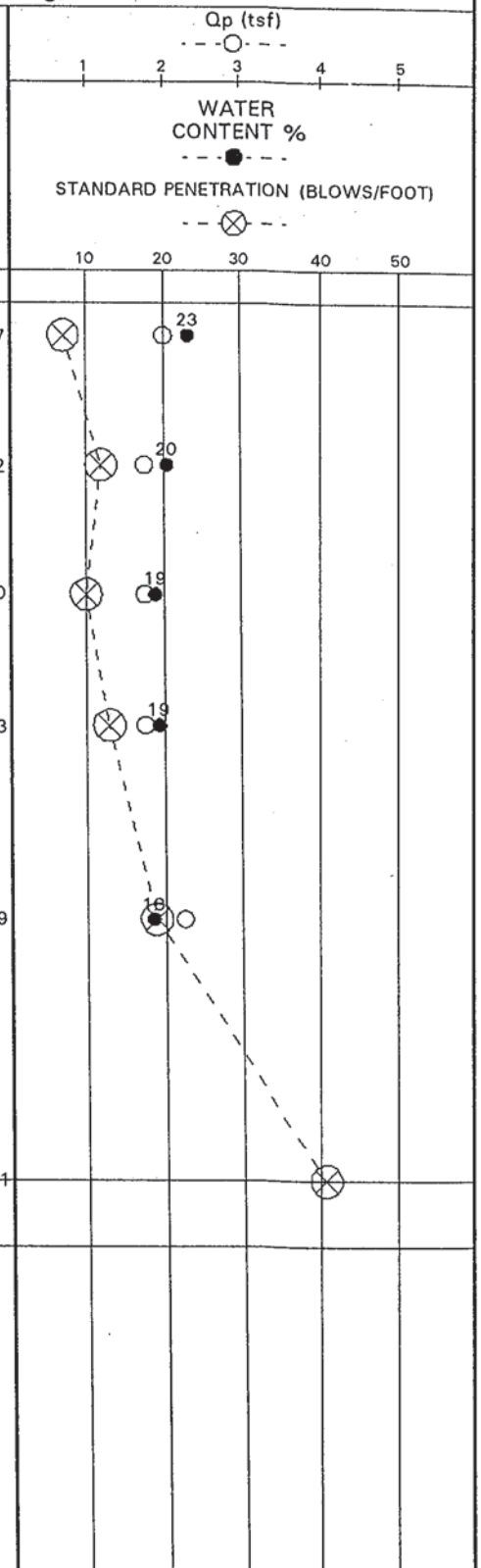
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-15

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 964.7

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		0.5	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		7
				Brown SILTY CLAY WITH SAND, trace gravel - firm to very stiff - (CL)		
	2SS					12
5	3SS					10
	4SS					13
10	5SS					19
	6SS		14.0			41
15				Brown fine to medium SILTY SAND, trace gravel - dense - damp - (SM)		
				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 12.6 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/6/99
BORING COMPLETED	7/6/99
RIG BK51HD	DRILLER BM
DRAWN KMB	APPROVED CMA
JOB # 8416	SHEET 1 of 1

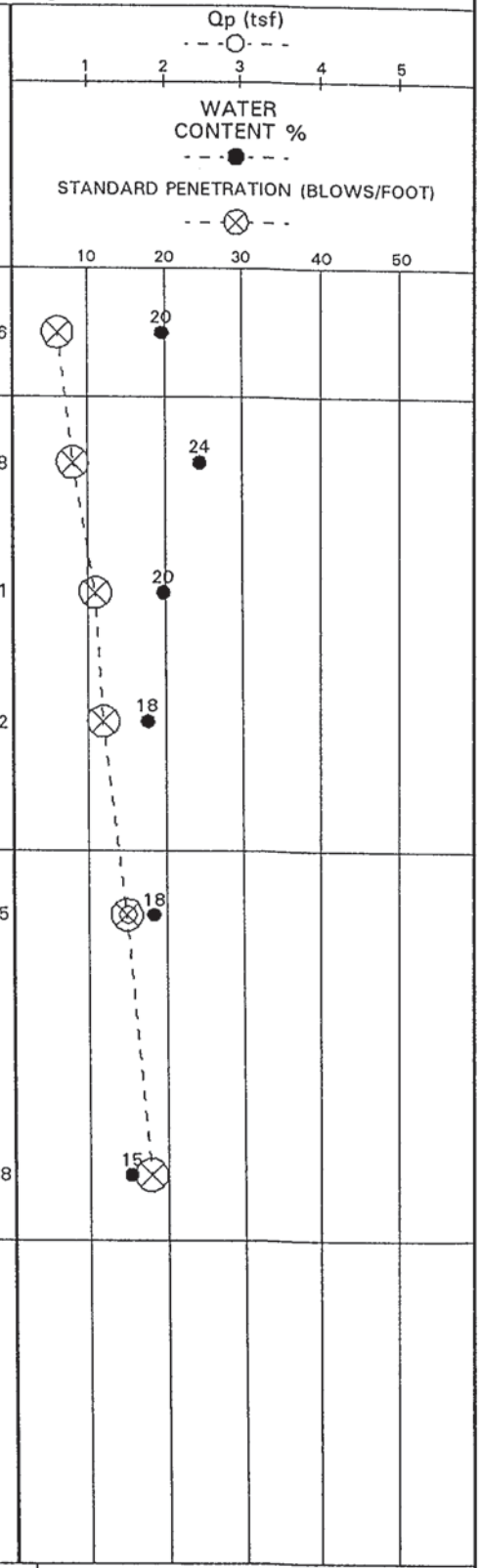
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-16

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 959.1

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		2.0	Brown SILTY SANDY CLAY, trace gravel - firm - (CL)		6
	2SS			Brown SILTY CLAY WITH SAND, trace gravel - stiff to very stiff - (CL)		8
5	3SS					11
	4SS		9.0			12
10	5SS			Brown SILTY SANDY CLAY, trace gravel - stiff to very stiff - (CL)		15
	6SS					18
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 12.5 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/2/99
BORING COMPLETED	7/2/99
RIG BK51HD	DRILLER BM
DRAWN KMB	APPROVED CMA
JOB # 8416	SHEET 1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-17 & P-17

PROJECT: Crow River Heights

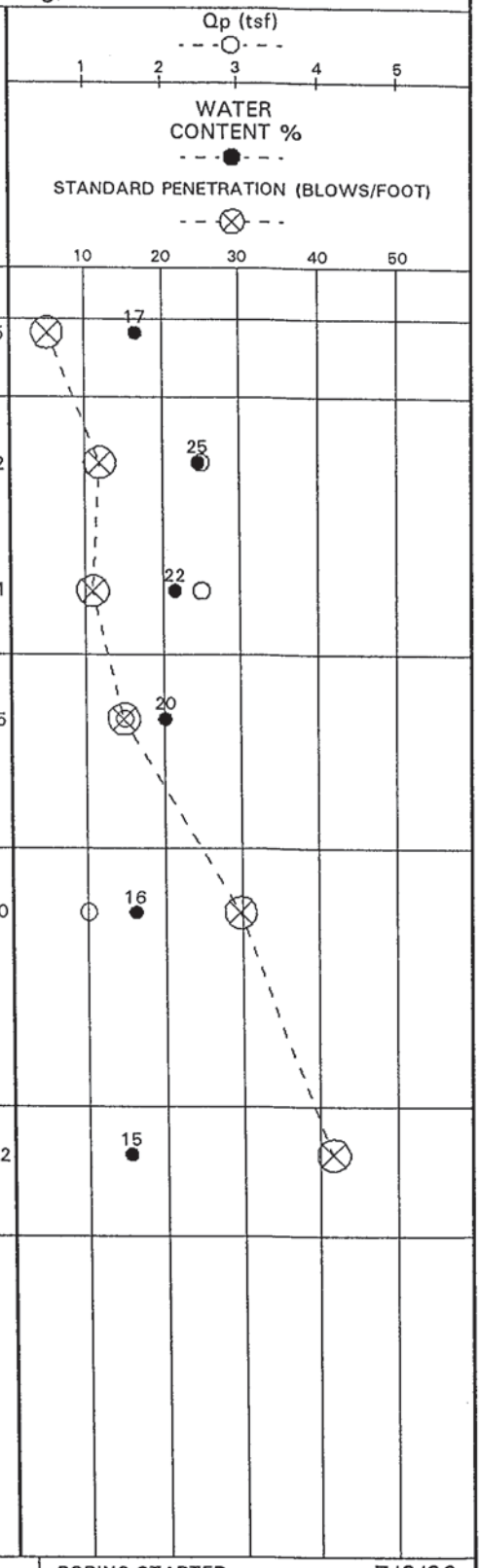
SITE: Beebe Lake Road & James Avenue NE, Hanover, Minnesota

CLIENT: Semler Construction, Inc.

ARCHITECT-ENGINEER: LSJ Engineering, Inc.

SURFACE ELEVATION: 956.8

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		0.8	Brown SANDY SILT WITH ORGANICS - (ML-OL) (Topsoil)		5
			2.0	Gray brown SANDY SILT, trace gravel - loose - (ML)		
	2SS			Brown and gray SILTY SANDY CLAY, trace gravel - stiff - (CL)		12
5	3SS		6.0			11
	4SS			Brown SILTY SANDY CLAY, trace gravel - stiff - (CL)		15
			9.0			
10	5SS			Brown SILTY SANDY CLAY, trace sand seams - very stiff - (CL)		30
			13.0			
	6SS			Gray CLAYEY SILTY SAND - dense - (SC)		42
15				End of boring at 15 feet Hollow stem auger used full depth Piezometer installed to 14 feet Top of riser elevation = 958.3 feet		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 14 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/2/99
BORING COMPLETED	7/2/99
RIG BK51HD	DRILLER BM
DRAWN KMB	APPROVED CMA
JOB # 8416	SHEET 1 of 1

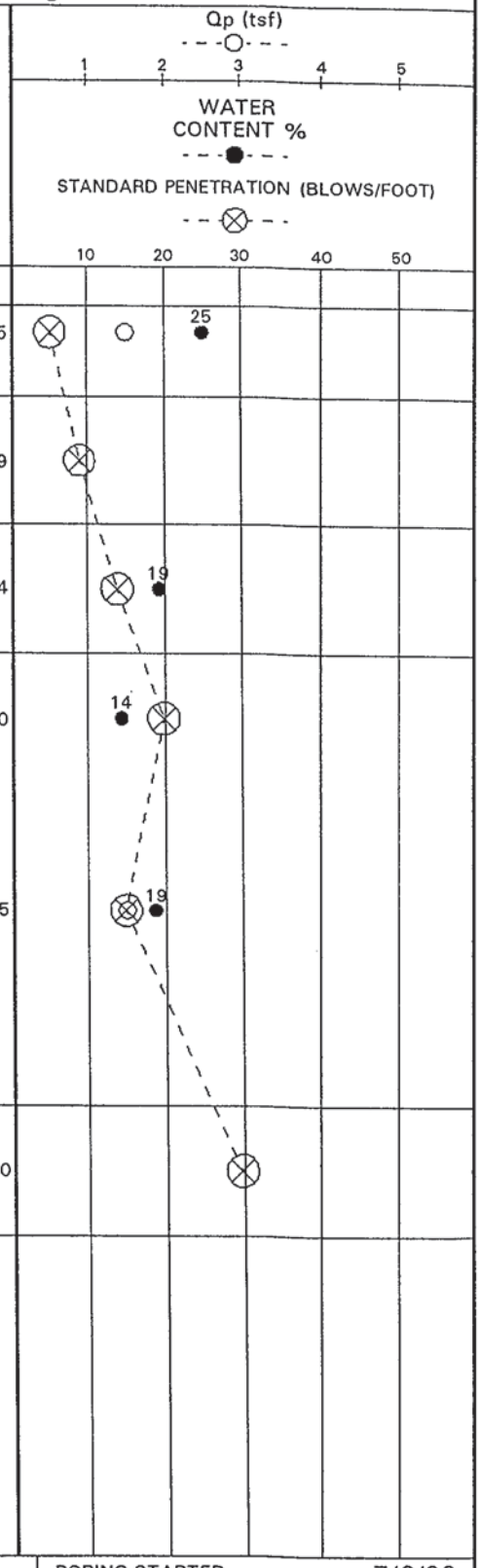
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-18

PROJECT: Crow River Heights
SITE: Beebe Lake Road & James Avenue NE, Hanover, Minnesota
CLIENT: Semler Construction, Inc.
ARCHITECT-ENGINEER: LSJ Engineering, Inc.

SURFACE ELEVATION: 951.1

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
			0.6	Dark brown CLAYEY SILT WITH ORGANICS - (ML-OL) (Topsoil)		
	1SS		2.0	Brown SILTY CLAY, trace sand - firm - (CL)		5
	2SS		4.0	Brown fine to medium SILTY SAND, trace gravel, clay seams - loose - damp - (SM)		9
5	3SS		6.0	Brown SANDY SILT, trace sand seams - medium dense - (ML)		14
	4SS			Brown SILTY SANDY CLAY, trace gravel, sand seams - very stiff to stiff - (CL)		20
10	5SS		13.0			15
	6SS			Brown fine to medium SILTY SAND, trace gravel - dense - damp - (SM)		30
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS

W.L. Groundwater not encountered
W.L. while drilling or after
W.L. HSA removal

Boring caved at 13.8 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

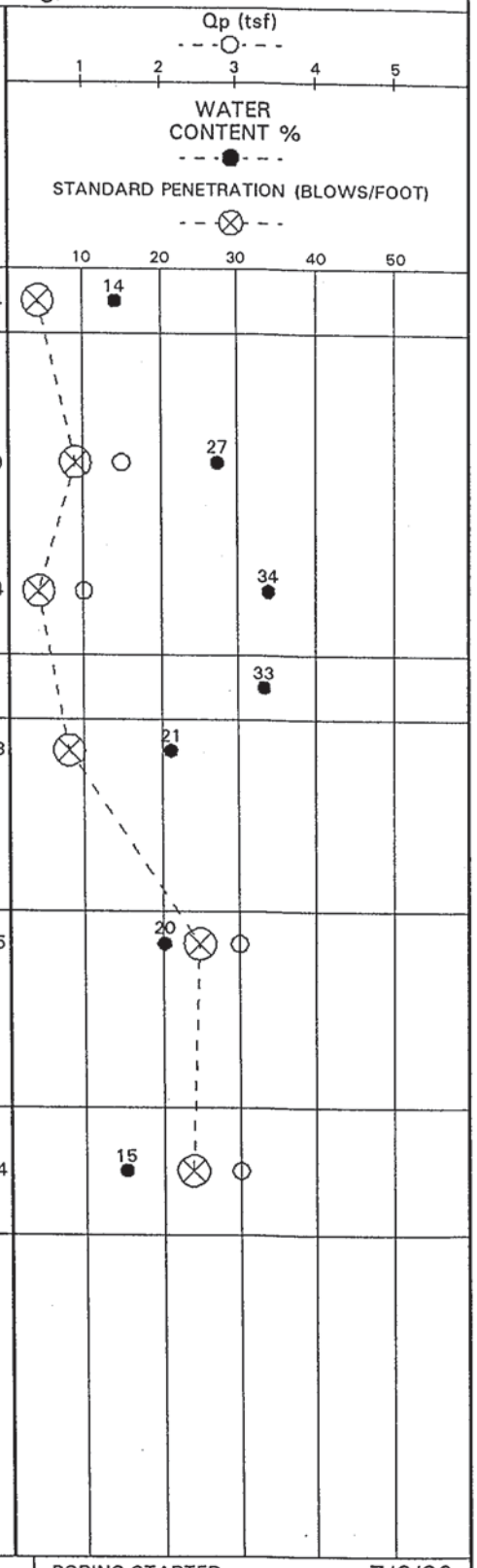
BORING STARTED	7/6/99
BORING COMPLETED	7/6/99
RIG	BK51HD
DRILLER	BM
DRAWN	KMB
APPROVED	CMA
JOB #	8416
SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-19

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
				SURFACE ELEVATION 950.0		
	1SS		1.0	Dark brown SANDY SILT WITH ORGANICS - loose - (ML-OL) (Topsoil)		4
	2SS			Brown and gray SILTY SANDY CLAY, trace gravel - stiff to soft - (CL)		9
5	3SS	▽	6.0			4
			7.0	Brown and gray SILTY SANDY CLAY, trace gravel - (CL)		
	4SS			Brown SILTY CLAY WITH SAND, trace gravel - stiff - (CL)		8
10	5SS	▼	10.0	Gray brown SILTY SANDY CLAY, trace gravel - very stiff - (CL)		25
	6SS		13.0	Gray SILTY SANDY CLAY, trace gravel - very stiff - (CL)		24
15				End of boring at 15 feet Hollow stem auger used full depth Borehole backfilled with cuttings		



WATER LEVEL OBSERVATIONS	
W.L.	▽ 6 feet while drilling
W.L.	▼ 12.2 feet after HSA removal
W.L.	

Boring caved at 13.3 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

BORING STARTED	7/2/99		
BORING COMPLETED	7/2/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

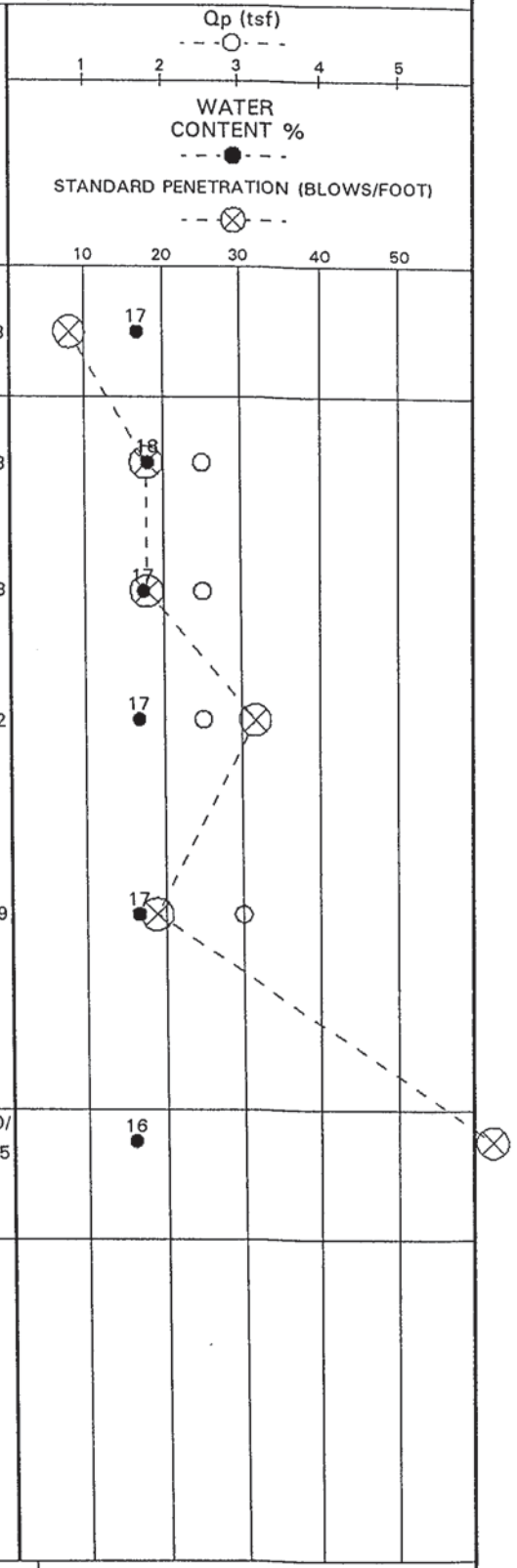
The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

LOG OF BORING B-20 & P-20

PROJECT Crow River Heights	SITE Beebe Lake Road & James Avenue NE Hanover, Minnesota
CLIENT Semler Construction, Inc.	ARCHITECT-ENGINEER LSJ Engineering, Inc.

SURFACE ELEVATION 946.1

DEPTH, FEET	SAMPLE NUMBER AND TYPE	WATER LEVEL	STRATA CHANGE, FEET	DESCRIPTION OF MATERIAL	SPECIAL TEST RESULTS	N-VALUE (BLOWS/FT.)
	1SS		2.0	Brown SANDY CLAY WITH SILT, trace gravel - stiff - (CL)		8
	2SS			Brown SILTY SANDY CLAY, trace gravel - very stiff to hard - (CL)		18
5	3SS					18
	4SS					32
10	5SS		13.0			19
	6SS			Brown SANDY CLAY WITH SILT, trace gravel - very hard - (CL)		50/0.5
15				End of boring at 15 feet Hollow stem auger used full depth Piezometer installed to 14.5 feet Top of riser elevation = 947.6 feet		



WATER LEVEL OBSERVATIONS	
W.L.	Groundwater not encountered
W.L.	while drilling or after
W.L.	HSA removal

Boring caved at 14.5 feet after HSA removal

GME CONSULTANTS, INC.
Geotechnical · Materials Environmental
14000 21st Avenue North
Minneapolis, Minnesota 55447
(612) 559-1859

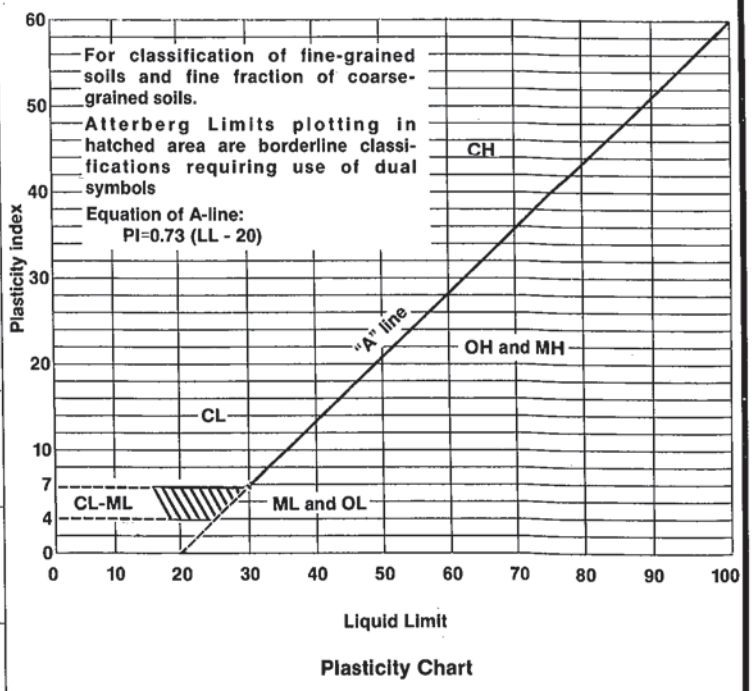
BORING STARTED	7/2/99		
BORING COMPLETED	7/2/99		
RIG	BK51HD	DRILLER	BM
DRAWN	KMB	APPROVED	CMA
JOB #	8416	SHEET	1 of 1

The stratification lines represent approximate boundaries between soil types; insitu the transition may be gradual.

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

(ASTM: D 2487 and 2488)

Major divisions			Group symbols	Typical names	Laboratory classification criteria	
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of corase fraction larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	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 per cent ..... GW, GP, SW, SP; More than 12 per cent ..... GM, GC, SM, SC; 5 to 12 per cent ..... *Borderline* cases requiring dual symbols	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM d / u	Silty gravels, gravel-sand-silt mixtures		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	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line or P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM d / u	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4
						Limits plotting in hatched zone with P.I. between 4 and 7 *are borderline* cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures		Atterberg limits below "A" line or P.I. greater than 7
Fine-grained soils More than half of material is *smaller* than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or 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 greater than 50)		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		
	High! organic soils		Pt	Peat and other highly organic soil		



Plasticity Chart

SPECIAL NOTES ON PLACEMENT OF COMPACTED FILL SOIL

GENERAL

The placement of compacted fill for support of foundations, floor slabs, pavements, or earth structures should be carried out by an experienced excavator with the proper equipment. The excavator must be prepared to adapt his procedures, equipment, and materials to the type of project, to weather conditions, and the structural requirements of the architect and engineer. Methods and materials used in summer may not be applicable in winter; fill used in dry excavations may not be suitable in wet excavations or during periods of precipitation; proposed fill soil may require wetting or drying for proper placement and compaction. Conditions may also vary during the course of a project or in different areas of the site. These needs should be addressed in the project drawings and specifications.

EXCAVATION/BACKFILL BELOW THE WATER TABLE

It is common to have to excavate and replace unsuitable soils below the water table for site correction. As a general rule of prudent construction technique, we recommend that excavation/backfill below the water table not be permitted, unless the excavation is dewatered. Numerous problems can develop when this procedure is attempted without dewatering.

- — Inability of the equipment operators and soil technicians to observe that all unsuitable soil/materials have been removed from the base of the excavation.
- — Inability to observe and measure that proper lateral oversizing is provided.
- — Inability to prevent or correct sloughing of excavation sidewalls, which can result in unsuitable soils trapped within the select backfill.
- — Inability of the contractor to adequately and uniformly compact the backfill.
- — Possibility of disturbance of the suitable soils at the base of the excavation.

The dewatering methods, normally chosen at the contractor's option, should follow prudent construction practice. Excavations in clay can often be dewatered with sump pits and pumps; this technique would not be applicable for excavation extending into permeable granular soil, especially for depths significantly below the water table. Dewatering granular soils should normally be done with well points or wells. When dewatering is needed, we strongly recommend that the procedures be discussed at pre-bid or pre-construction meetings. The dewatering technique chosen by the contractor should be reviewed by the architect and engineer **before** construction starts; it should not be left until excavation is under way.

The selection of proper backfill materials is important when working in dewatered excavations. Even with dewatering, the base is usually wet and the contractor must be careful not to disturb the base. We recommend that the first lifts of backfill be a clean medium to course grain sand with less than 5% passing the #200 sieve. The use of silty sand, clayey sand, or cohesive/semi-cohesive soils is not recommended for such situations. The excavator should be required to submit samples of the proposed material(s) he plans to use as backfill **before** the fill is hauled to the site, so that it can be tested for suitability.

WINTER EARTHWORK CONSTRUCTION

Winter earthwork presents its own range of problems which must be overcome; the situation may be complicated by the need for dewatering discussed above.

During freezing conditions, the fill used must **not** be frozen when delivered to the site. It also must not be allowed to freeze during or after compaction. Since the ability to work the soil while keeping it from freezing depends in part on the soil type, the specifications should require the contractor to submit a sample of his proposed fill before construction starts, for laboratory testing. If the soil engineer and structural engineer determine that it is not suitable, it should be rejected. In general, silty sand, clayey sand, and cohesive/semi-cohesive soils should not be used as fill under freezing conditions. All frozen soil of any type should be rejected for use as compacted fill.

It is important that compacted fill be protected from freezing after it is placed. The excavator should be required to submit a plan for protecting the soil. The plan should include details on the type and amount of material (straw, blankets, extra loose fill, topsoil, etc.) proposed for use as frost protection. The need to protect the soil from freezing is ongoing throughout construction and applies both before **and** after concrete is placed, until backfilling for final frost protection is completed. Foundations placed on frozen soil can experience heaving and significant settlement, rotation, or other movement as the soil thaws. Such movement can also occur if the soil is allowed to freeze **after** the concrete is placed and then allowed to thaw. The higher the percentage of fines (clay and silt, P-200 material) in the fill, the more critical is the need for protection from freezing.

MOISTURE CONTROL OF FILL

The contractor should be required to adjust the moisture content of the soil to within a narrow range near the optimum moisture content (as defined by the applicable Proctor or AASHTO Test). In general, fill should be placed within about 2% of optimum. The need for moisture control is more critical as the percentage of fines increases. Naturally-occurring clayey sand or cohesive/semi-cohesive soil are often much wetter than the optimum. Placing and attempting to compact such soils to the specified density may be difficult, or not possible. Even if compacted to the specified density, excessively wet soils may not be suitable as floor slab or pavement subgrades due to pumping under applied load. This is especially true when wet cohesive/semi-cohesive soil is used as backfill in utility trenches under streets. Excessively wet soil in thick fill sections may cause post-construction settlement beyond that estimated for fill placed at or near (±2%) the optimum moisture content.

An exception to this would be low permeability soil placed as a pond liner or for a dam. Such soil should usually be placed at 2% to 4% above the optimum moisture content, to provide for a lower insitu permeability. Also, shrinking/swelling soils (expansive clay) should be placed at about 2% to 4% above optimum moisture to reduce the possibility of soil expansion. Clayey silt, silt, or very silty fine sand should be placed excessively dry. Such soils can undergo post-construction consolidation upon being wetted, even if the specified density had been achieved. This is caused by the collapse of flocculant soil particle arrangement, and can result in settlement of buildings or slabs constructed over the soil.

Proper control of fill soil moisture is the responsibility of the excavator. The excavator should evaluate the need for wetting or drying the soils, based either on the data in the soil report, or his own site testing. If the excavator is bringing in off-site fill, it is also his responsibility to evaluate the moisture content of the soil, and the need for wetting or drying. We recommend that this matter be addressed in the project specifications.

CONSTRUCTION ON COMPACTED SOIL

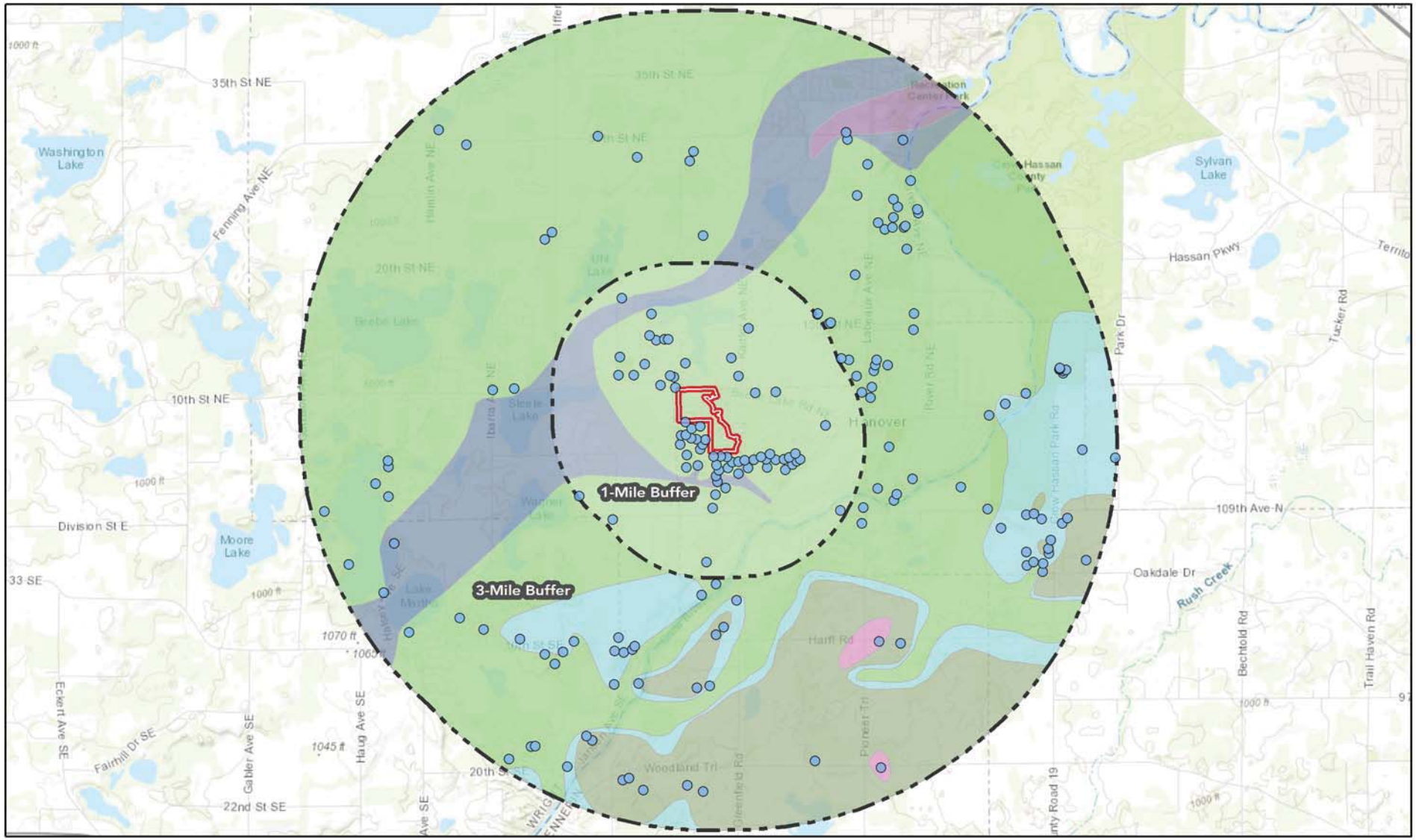
After the select fill has been placed, compacted, and tested, it must be maintained and protected in order to properly support structures. The suitability of compacted fill soil can be greatly diminished if it is allowed to freeze, become saturated while unconfined (such as in footing excavations or at the surface of slab/placement subgrade), or disturbed by construction equipment.

The responsibility for protecting the soil, or for correcting any disturbance, should be clearly defined in the specifications. Soils which become wet and soft after compaction testing do not necessarily reflect inaccurate field density tests. Especially with non-expansive cohesive/semi-cohesive soils, saturation when unconfined can severely reduce the **shear strength** while the density remains adequate. The reduced shear strength can cause footings, floor slabs, or pavements to settle or fail under load. We strongly recommend that all pavement subgrade be test rolled (MN/DOT Specification 2111) immediately before paving to determine if the subgrade has not been protected and soft spots have developed.

FLOOR SLAB SUBGRADE AND UTILITY TRENCHES

This facet of construction presents special problems, especially if the slab subgrade is allowed to freeze. When the soil thaws, it undergoes a period of temporarily lower shear strength. Floor slabs should **not** be cast over soil in such a weakened or frozen condition (reference pertinent PCA and ACI publications). To do so can result in cracked and failing slabs. The time period to heat and thaw a building may place the construction schedule and/or costs in jeopardy. We strongly recommend that this matter be reviewed in pre-bid and pre-construction meetings.

Backfilling of utility trenches in the floor slab subgrade can be difficult. If the soil is wet, compaction to the specified density may be difficult, or not possible. The narrowly cut trenches may preclude the use of proper compaction equipment. With the use of small equipment in confined areas, the contractor must place the soil in thin lifts (4 to 6 inches), with the soil at the proper moisture content. This work is typically carried out by contractors other than the mass grading or earthwork contractor. We strongly recommend that the responsibility to carry out the compaction be clearly detailed in the applicable section of the specifications, and reviewed with the appropriate contractor and subcontractor.



This map was created using Loucks Geographic Information Systems (GIS), it is a compilation of information and data from various sources. This map is not a surveyed or legally recorded map and is intended to be used as a reference. Tom Loucks, Inc. is not responsible for any inaccuracies contained herein.

LOUCKS

Legend

- Project Boundary
- Wells (Average Bedrock Depth = 150 Ft.)

Bedrock Geology

- Eau Claire Formation
- Jordan Sandstone
- St. Lawrence Formation
- St. Peter Sandstone
- Tunnel City Group
- Wonewoc Sandstone

N

0 6,000

Scale In Feet

Crow River Heights

Hanover, MN

Geology Exhibit

ATTACHMENT 7

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

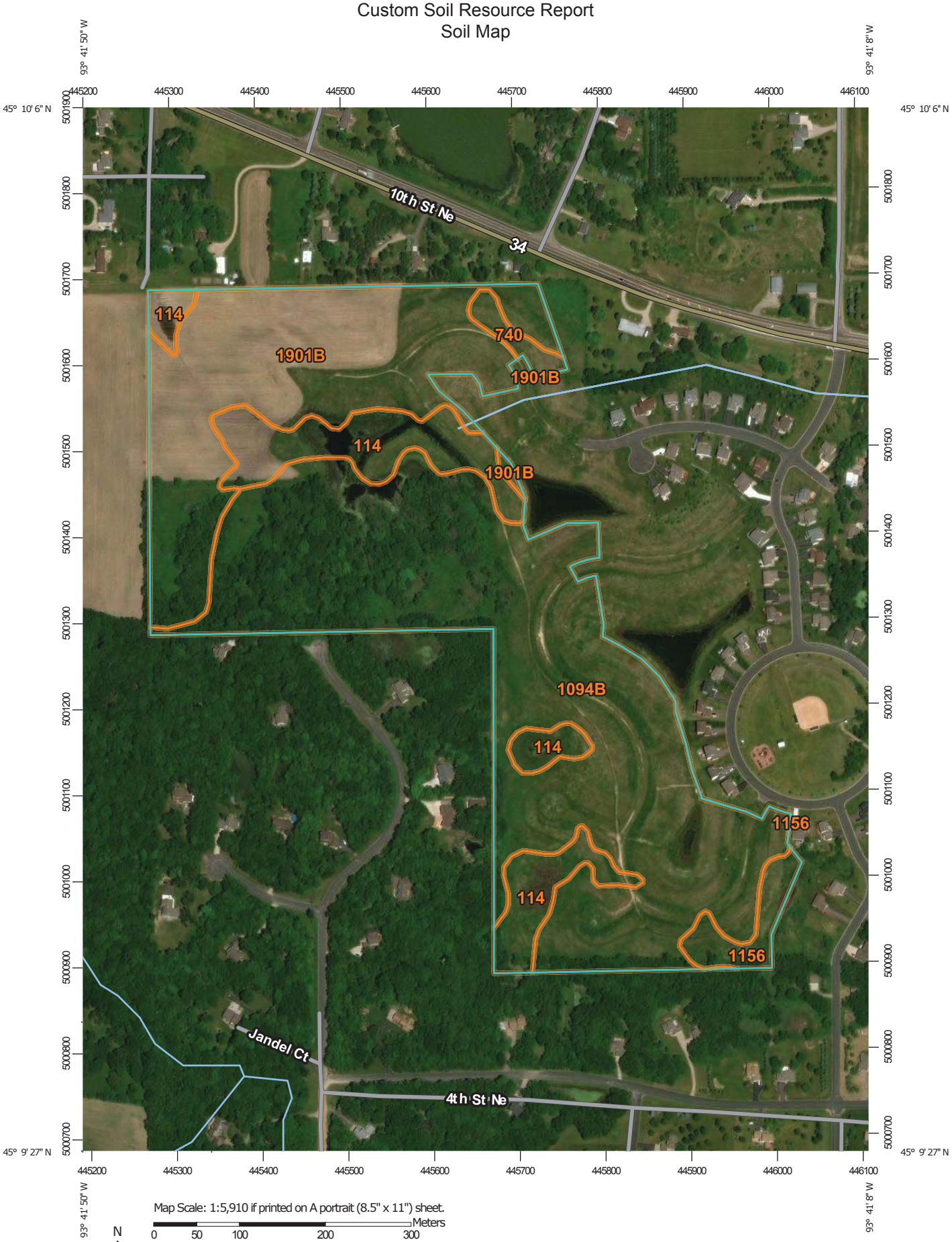
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wright County, Minnesota

ATTACHMENT 8

January 29, 2018

Custom Soil Resource Report
Soil Map



Map Unit Legend

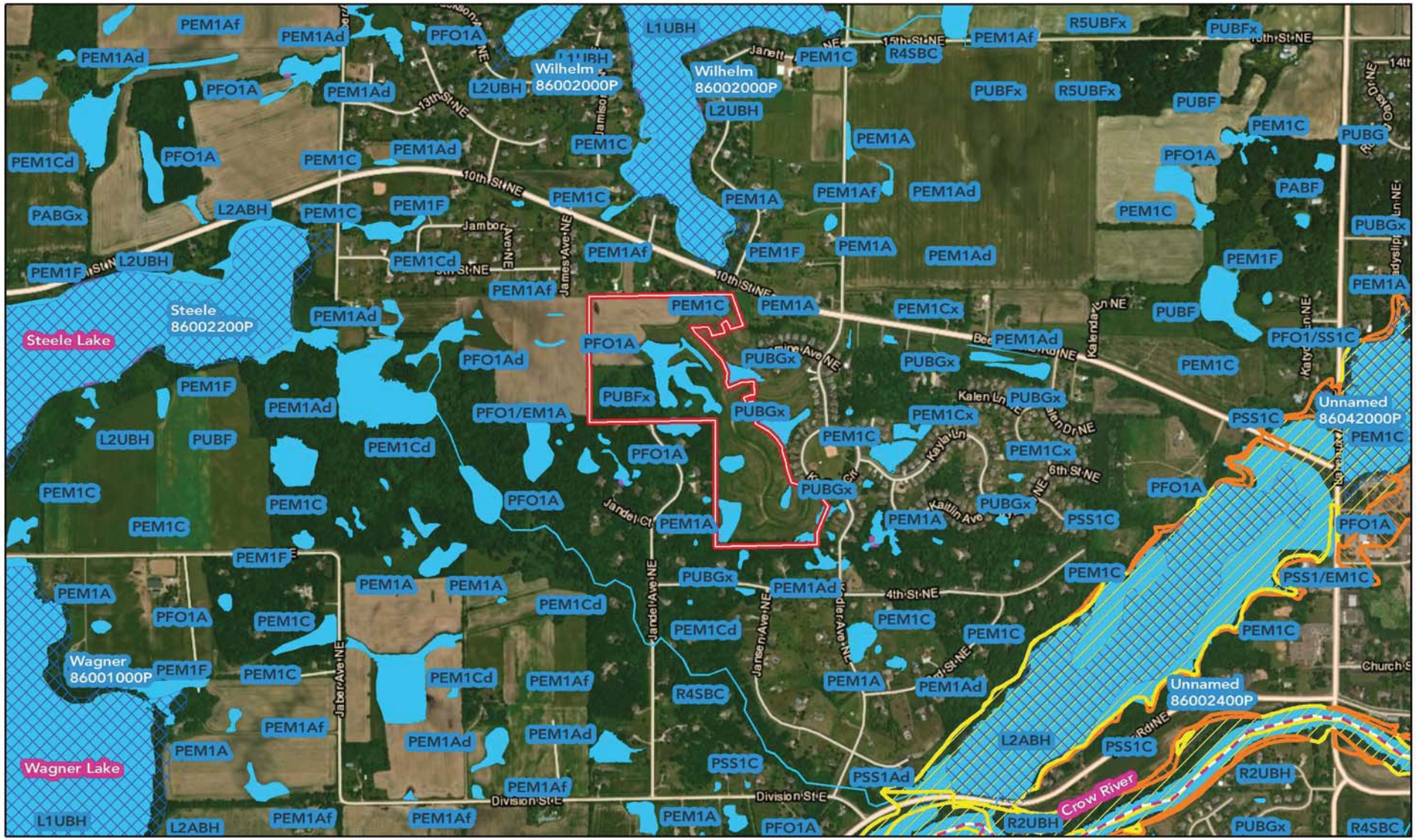
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
114	Glencoe clay loam, 0 to 1 percent slopes	9.4	13.0%
740	Hamel-Glencoe complex, 0 to 2 percent slopes	0.9	1.2%
1094B	Angus-Cordova complex, 0 to 5 percent slopes	40.0	55.8%
1156	Cordova loam, 0 to 2 percent slopes	1.8	2.5%
1901B	Angus-Le Sueur complex, 1 to 5 percent slopes	19.7	27.4%
Totals for Area of Interest		**71.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.



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LOUCKS

Legend

- Project Boundary
- MN DNR PWI Watercourse
- MN DNR PWI Waterbody
- NHD Waterbody
- 100 yr. Flood
- 500 yr. Flood
- NWI Wetland

N

0 1,500

Scale In Feet

Crow River Heights

Hanover, MN

Water Resources

Exhibit 5

ATTACHMENT 9

Crow River Heights West Site

Hanover, Wright County, Minnesota

Wetland Delineation Report

Prepared for

Dennis Backes, Backes Companies, Inc

by

Kjolhaug Environmental Services Company, Inc.
(KES Project No. 2017-052)

October 2, 2017

ATTACHMENT 10

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Wetland Delineation Report

1. WETLAND DELINEATION SUMMARY

- The 70.5-acre Crow River Heights West Site was inspected on May 3, 2017 for the presence and extent of wetland.
- The National Wetlands Inventory (NWI) map showed nine wetlands present within the property boundary.
- The soil survey showed Angus-Cordova Complex (Partially Hydric) and Glencoe Clay Loam (Hydric) as the main Hydric Soil types mapped on the property.
- The DNR Public Waters Inventory showed one DNR Public Water (Wilhelm Lake 86-20 P) located approximately 250’ north of the site boundary.
- The National Hydrography Dataset showed one Lake/Pond water feature present at the location of Wilhelm Lake, as well as two smaller Lake/Pond water features to the southeast and west of the site.
- Twelve wetlands were delineated within the site boundary and are summarized in Table 3 in Section 4.2.

2. OVERVIEW

The 70.5-acre Crow River Heights West Site was inspected on May 3, 2017 for the presence and extent of wetland. The property was located in Section 34, Township 120N, Range 24W, Hanover, Wright County, Minnesota. The review area was situated west of Labeaux Ave NE and south of Beebe Lake Road NE (**Figure 1**). The property corresponded to Wright County PID#: **108500341102.**

The northwestern portion of the site consisted of annually-tilled cropland that had not been tilled at the time of the field visit. An area of woodland was present on the western portion of the property that was dominated by hardwood tree species including basswood, sugar maple, and oak trees. The topography sloped from an elevation of 992 ft MSL in the northwestern portion of the site down to a low of 960 ft MSL in the southeastern portion of the site. The site had been previously graded for a housing development, but the project was never completed. The site contains numerous excavated road beds, as well as storm ponds that lacked installed outlets. Surrounding land use consisted of single-family housing developments, and farm land.

Twelve wetlands were delineated within the site boundary. The delineated wetland boundaries and existing conditions are shown on **Figure 2**.

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary and type determination under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence and an Approved Jurisdictional Determination (AJD).

3. METHODS

3.1 Wetland Delineation

Wetlands were identified using the Routine Determination method described in the Corps of Engineers Wetlands Delineation Manual (Waterways Experiment Station, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act.

Wetland boundaries were identified as the upper-most extent of wetland that met criteria for hydric soils, hydrophytic vegetation, and wetland hydrology. Wetland-upland boundaries were marked with pin flags that were located by land surveyors from Loucks, Inc. A copy of the survey has been included as **Appendix B**.

Soils, vegetation, and hydrology were documented at a representative location along the wetland-upland boundary. Plant species dominance was estimated based on the percent aerial or basal coverage visually estimated within a 30-foot radius for trees and vines, a 15-foot radius for the shrub layer, and a 5-foot radius for the herbaceous layer within the community type sampled.

Soils were characterized to a minimum depth of 24 inches (unless otherwise noted) using a Munsell Soil Color Book and standard soil texturing methodology. Hydric soil indicators used are from Field Indicators of Hydric Soils in the United States (USDA Natural Resources Conservation Service (NRCS) in cooperation with the National Technical Committee for Hydric Soils, Version 7, 2010).

Mapped soils are separated into five classes based on the composition of hydric components and the Hydric Rating by Map Unit color classes utilized on Web Soil Survey. The five classes include Hydric (100 percent hydric components), Predominantly Hydric (66 to 99 percent hydric components), Partially Hydric (33 to 65 percent hydric components), Predominantly Non-Hydric (1 to 32 percent hydric components), and Non-Hydric (less than one percent hydric components).

Plants were identified using standard regional plant keys. Taxonomy and indicator status of plant species was taken from the 2017 National Wetland Plant List (U.S. Army Corps of Engineers 2017. National Wetland Plant List, version 3.3, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH).

3.2 Aerial Review for Offsite Hydrology Determinations

Areas in agricultural cropland that exhibited potential wetland signatures on aerial photography and with low or depressional topography were reviewed generally following methods described in Using Aerial Imagery to Assess Wetland Hydrology (Minnesota Board of Water and Soil Resources (BWSR) 2010) and Guidance for Submittal of Delineation Reports to the St. Paul District Corps of Engineers and Wetland Conservation Act Local Governmental Units in Minnesota, Version 2.0 (USACE 2015). These methods use aerial photography and antecedent precipitation conditions to identify areas that have wetland hydrology signatures during periods of typical precipitation.

Available years of Farm Service Agency (FSA) aerial photography were reviewed for the site to determine long-term hydrology. In cases where additional aerial photography was relevant, available, and necessary to make hydrology determinations, we reviewed aerial photography from other sources such as the Minnesota Geospatial Information Office (MnGEO) and Google Earth.

Signatures at locations of potential wetlands on aerial photographs were interpreted and classified using seven codes (**Table 1**). Wetland hydrology was assumed to be present within areas exhibiting wetland signatures in more than 50% of years with normal climatic conditions based on antecedent precipitation.

Table 1. Aerial photograph interpretation codes

Code	Classification
CS	Crop stress
DO	Drowned out
NC	Not cropped
SW	Standing water
WS	Wetland signature
AP	Altered pattern
NV	Normal vegetation

This analysis used only aerial photographs taken following periods of precipitation within the normal range as determined using the Wetland Delineation Precipitation Data Retrieval tool (Minnesota Climatology Office 2015). This tool classifies antecedent precipitation as Normal (N), Wet (W) or Dry (D) by comparing precipitation during the three months preceding the estimated date of aerial photography to the 30-year average from 1981-2010. July 1 was used as the estimated date of FSA aerial photography.

4. RESULTS

4.1 Review of NWI, Soils, Public Waters and NHD Information

The National Wetlands Inventory (NWI) (Minnesota Geospatial Commons 2009-2014 and U.S. Fish and Wildlife Service) showed nine wetlands present within the property boundaries (**Figure 3**).

The Soil Survey (USDA NRCS 2015) showed Angus-Cordova Complex (Partially Hydric) and Glencoe Clay Loam (Hydric) as the main Hydric Soil types mapped on the property. Soil types mapped on the property are listed in **Table 2** and a map showing soil types is included in **Figure 4**. The Hydric Soil Lists – All Components table is included in **Appendix C**.

Table 2. Soil types mapped on the Crow River Heights West Site

Symbol	Soil Name	Acres	% of Area	Hydric Category
1094B	Angus-Cordova	40.9	58.0	Partially Hydric
1901B	Angus-Le Sueur	18.1	25.7	Predominantly Non-Hydric
114	Glencoe	9.2	13.0	Hydric
1156	Cordova	1.8	2.5	Predominantly Hydric
740	Hamel-Glencoe	0.6	0.8	Predominantly Hydric

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) showed one DNR Public Water (Wilhelm Lake 86-20 P) located approximately 250’ north of the site (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) showed one Lake/Pond water feature present at the location of Wilhelm Lake, as well as two smaller Lake/Pond water features to the southeast and west of the site (**Figure 6**).

4.2 Wetland Descriptions and No-Loss Discussion

Potential wetlands were evaluated during field observations on May 3, 2017. Twelve wetlands were identified and delineated on the property (**Figure 2**), and are described below in **Table 3**. Corresponding data forms are included in **Appendix D**. The following descriptions of the wetlands and adjacent uplands reflects conditions observed at the time of the field visit. Herbaceous vegetation was actively growing at the time of the wetland delineation. The agricultural fields had not yet been tilled at the time of the field visit. Precipitation conditions were typical based on the Precipitation Worksheet Using Gridded Database method, and wetter than the normal range based on available 30-day rolling total precipitation (**Appendix C**).

Table 3. Delineated Wetland Descriptions - Crow River Heights West site

Wetland ID	Wetland Area (acres)	Circular 39	Cowardin	Eggers and Reed	Dominant Vegetation	Adjacent Upland Vegetation	Observed Drainage Features	Observed Hydrology Indicat.	Mapped NWI Wetland	Mapped Soil Series
1	0.29	1	PFO1A	Forested, seasonally flooded basin	Green ash and silver maple trees, reed canary grass	White oak, red oak and ironwood trees, geranium, Pennsylvania sedge, Virginia waterleaf, gooseberry, prickly ash, wood anemone, violet	Wetland 1 extends offsite to the south.	Center of wetland inundated with approximately 6-12" of surface water.	PEM1C/PEM1A	Angus-Cordova Complex
2	8.34	1/2/3/5	PFO1A/PEM1A/PEM1B/PEM1Cx/PUBFx	Partially forested seasonally flooded basin/fresh wet meadow/shallow marsh/open water	Green ash trees, reed canary grass, hummock sedge, cattail, green bulrush, scattered willow trees, open water, duckweed	Red oak, white oak and green ash trees, prickly ash, cherry and buckthorn shrubs, woodland strawberry, smooth brome, dandelion, common milkweed, common violet	Wetland 4 drains towards Wetland 1 through a shallow erosional drainage feature. Wetland 2 extends slightly offsite to the south.	The Type 5 portion of the wetland was inundated with at least 3' of water. The rest of the wetland was inundated with 6-12" of water with a saturated fringe.	PEM1C/PUBFx/ PFO1A/PEM1A	Angus-Cordova Complex, Glencoe Clay Loam
3	0.15	1	PFO1A	Forested, seasonally flooded basin	Green ash trees, common buckthorn, Virginia waterleaf, geranium, sedge species	White oak, red oak and ironwood trees, geranium, Pennsylvania sedge, Virginia waterleaf, gooseberry, prickly ash	Wetland 3 appeared to surface flow to Wetland 5.	Center of wetland inundated with approximately 6" of surface water.	N/A	Angus-Cordova Complex
4	0.42	2	PEM1Bf	Fresh wet meadow	Smartweed, sedge species, beggarstick, reed canary grass	Farmed area lacking vegetation, had not been tilled at the time of the field visit. Scattered dandelion and horseweed present.	Wetland 4 flowed to Wetland 2 through a shallow erosional drainage feature.	Center of wetland inundated with approximately 6" of surface water.	N/A	Glencoe Clay Loam
5	0.03	1	PFO1A	Forested, seasonally flooded basin	Elm, ironwood and red maple trees	White oak, red oak and ironwood trees, geranium, Pennsylvania sedge, Virginia waterleaf, gooseberry, prickly ash	Wetland 5 appeared to surface flow to Wetland 7 and Wetland 2	Center of wetland inundated with approximately 6" of surface water.	N/A	Angus-Cordova Complex
6	1.47	2/3	PEM1B/C	Fresh wet meadow/shallow marsh	Cattail, reed canary grass	Smooth brome, Kentucky bluegrass, reed canary grass, Canada goldenrod	Wetland 6 extended offsite to the south and east.	Center of wetland inundated with 6-12" of surface water with a saturated fringe.	PUBFx/PEM1Ad	Cordova
7	0.03	1	PEM1A	Seasonally flooded basin	Sparsely vegetated with geranium and giant goldenrod	White oak, red oak and ironwood trees, geranium, Pennsylvania sedge, Virginia waterleaf, gooseberry, prickly ash	Wetland 7 recieves surface flow from Wetland 5.	Center of wetland inundated with approximately 6" of surface water. Water was perched, sample borehole lacked saturation or inundation.	N/A	Angus-Cordova Complex
8	0.06	1	PEM1A	Seasonally flooded basin	Reed canary grass, Kentucky bluegrass, sedge species, willow shrubs	Kentucky bluegrass, Canada goldenrod, smooth brome	Isolated depression	Center of wetland inundated with approximately 6" of surface water.	N/A	Angus-Cordova Complex, Glencoe Clay Loam
9	0.07	1	PEM1A	Seasonally flooded basin	Kentucky bluegrass, giant goldenrod, Virginia waterleaf	Ironwood, red oak, red cedar and white oak trees, Virginia waterleaf, prickly ash and buckthorn shrubs	Wetland 9 appeared to surface flow to Wetland 3.	Center of wetland inundated with approximately 6" of surface water.	N/A	Angus-Le Sueur Complex
10	0.15	1	PEM1A	Seasonally flooded basin	Reed canary grass, Kentucky bluegrass, sedge species, willow shrubs	Kentucky bluegrass, Canada goldenrod, smooth brome	Isolated depression	Saturated at surface.	N/A	Angus-Le Sueur Complex
11	1.19	2/3	PEM1B/C	Fresh wet meadow/shallow marsh	Cattail, reed canary grass, scattered green ash trees and shrubs	Kentucky bluegrass, smooth brome, scattered prickly ash, red cedar, and green ash seedlings	Wetland 11 extends offsite to the west.	Center of wetland inundated with 6-12" of surface water with a saturated fringe.	PEM1C/PEM1A	Glencoe Clay Loam
12	1.60	2/3	PEM1B/C	Fresh wet meadow/shallow marsh	Cattail, lake sedge, reed canary grass	Kentucky bluegrass, Canada goldenrod, Canada thistle	Wetland 12 extended slightly offsite to the west and south. A shallow excavated channel on the western side of Wetland 12 flow into the wetland.	Center of wetland inundated with 6-12" of surface water with a saturated fringe.	PEM1Cd/ PEM1A	Glencoe Clay Loam

No-Loss Discussion

The Crow River Heights West site had been previously graded at some point between 2006-2008 for a housing development. The project was never finished due to the recession and subsequent economic turbulence during 2008. Since 2008 the site has remained undeveloped, with excavated road beds onsite taking on wetland characteristics, and with storm water ponds that lack constructed outlets filling up with water. Kjolhaug Environmental Services had delineated this property prior to the 2008 construction. The comparison of the wetland boundaries prior to, and post-construction have been included in **Appendix E**, as well as a copy of the survey showing the previously delineated wetland boundaries. The wetland areas onsite that have been incidentally created as a result of the grading are not regulated as wetlands under the Minnesota Wetland Conservation Act. As stated in the Attachment B of the Joint Application Form, we are requesting a No-Loss Determination for the incidental wetlands onsite under WCA (WCA 8420.0105 Subp. 2D.). Specifically, Wetlands 2 and 11 have increased in size considerably since the time of the grading activities. We are requesting a No-Loss for the additional wetland areas within Wetland 2 and Wetland 11, as shown on the figures included in **Appendix E**.

Wetland 2 consisted of a Type 1/2/3/5 PFO1A/PEM1A/PEM1B/PEM1Cx/PUBFx wetland located on the northern portion of the site. The eastern portion of Wetland 2 had previously been excavated to be a road bed, which has since developed into Type 3 wetland dominated by cattails, and containing approximately 6-12” of standing water. The western portion of the wetland had been excavated into a storm pond, which is now Type 5 wetland containing approximately 3’ of standing water. When the site had been graded initially, a berm was created along the eastern side of Wetland 2. The berm impounds water in this area, further expanding the size of Wetland 2. The storm water pond that was created within Wetland 2 also lacks an outlet.

Wetland 11 consisted of a Type 2/3 PEM1B/1C wetland located on the central portion of the site. The wetland has expanded since the time of the previous delineation into the adjacent graded area. This area has since taken on wetland characteristics, but is incidentally created and therefore should not be regulated under WCA.

4.3 Other Areas

Other areas were investigated because they were: (1) observed to support a hydrophytic plant community, (2) had visible wetland hydrology indicators, (3) were shown as wetland on the NWI map, or (4) were depressional and mapped as hydric soil. Field investigation led to the conclusion that these areas were not wetland.

Sample Point A was taken within an excavated road bed on the southeastern portion of the site that contained standing water at the time of the field visit. This area was not shown as a wetland on the NWI map, and fell in an area mapped as Angus-Cordova complex (Partially Hydric) on the soil survey. This area did not meet any hydric soil indicators, and was therefore determined to be upland.

Two storm water ponds were located on the eastern portion of the site. Both ponds were shown as PUBGx wetlands on the NWI map, and fell in areas mapped as Angus-Cordova complex (Partially Hydric) on the soil survey. The storm ponds were excavated in an area that was historically upland, and were therefore not delineated as wetland.

No other areas with hydrophytic vegetation or wetland hydrology were observed on the site. No other areas were shown as hydric soil on the soil survey or as wetland on the NWI map.

4.4 Aerial Review for Offsite Hydrology Determinations

Aerial photography was reviewed for 30 years between 1979 and 2016. Years 1979-2000, 2003, 2006, 2008, 2009, 2010, 2013, 2015, and 2016 were assessed for wet/normal/dry climatic conditions using the Wetland Delineation Precipitation Data Retrieval tool and an estimated photo date of July 1 for the FSA aerials. Fifteen years (1980-1983, 1986, 1989, 1994-1996, 1998-2000, 2008, 2015 and 2016) were determined have precipitation in the normal range during the three months preceding the estimated photo dates. Areas showing at least one wetland signature during a year with wetter than normal precipitation conditions were included in the aerial review. The results are summarized in **Table 4** and review areas are shown on **Figure 7**. Aerial photographs showing review areas and interpretations are included in **Appendix F**.

One Area (Area A) exhibited potential wetland signatures, was located in agricultural cropland, and was reviewed according to the BWSR (2010) protocol. Areas exhibiting wetland signatures in more than 50% of the years with precipitation in the normal range are generally assumed to meet wetland hydrology criteria. Areas exhibiting wetland signatures in 30% to 50% of the years with precipitation in the normal range were also reviewed in the field (**Table 4, Figures 7 and 7A**).

Table 4. Offsite hydrology determinations

Area	No. of Photo Years w/ Normal Precipitation	No. of Normal Precipitation Years w/ Wetland Signatures	% of Normal Precipitation Years w/ Wetland Signatures	Hydrology Determination
A	15	10	67%	Hydrology Present

Areas A showed wetland signatures in 67% of years with normal precipitation conditions. This area corresponded to Wetland 4, and is described above in Table 3 (Delineated Wetland Descriptions).

4.5 Request for Wetland Boundary and Jurisdictional Determination

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary and type determination under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence and an Approved Jurisdictional Determination (AJD) under Section 404 of the Federal Clean Water Act.

5. CERTIFICATION OF DELINEATION

The procedures utilized in the described delineation are based on the U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act. This wetland delineation and report were prepared in compliance with the regulatory standards in place at the time the work was performed.

Site boundaries indicated on figures within this report are approximate and do not constitute an official survey product.

Delineation completed by: Adam Cameron, Wetland Ecologist/GIS Specialist
MN Certified Wetland Delineator In-Training No. 5221

Ben Carlson, Wetland Specialist
MN Certified Wetland Delineator No. 1125

Andrew Krinke, Ecologist/GIS Specialist
MN Certified Wetland Delineator In-Training No. 5197

Report prepared by: Adam Cameron, Wetland Ecologist/GIS Specialist
MN Certified Wetland Delineator In-Training No. 5221

Report reviewed by: _____ Date: October 3, 2017
Mark Kjolhaug, Professional Wetland Scientist No. 000845

Crow River Heights West Site

Wetland Delineation Report

FIGURES

Figure 1 - Site Location

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2 - Existing Conditions (2017 KES Drone Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

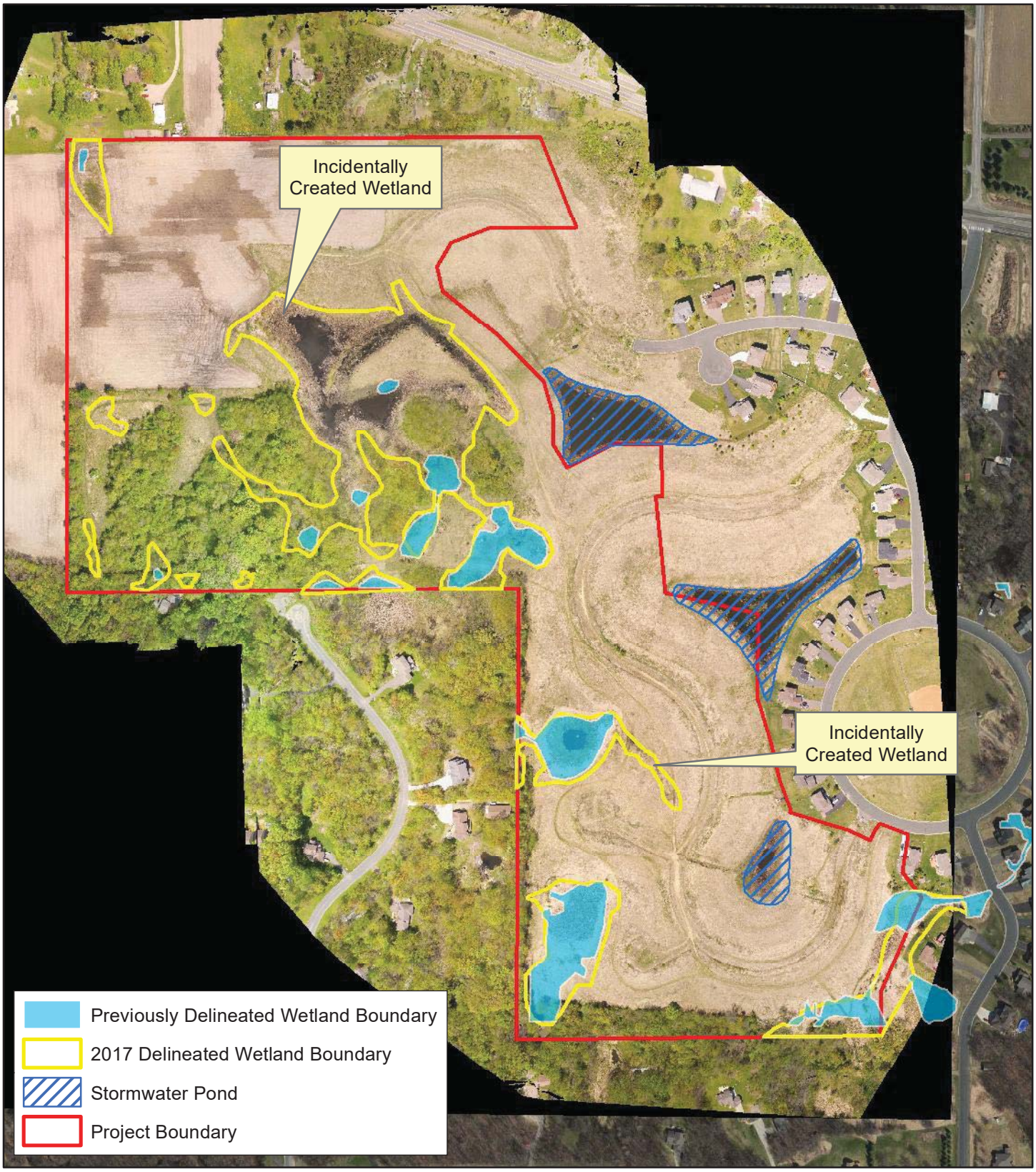


Figure 2A - Existing Conditions (2017 KES Drone Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

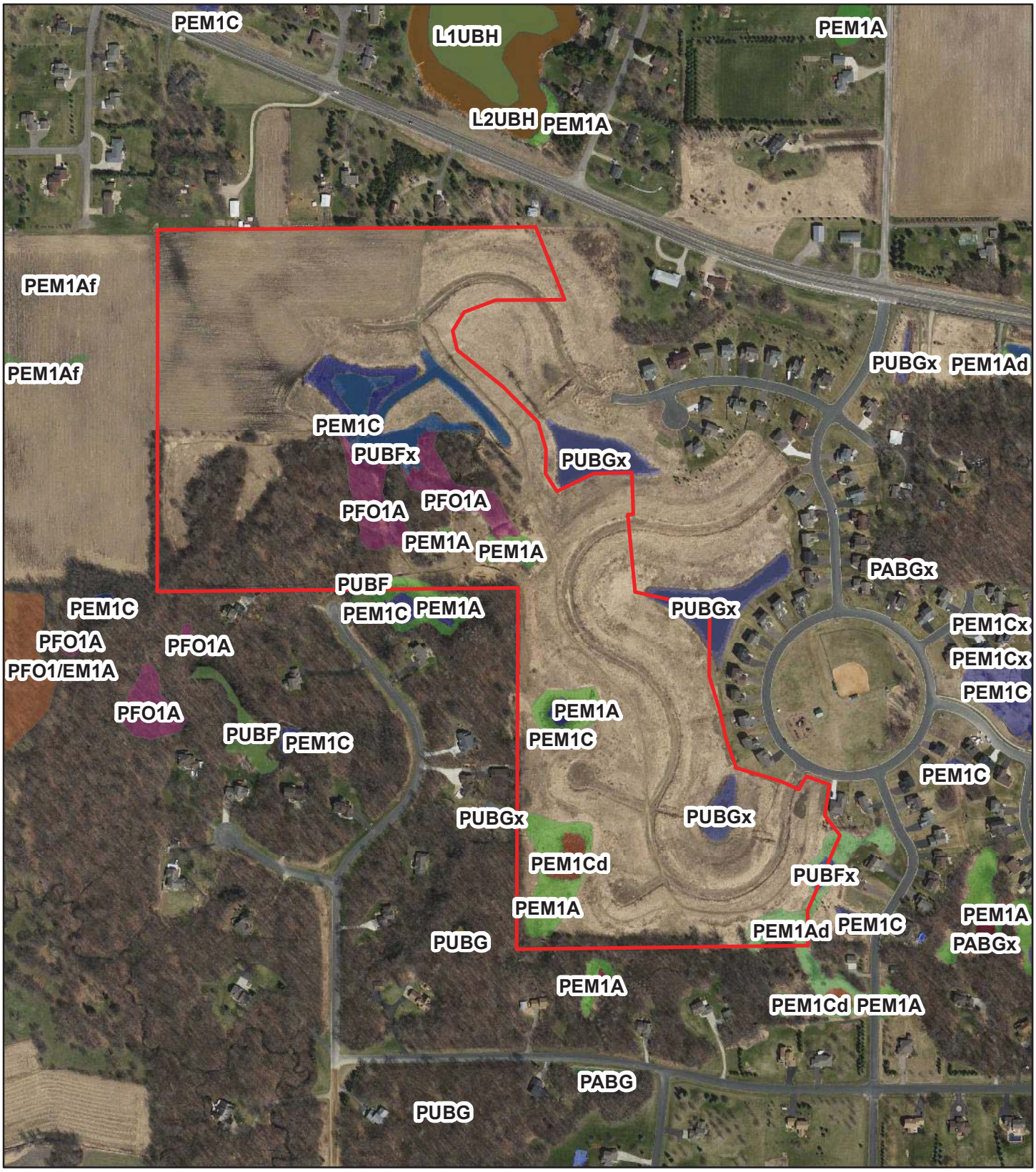


Figure 3 - National Wetlands Inventory

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013), USFWS

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

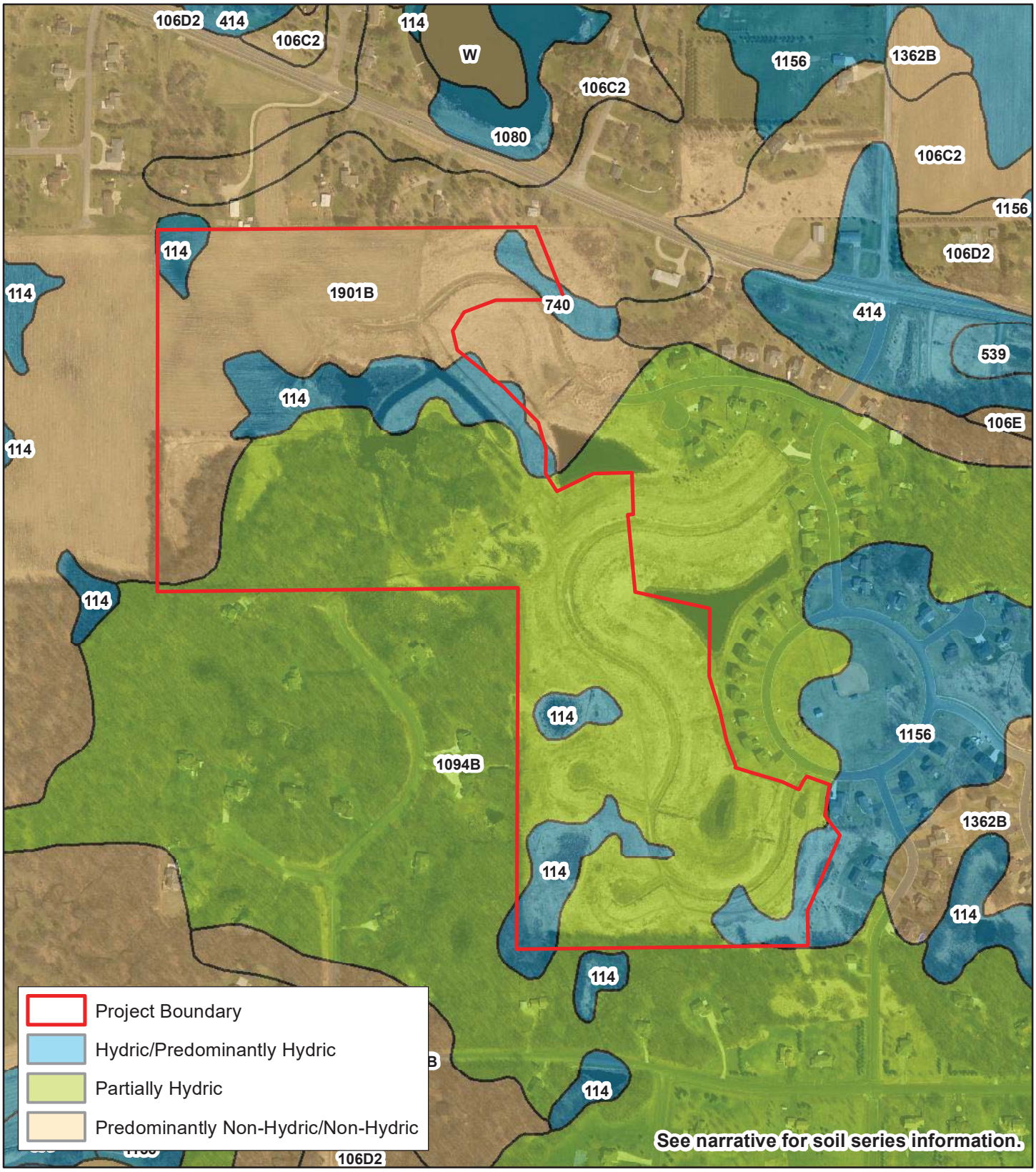


Figure 4 - Soil Survey

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: USDA, NRCS

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 5 - DNR Public Waters Inventory

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

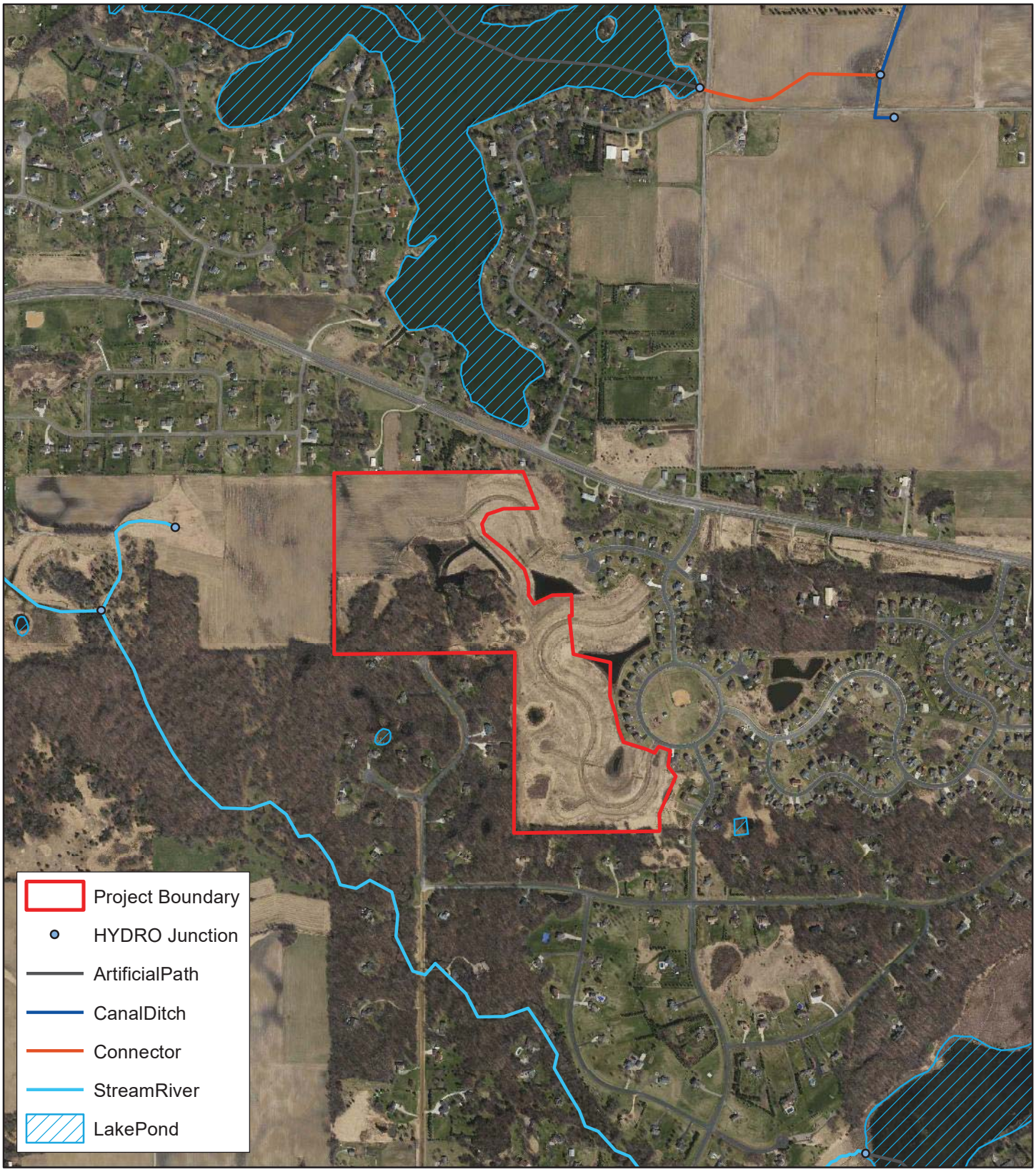


Figure 6 - National Hydrography Dataset

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: USGS

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 7 - Offsite Hydrology Assessment Areas (2013 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

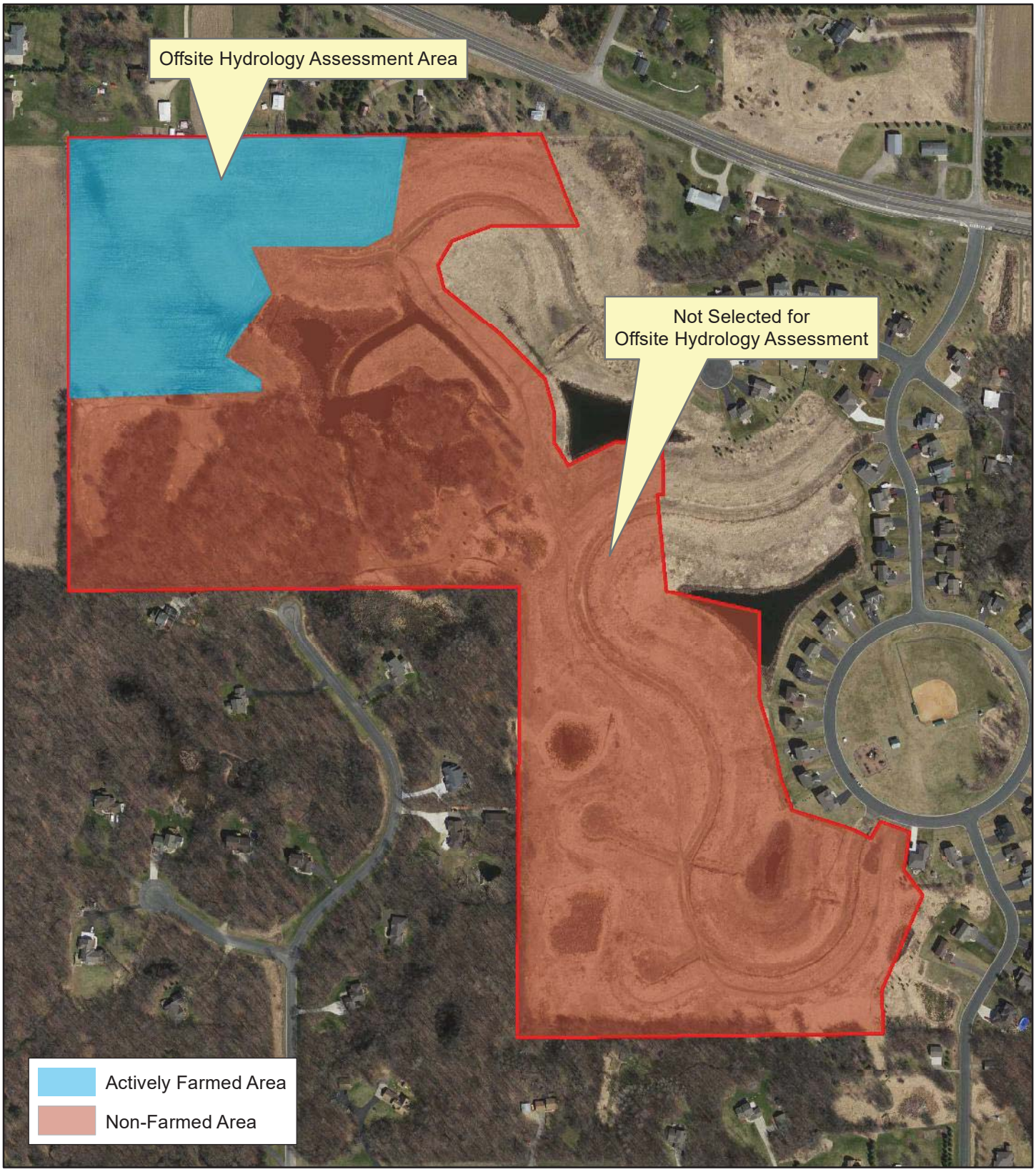


Figure 7A - Offsite Hydrology Assessment Areas

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Crow River Heights West Site

Wetland Delineation Report

APPENDIX A

Joint Application Form for Activities Affecting Water Resources in Minnesota

Joint Application Form for Activities Affecting Water Resources in Minnesota

This joint application form is the accepted means for initiating review of proposals that may affect a water resource (wetland, tributary, lake, etc.) in the State of Minnesota under state and federal regulatory programs. Applicants for Minnesota Department of Natural Resources (DNR) Public Waters permits **MUST** use the MPARS online permitting system for submitting applications to the DNR. Applicants can use the information entered into MPARS to substitute for completing parts of this joint application form (see the paragraph on MPARS at the end of the joint application form instructions for additional information). This form is only applicable to the water resource aspects of proposed projects under state and federal regulatory programs; other local applications and approvals may be required. Depending on the nature of the project and the location and type of water resources impacted, multiple authorizations may be required as different regulatory programs have different types of jurisdiction over different types of resources.

Regulatory Review Structure

Federal

The St. Paul District of the U.S. Army Corps of Engineers (Corps) is the federal agency that regulates discharges of dredged or fill material into waters of the United States (wetlands, tributaries, lakes, etc.) under Section 404 of the Clean Water Act (CWA) and regulates work in navigable waters under Section 10 of the Rivers and Harbors Act. Applications are assigned to Corps project managers who are responsible for implementing the Corps regulatory program within a particular geographic area.

State

There are three state regulatory programs that regulate activities affecting water resources. The Wetland Conservation Act (WCA) regulates most activities affecting wetlands. It is administered by local government units (LGUs) which can be counties, townships, cities, watershed districts, watershed management organizations or state agencies (on state-owned land). The Minnesota DNR Division of Ecological and Water Resources issues permits for work in specially-designated public waters via the Public Waters Work Permit Program (DNR Public Waters Permits). The Minnesota Pollution Control Agency (MPCA) under Section 401 of the Clean Water Act certifies that discharges of dredged or fill material authorized by a federal permit or license comply with state water quality standards. One or more of these regulatory programs may be applicable to any one project.

Required Information

Prior to submitting an application, applicants are **strongly encouraged** to seek input from the Corps Project Manager and LGU staff to identify regulatory issues and required application materials for their proposed project. Project proponents can request a pre-application consultation with the Corps and LGU to discuss their proposed project by providing the information required in Sections 1 through 5 of this joint application form to facilitate a meaningful discussion about their project. Many LGUs provide a venue (such as regularly scheduled technical evaluation panel meetings) for potential applicants to discuss their projects with multiple agencies prior to submitting an application. Contact information is provided below.

The following bullets outline the information generally required for several common types of determinations/authorizations.

- For delineation approvals and/or jurisdictional determinations, submit Parts 1, 2 and 5, and Attachment A.
- For activities involving CWA/WCA exemptions, WCA no-loss determinations, and activities not requiring mitigation, submit Parts 1 through 5, and Attachment B.
- For activities requiring compensatory mitigation/replacement plan, submit Parts 1 thru 5, and Attachments C and D.
- For local road authority activities that qualify for the state's local road wetland replacement program, submit Parts 1 through 5, and Attachments C, D (if applicable), and E to both the Corps and the LGU.

Submission Instructions

Send the completed joint application form and all required attachments to:

U.S Army Corps of Engineers. Applications may be sent directly to the appropriate Corps Office. For a current listing of areas of responsibilities and contact information, visit the St. Paul District's website at: http://www.mvp.usace.army.mil/Missions/Regulatory.aspx and select "Minnesota" from the contact Information box. Alternatively, applications may be sent directly to the St. Paul District Headquarters and the Corps will forward them to the appropriate field office.

Section 401 Water Quality Certification: Applicants do not need to submit the joint application form to the MPCA unless specifically requested. The MPCA will request a copy of the completed joint application form directly from an applicant when they determine an individual 401 water quality certification is required for a proposed project.

Wetland Conservation Act Local Government Unit: Send to the appropriate Local Government Unit. If necessary, contact your county Soil and Water Conservation District (SWCD) office or visit the Board of Water and Soil Resources (BWSR) web site (www.bwsr.state.mn.us) to determine the appropriate LGU.

DNR Public Waters Permitting: In 2014 the DNR will begin using the Minnesota DNR Permitting and Reporting System (MPARS) for submission of Public Waters permit applications (https://webapps11.dnr.state.mn.us/mpars/public/authentication/login). Applicants for Public Waters permits **MUST** use the MPARS online permitting system for submitting applications to the DNR. To avoid duplication and to streamline the application process among the various resource agencies, applicants can use the information entered into MPARS to substitute for completing parts of this joint application form. The MPARS print/save function will provide the applicant with a copy of the Public Waters permit application which, at a minimum, will satisfy Parts one and two of this joint application. For certain types of activities, the MPARS application may also provide all of the necessary information required under Parts three and four of the joint application. However, it is the responsibility of the Applicant to make sure that the joint application contains all of the required information, including identification of all aquatic resources impacted by the project (see Part four of the joint application). After confirming that the MPARS application contains all of the required information in Parts one and two the Applicant may attach a copy to the joint application and fill in any missing information in the remainder of the joint application.

PART ONE: Applicant Information

If applicant is an entity (company, government entity, partnership, etc.), an authorized contact person must be identified. If the applicant is using an agent (consultant, lawyer, or other third party) and has authorized them to act on their behalf, the agent's contact information must also be provided.

Applicant/Landowner Name: Dennis Backes
Mailing Address:
Phone:
E-mail Address:

Authorized Contact (do not complete if same as above):
Mailing Address:
Phone:
E-mail Address:

Agent Name: Adam Cameron
Mailing Address: 26105 Wild Rose Lane, Shorewood MN 55331
Phone: 952-401-8757 Ext. #106
E-mail Address: Adam@kjolhaugenv.com

PART TWO: Site Location Information

County: Wright **City/Township: Hanover**
Parcel ID and/or Address: 108500341102
Legal Description (Section, Township, Range): S:34 T:120N R:24W
Lat/Long (decimal degrees): 45.163671, -93.689999
Attach a map showing the location of the site in relation to local streets, roads, highways.
Approximate size of site (acres) or if a linear project, length (feet): 70.5 Acres

If you know that your proposal will require an individual Permit from the U.S. Army Corps of Engineers, you must provide the names and addresses of all property owners adjacent to the project site. This information may be provided by attaching a list to your application or by using block 25 of the Application for Department of the Army permit which can be obtained at:

http://www.mvp.usace.army.mil/Portals/57/docs/regulatory/RegulatoryDocs/engform_4345_2012oct.pdf

PART THREE: General Project/Site Information

If this application is related to a delineation approval, exemption determination, jurisdictional determination, or other correspondence submitted ***prior to*** this application then describe that here and provide the Corps of Engineers project number.

Describe the project that is being proposed, the project purpose and need, and schedule for implementation and completion. The project description must fully describe the nature and scope of the proposed activity including a description of all project elements that effect aquatic resources (wetland, lake, tributary, etc.) and must also include plans and cross section or profile drawings showing the location, character, and dimensions of all proposed activities and aquatic resource impacts.

Project Name and/or Number: Crow River Heights West

PART FOUR: Aquatic Resource Impact[1] Summary

If your proposed project involves a direct or indirect impact to an aquatic resource (wetland, lake, tributary, etc.) identify each impact in the table below. Include all anticipated impacts, including those expected to be temporary. Attach an overhead view map, aerial photo, and/or drawing showing all of the aquatic resources in the project area and the location(s) of the proposed impacts. Label each aquatic resource on the map with a reference number or letter and identify the impacts in the following table.

Aquatic Resource ID (as noted on overhead view)	Aquatic Resource Type (wetland, lake, tributary etc.)	Type of Impact (fill, excavate, drain, or remove vegetation)	Duration of Impact Permanent (P) or Temporary (T)[1]	Size of Impact[2]	Overall Size of Aquatic Resource [3]	Existing Plant Community Type(s) in Impact Area[4]	County, Major Watershed #, and Bank Service Area # of Impact Area[5]

[1]If impacts are temporary; enter the duration of the impacts in days next to the "T". For example, a project with a temporary access fill that would be removed after 220 days would be entered "T (220)".
[2]Impacts less than 0.01 acre should be reported in square feet. Impacts 0.01 acre or greater should be reported as acres and rounded to the nearest 0.01 acre. Tributary impacts must be reported in linear feet of impact and an area of impact by indicating first the linear feet of impact along the flowline of the stream followed by the area impact in parentheses). For example, a project that impacts 50 feet of a stream that is 6 feet wide would be reported as 50 ft (300 square feet).
[3]This is generally only applicable if you are applying for a de minimis exemption under MN Rules 8420.0420 Subp. 8, otherwise enter "N/A".
[4]Use *Wetland Plants and Plant Community Types of Minnesota and Wisconsin* 3rd Ed. as modified in MN Rules 8420.0405 Subp. 2.
[5]Refer to Major Watershed and Bank Service Area maps in MN Rules 8420.0522 Subp. 7.

If any of the above identified impacts have already occurred, identify which impacts they are and the circumstances associated with each:

PART FIVE: Applicant Signature

☐ Check here if you are requesting a pre-application consultation with the Corps and LGU based on the information you have provided. Regulatory entities will not initiate a formal application review if this box is checked.

By signature below, I attest that the information in this application is complete and accurate. I further attest that I possess the authority to undertake the work described herein.

Signature: _____ 5-17-17 Date:

I hereby authorize _____ to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this application.

[1] **The term "impact" as used in this joint application form is a generic term used for disclosure purposes to identify activities that may require approval from one or more regulatory agencies. For purposes of this form it is not meant to indicate whether or not those activities may require mitigation/replacement.**

Attachment A
Request for Delineation Review, Wetland Type Determination, or Jurisdictional Determination

By submission of the enclosed wetland delineation report, I am requesting that the U.S. Army Corps of Engineers, St. Paul District (Corps) and/or the Wetland Conservation Act Local Government Unit (LGU) provide me with the following (check all that apply):

☒ **Wetland Type Confirmation**

☒ **Delineation Concurrence**. Concurrence with a delineation is a written notification from the Corps and a decision from the LGU concurring, not concurring, or commenting on the boundaries of the aquatic resources delineated on the property. Delineation concurrences are generally valid for five years unless site conditions change. Under this request alone, the Corps will not address the jurisdictional status of the aquatic resources on the property, only the boundaries of the resources within the review area (including wetlands, tributaries, lakes, etc.).

☐ **Preliminary Jurisdictional Determination**. A preliminary jurisdictional determination (PJD) is a non-binding written indication from the Corps that waters, including wetlands, identified on a parcel may be waters of the United States. For purposes of computation of impacts and compensatory mitigation requirements, a permit decision made on the basis of a PJD will treat all waters and wetlands in the review area as if they are jurisdictional waters of the U.S. PJDs are advisory in nature and may not be appealed.

☒ **Approved Jurisdictional Determination**. An approved jurisdictional determination (AJD) is an official Corps determination that jurisdictional waters of the United States are either present or absent on the property. AJDs can generally be relied upon by the affected party for five years. An AJD may be appealed through the Corps administrative appeal process.

In order for the Corps and LGU to process your request, the wetland delineation must be prepared in accordance with the 1987 Corps of Engineers Wetland Delineation Manual, any approved Regional Supplements to the 1987 Manual, and the *Guidelines for Submitting Wetland Delineations in Minnesota* (2013).
http://www.mvp.usace.army.mil/Missions/Regulatory/DelineationJDGuidance.aspx

Attachment B
Supporting Information for Applications Involving Exemptions, No Loss Determinations, and Activities Not Requiring Mitigation

Complete this part ***if*** you maintain that the identified aquatic resource impacts in Part Four do not require wetland replacement/compensatory mitigation OR ***if*** you are seeking verification that the proposed water resource impacts are either exempt from replacement or are not under CWA/WCA jurisdiction.

Identify the specific exemption or no-loss provision for which you believe your project or site qualifies:

WCA 8420.0105 Subp. 2D.

Provide a detailed explanation of how your project or site qualifies for the above. Be specific and provide and refer to attachments and exhibits that support your contention. Applicants should refer to rules (e.g. WCA rules), guidance documents (e.g. BWSR guidance, Corps guidance letters/public notices), and permit conditions (e.g. Corps General Permit conditions) to determine the necessary information to support the application. Applicants are strongly encouraged to contact the WCA LGU and Corps Project Manager prior to submitting an application if they are unsure of what type of information to provide:

Please see Section 4.2 of the Wetland Delineation Report (Wetland Descriptions and No-Loss Discussion).

Attachment C
Avoidance and Minimization

Project Purpose, Need, and Requirements. Clearly state the purpose of your project and need for your project. Also include a description of any specific requirements of the project as they relate to project location, project footprint, water management, and any other applicable requirements. Attach an overhead plan sheet showing all relevant features of the project (buildings, roads, etc.), aquatic resource features (impact areas noted) and construction details (grading plans, storm water management plans, etc.), referencing these as necessary:

Avoidance. Both the CWA and the WCA require that impacts to aquatic resources be avoided if practicable alternatives exist. Clearly describe all on-site measures considered to avoid impacts to aquatic resources and discuss at least two project alternatives that avoid all impacts to aquatic resources on the site. These alternatives may include alternative site plans, alternate sites, and/or not doing the project. Alternatives should be feasible and prudent (see MN Rules 8420.0520 Subp. 2 C). Applicants are encouraged to attach drawings and plans to support their analysis:

Minimization. Both the CWA and the WCA require that all unavoidable impacts to aquatic resources be minimized to the greatest extent practicable. Discuss all features of the proposed project that have been modified to minimize the impacts to water resources (see MN Rules 8420.0520 Subp. 4):

Off-Site Alternatives. An off-site alternatives analysis is not required for all permit applications. If you know that your proposal will require an individual permit (standard permit or letter of permission) from the U.S. Army Corps of Engineers, you may be required to provide an off-site alternatives analysis. The alternatives analysis is not required for a complete application but must be provided during the review process in order for the Corps to complete the evaluation of your application and reach a final decision. Applicants with questions about when an off-site alternatives analysis is required should contact their Corps Project Manager.

Attachment D
Replacement/Compensatory Mitigation

Complete this part ***if*** your application involves wetland replacement/compensatory mitigation not associated with the local road wetland replacement program. Applicants should consult Corps mitigation guidelines and WCA rules for requirements.

Replacement/Compensatory Mitigation via Wetland Banking. Complete this section if you are proposing to use credits from an existing wetland bank (with an account number in the State wetland banking system) for all or part of your replacement/compensatory mitigation requirements.

Wetland Bank Account #	County	Major Watershed #	Bank Service Area #	Credit Type (if applicable)	Number of Credits

Applicants should attach documentation indicating that they have contacted the wetland bank account owner and reached at least a tentative agreement to utilize the identified credits for the project. This documentation could be a signed purchase agreement, signed application for withdrawal of credits or some other correspondence indicating an agreement between the applicant and the bank owner. *However, applicants are advised not to enter into a binding agreement to purchase credits until the mitigation plan is approved by the Corps and LGU.*

Project-Specific Replacement/Permittee Responsible Mitigation. Complete this section if you are proposing to pursue actions (restoration, creation, preservation, etc.) to generate wetland replacement/compensatory mitigation credits for this proposed project.

WCA Action Eligible for Credit[1]	Corps Mitigation Compensation Technique[2]	Acres	Credit % Requested	Credits Anticipated[3]	County	Major Watershed #	Bank Service Area #

[1]Refer to the name and subpart number in MN Rule 8420.0526.
[2]Refer to the technique listed in *St. Paul District Policy for Wetland Compensatory Mitigation in Minnesota*.
[3]If WCA and Corps crediting differs, then enter both numbers and distinguish which is Corps and which is WCA.

Explain how each proposed action or technique will be completed (e.g. wetland hydrology will be restored by breaking the tile……) and how the proposal meets the crediting criteria associated with it. Applicants should refer to the Corps mitigation policy language, WCA rule language, and all associated Corps and WCA guidance related to the action or technique:

Attach a site location map, soils map, recent aerial photograph, and any other maps to show the location and other relevant features of each wetland replacement/mitigation site. Discuss in detail existing vegetation, existing landscape features, land use (on and surrounding the site), existing soils, drainage systems (if present), and water sources and movement. Include a topographic map showing key features related to hydrology and water flow (inlets, outlets, ditches, pumps, etc.):

Attach a map of the existing aquatic resources, associated delineation report, and any documentation of regulatory review or approval. Discuss as necessary:

For actions involving construction activities, attach construction plans and specifications with all relevant details. Discuss and provide documentation of a hydrologic and hydraulic analysis of the site to define existing conditions, predict project outcomes, identify specific project performance standards and avoid adverse offsite impacts. Plans and specifications should be prepared by a licensed engineer following standard engineering practices. Discuss anticipated construction sequence and timing:

For projects involving vegetation restoration, provide a vegetation establishment plan that includes information on site preparation, seed mixes and plant materials, seeding/planting plan (attach seeding/planting zone map), planting/seeding methods, vegetation maintenance, and an anticipated schedule of activities:

For projects involving construction or vegetation restoration, identify and discuss goals and specific outcomes that can be determined for credit allocation. Provide a proposed credit allocation table tied to outcomes:

Provide a five-year monitoring plan to address project outcomes and credit allocation:

Discuss and provide evidence of ownership or rights to conduct wetland replacement/mitigation on each site:

Quantify all proposed wetland credits and compare to wetland impacts to identify a proposed wetland replacement ratio. Discuss how this replacement ratio is consistent with Corps and WCA requirements:

By signature below, the applicant attests to the following (only required if application involves project-specific/permittee responsible replacement):

- All proposed replacement wetlands were not:
  - Previously restored or created under a prior approved replacement plan or permit
  - Drained or filled under an exemption during the previous 10 years
  - Restored with financial assistance from public conservation programs
  - Restored using private funds, other than landowner funds, unless the funds are paid back with interest to the individual or organization that funded the restoration and the individual or organization notifies the local government unit in writing that the restored wetland may be considered for replacement.
- The wetland will be replaced before or concurrent with the actual draining or filling of a wetland.
- An irrevocable bank letter of credit, performance bond, or other acceptable security will be provided to guarantee successful completion of the wetland replacement.
- Within 30 days of either receiving approval of this application or beginning work on the project, I will record the Declaration of Restrictions and Covenants on the deed for the property on which the replacement wetland(s) will be located and submit proof of such recording to the LGU and the Corps.

Applicant or Representative: Title:

Signature: _____ Date:

Attachment E
Local Road Replacement Program Qualification

Complete this part ***if*** you are a local road authority (county highway department, city transportation department, etc.) seeking verification that your project (or a portion of your project) qualifies for the MN Local Government Road Wetland Replacement Program (LGRWRP). If portions of your project are not eligible for the LGRWRP, then Attachment D should be completed and attached to your application.

Discuss how your project is a repair, rehabilitation, reconstruction, or replacement of a currently serviceable road to meet state/federal design or safety standards/requirements. Applicants should identify the specific road deficiencies and how the project will rectify them. Attach supporting documents and information as applicable:

Provide a map, plan, and/or aerial photograph accurately depicting wetland boundaries within the project area. Attach associated delineation/determination report or otherwise explain the method(s) used to identify and delineate wetlands. Also attach and discuss any type of review or approval of wetland boundaries or other aspects of the project by a member or members of the local Technical Evaluation Panel (TEP) or Corps of Engineers:

In the table below, identify only the wetland impacts from Part 4 that the road authority has determined should qualify for the LGRWRP.

Wetland Impact ID (as noted on overhead view)	**Type of Impact** (fill, excavate, drain)	**Size of Impact** (square feet or acres to 0.01)	**Existing Plant Community Type(s)** in Impact Area[1]	**County, Major Watershed #, and Bank Service Area #** of Impact[2]

[1]Use *Wetland Plants and Plant Community Types of Minnesota and Wisconsin* 3rd Ed. as modified in MN Rules 8420.0405 Subp. 2.

[2]Refer to Major Watershed and Bank Service Area maps in MN Rules 8420.0522 Subp. 7.

Discuss the feasibility of providing onsite compensatory mitigation/replacement for important site-specific wetland functions:

Please note that under the MN Wetland Conservation Act, projects with less than 10,000 square feet of wetland impact are allowed to commence prior to submission of this notification so long as the notification is submitted within 30 days of the impact. The Clean Water Act has no such provision and requires that permits be obtained prior to any regulated discharges into water of the United States. To avoid potential unauthorized activities, road authorities must, at a minimum, provide a complete application to the Corps and receive a permit prior to commencing work.

By signature below, the road authority attests that they have followed the process in MN Rules 8420.0544 and have determined that the wetland impacts identified in Part 4 are eligible for the MN Local Government Road Wetland Replacement Program.

Road Authority Representative: Title:

Signature: _____ Date:

Technical Evaluation Panel Concurrence: Project Name and/or Number: Crow River Heights West

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

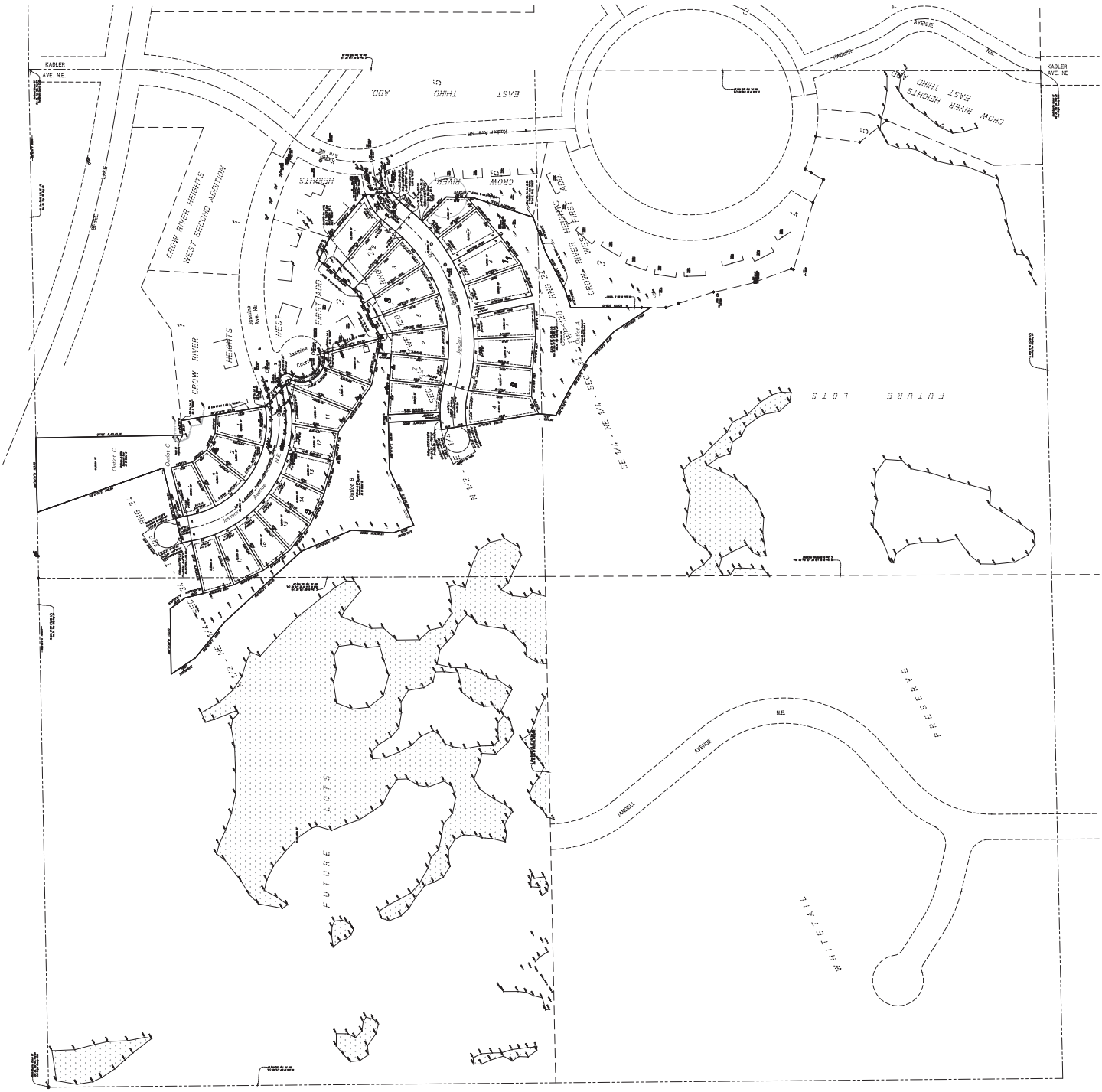
Upon approval and signature by the TEP, application must be sent to: **Wetland Bank Administration**
Minnesota Board of Water & Soil Resources
520 Lafayette Road North
Saint Paul, MN 55155

Crow River Heights West Site

Wetland Delineation Report

APPENDIX B

Wetland Boundary Survey


KADLER AVE. NE.
KADLER AVE. NE
CROW RIVER HEIGHTS WEST SECOND ADDITION
CROW RIVER HEIGHTS
CROW RIVER HEIGHTS WEST FIRST ADD.
CROW RIVER HEIGHTS EAST THIRD ADD.
EAST THIRD ADD.
CROW RIVER HEIGHTS
Outlot C
Outlot B
Outlot A
Jordan
Jennifer
Kristin
Courtney
Stephanie
Melissa
Kadler Ave. NE
24th Street NE
N 1/2 - NE 1/4 - SEC 24
SE 1/4 - NE 1/4 - SEC 24
NW 1/4 - NE 1/4 - SEC 24
FUTURE LOTS
FUTURE LOTS
FUTURE LOTS
FREESERVE
JANDELL AVENUE N.E.
WHITETAIL

Crow River Heights West Site

Wetland Delineation Report

APPENDIX C

Precipitation Data & Supporting Information

Crow River Heights West, Hanover MN:
Precipitation Summary
Source: Minnesota Climatology Working Group

Monthly Totals: 2017 (latitude: 45.15929 longitude: 93.69616)

Target: T120 R24 S34

mon	year	cc	tttN	rrW	ss	nnnn	oooooooo	pre (inches)
Jan	2017	86	119N	24W	29	NWS	ROCKFORD	.59
Feb	2017	86	119N	24W	29	NWS	ROCKFORD	.73
Mar	2017	86	119N	24W	29	NWS	ROCKFORD	.43
Apr	2017	86	119N	24W	29	NWS	ROCKFORD	3.14

Feb/Mar/Apr/May Daily Records

Feb 1, 2017	0
Feb 2, 2017	0
Feb 3, 2017	0
Feb 4, 2017	0
Feb 5, 2017	0
Feb 6, 2017	0
Feb 7, 2017	0
Feb 8, 2017	.01
Feb 9, 2017	0
Feb 10, 2017	0
Feb 11, 2017	0
Feb 12, 2017	0
Feb 13, 2017	0
Feb 14, 2017	0
Feb 15, 2017	0
Feb 16, 2017	0
Feb 17, 2017	0
Feb 18, 2017	0
Feb 19, 2017	0
Feb 20, 2017	0
Feb 21, 2017	.72
Feb 22, 2017	0
Feb 23, 2017	0
Feb 24, 2017	0
Feb 25, 2017	0
Feb 26, 2017	0
Feb 27, 2017	0
Feb 28, 2017	0

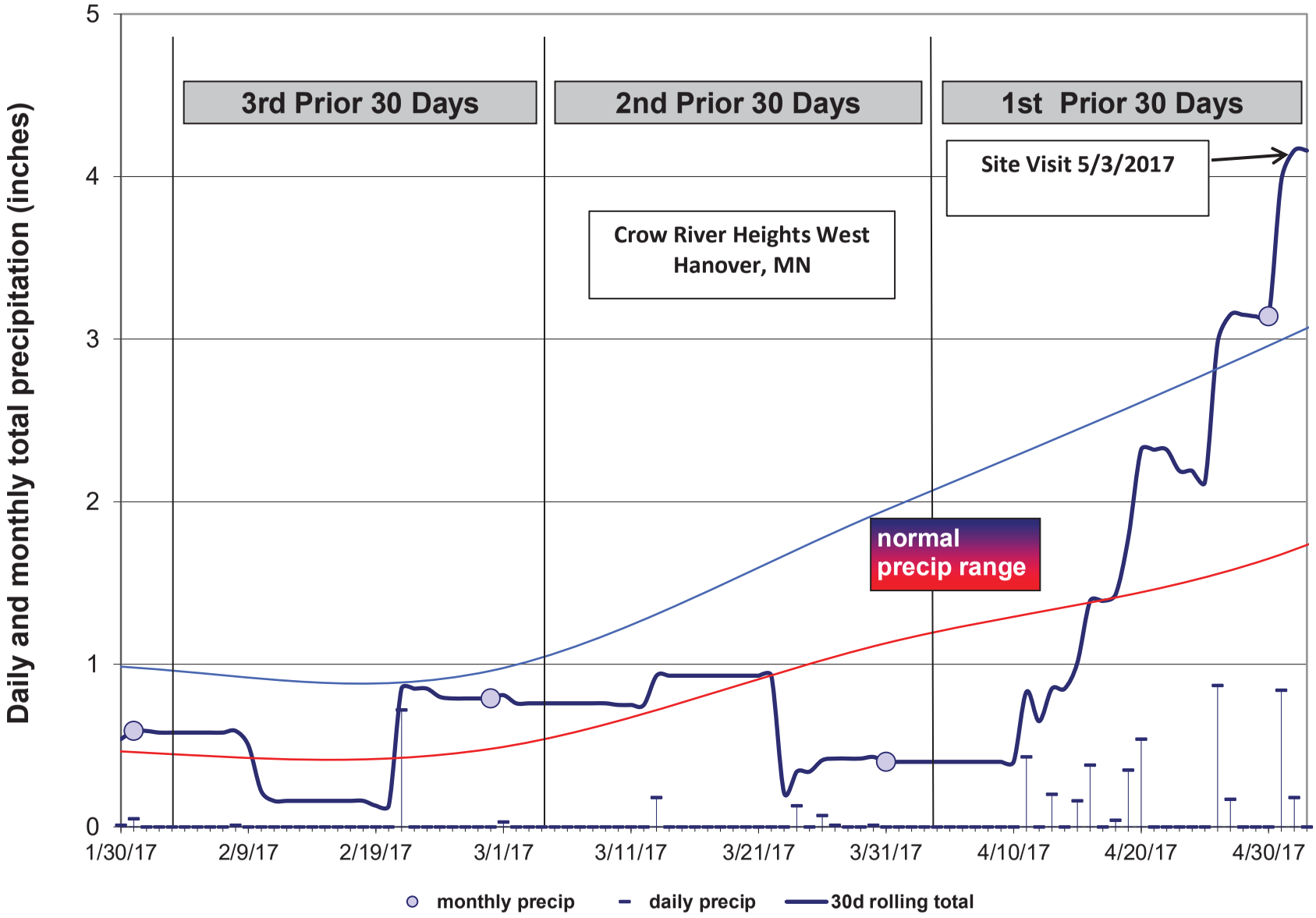
Mar 1, 2017	.03
Mar 2, 2017	0
Mar 3, 2017	0
Mar 4, 2017	0
Mar 5, 2017	0
Mar 6, 2017	0
Mar 7, 2017	0
Mar 8, 2017	0
Mar 9, 2017	0
Mar 10, 2017	0
Mar 11, 2017	0
Mar 12, 2017	0
Mar 13, 2017	.18
Mar 14, 2017	0
Mar 15, 2017	0
Mar 16, 2017	0
Mar 17, 2017	0
Mar 18, 2017	0
Mar 19, 2017	0
Mar 20, 2017	0
Mar 21, 2017	0
Mar 22, 2017	0
Mar 23, 2017	0
Mar 24, 2017	.13
Mar 25, 2017	0
Mar 26, 2017	.07
Mar 27, 2017	.01
Mar 28, 2017	0
Mar 29, 2017	0
Mar 30, 2017	.01
Mar 31, 2017	0

Apr 1, 2017	0
Apr 2, 2017	0
Apr 3, 2017	0
Apr 4, 2017	0
Apr 5, 2017	0
Apr 6, 2017	0
Apr 7, 2017	0
Apr 8, 2017	0
Apr 9, 2017	0
Apr 10, 2017	0
Apr 11, 2017	.43
Apr 12, 2017	0
Apr 13, 2017	.20
Apr 14, 2017	0
Apr 15, 2017	.16
Apr 16, 2017	.38
Apr 17, 2017	0
Apr 18, 2017	.04
Apr 19, 2017	.35
Apr 20, 2017	.54
Apr 21, 2017	0
Apr 22, 2017	0
Apr 23, 2017	0
Apr 24, 2017	0
Apr 25, 2017	0
Apr 26, 2017	.87
Apr 27, 2017	.17
Apr 28, 2017	0
Apr 29, 2017	0
Apr 30, 2017	0

May 1, 2017	0.84
May 2, 2017	0.18
May 3, 2017	0

1981-2010 Summary Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.39	0.40	1.14	1.95	1.89	3.27	2.67	2.98	2.39	1.25	0.87	0.49	15.51	25.61	25.46
70%	0.78	0.88	1.69	3.00	4.04	4.96	4.11	4.34	4.85	3.11	1.98	1.27	20.66	31.34	31.27
mean	0.67	0.63	1.52	2.61	3.16	4.34	3.63	3.93	3.48	2.43	1.56	0.98	18.53	28.94	28.79


Daily and monthly total precipitation (inches)
5
4
3
2
1
0
3rd Prior 30 Days
2nd Prior 30 Days
1st Prior 30 Days
Site Visit 5/3/2017
Crow River Heights West
Hanover, MN
normal
precip range
1/30/17
2/9/17
2/19/17
3/1/17
3/11/17
3/21/17
3/31/17
4/10/17
4/20/17
4/30/17
monthly precip
daily precip
30d rolling total

Minnesota State Climatology Office

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:

county: **Wright** township number: **120N**
township name: **Frankfort** range number: **24W**
nearest community: **Hanover** section number: **34**

Aerial photograph or site visit date:
Wednesday, May 3, 2017

Score using 1981-2010 normal period

values are in inches A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.	first prior month: **April 2017**	second prior month: **March 2017**	third prior month: **February 2017**
estimated precipitation total for this location:	**3.24**	**0.65**	**0.73**
there is a 30% chance this location will have less than:	1.95	1.14	0.40
there is a 30% chance this location will have more than:	3.00	1.69	0.88
type of month: dry normal wet	**wet**	**dry**	**normal**
monthly score	**3 * 3 = 9**	**2 * 1 = 2**	**1 * 2 = 2**
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)	**13 (Normal)**		

Other Resources:

- retrieve daily precipitation data
- view radar-based precipitation estimates
- view weekly precipitation maps
- *Evaluating Antecedent Precipitation Conditions* (BWSR)

Hydric Soil List - All Components

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

Report—Hydric Soil List - All Components

Hydric Soil List - All Components–MN171-Wright County, Minnesota					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
114: Glencoe clay loam, 0 to 1 percent slopes	Glencoe	65-95	Depressions	Yes	2
	Okoboji	5-15	Depressions	Yes	2
	Canisteo	0-10	Ground moraines,rims on depressions	Yes	2
	Webster	0-10	Ground moraines	Yes	2
740: Hamel-Glencoe complex, 0 to 2 percent slopes	Hamel	50-60	Ground moraines	Yes	2
	Glencoe	30-40	Depressions	Yes	2
	Terril	0-20	Ground moraines	No	—
1094B: Angus-Cordova complex, 0 to 5 percent slopes	Angus	60	Hills on moraines	No	—
	Cordova	30	Drainageways on moraines	Yes	2
	Le Sueur	5	—	No	—
	Glencoe-Depressional	5	Depressions	Yes	2,3
1156: Cordova loam, 0 to 2 percent slopes	Cordova	85	Drainageways on moraines	Yes	2
	Glencoe-Depressional	10	Depressions	Yes	2,3
	Nessel	5	—	No	—
1901B: Angus-Le Sueur complex, 1 to 5 percent slopes	Angus	60	Hills on moraines	No	—
	Le Sueur	30	Moraines	No	—
	Cordova	10	Swales	Yes	2

Data Source Information

Soil Survey Area: Wright County, Minnesota
Survey Area Data: Version 10, Sep 19, 2016

Crow River Heights West Site

Wetland Delineation Report

APPENDIX D

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP1-1U
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear
Slope (%): 3 - 5 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30 ft Radius)			
1 *Quercus macrocarpa*	10	Y	FAC
2			
3			
4			
5			
	10 = Total Cover		
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Ulmus americana*	10	Y	FACW
2 *Rhamnus cathartica*	10	Y	FAC
3 *Acer saccharum*	10	Y	FACU
4			
5			
	30 = Total Cover		
Herb stratum (Plot size: 5 ft Radius)			
1 *Geranium maculatum*	50	Y	FACU
2 *Anemone virginiana*	10	N	FACU
3 *Viola sororia*	5	N	FAC
4			
5			
6			
7			
8			
9			
10			
	65 = Total Cover		
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across all Strata: 5 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 60.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	25	x 3 =	75
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column totals	105 (A)		375 (B)

Prevalence Index = B/A = 3.57

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence index is greater than 3.0

SOIL

Sampling Point: SP1-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/1	100					Clay Loam	
8-16	10YR 3/2	100					Clay Loam	
16-20	10YR 3/2	100					Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	20
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	16

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP1-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID: Wetland 1
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30 ft Radius)			
1 *Acer saccharinum*	25	Y	FACW
2 *Fraxinus pennsylvanica*	25	Y	FACW
3			
4			
5			
	50	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Rhamnus cathartica*	10	Y	FAC
2			
3			
4			
5			
	10	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	10	Y	FACW
2 *Carex stricta*	10	Y	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	20	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	60	x 2 =	120
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	80 (A)		160 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP1-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-20	10YR 2/1	100					Clay Loam	
20-24	10YR 4/2	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	2
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 4 - 6 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil X, or hydrology ____ significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Soils in this location were disturbed due to previous grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Bromus inermis*	100	Y	FACU
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column totals	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-16	10YR 2/1	100					Clay Loam	
16-24	10YR 4/3	98	10YR 4/6	2	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Soils in this location were disturbed due to previous grading of the site.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil X, or hydrology X significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	f yes, optional wetland site ID: Wetland 2
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. This area had been excavated in historic upland, therefore vegetation, soils, and hydrology were significantly disturbed.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Salix amygdaloides*	20	Y	FACW
2			
3			
4			
5			
	20	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Typha angustifolia*	100	Y	OBL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	100	x 1 =	100
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	120 (A)		140 (B)

Prevalence Index = B/A = 1.17

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-12	10YR 2/1	100					Mucky Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	3
Water table present?	Yes	X	No		Depth (inches):	3
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-2U
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear
Slope (%): 3 - 5 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30 ft Radius)			
1 *Juniperus virginiana*	15	Y	FACU
2			
3			
4			
5			
	15	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Zanthoxylum americanum*	35	Y	FACU
2 *Prunus virginiana*	15	Y	FACU
3 *Rhamnus cathartica*	15	Y	FAC
4			
5			
	65	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Bromus inermis*	70	Y	FACU
2 *Fragaria virginiana*	20	Y	FACU
3 *Viola sororia*	10	N	FAC
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across all Strata: 6 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 16.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	25	x 3 =	75
FACU species	155	x 4 =	620
UPL species	0	x 5 =	0
Column totals	180 (A)		695 (B)

Prevalence Index = B/A = 3.86

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-2U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-13	10YR 3/2	100					Loam	
13-15	10YR 4/3	100					Loam	
15-24	10YR 4/3	100					Clay Loam	
24-28	10YR 4/2	90	10YR 4/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-2W
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave
Slope (%): 0 - 2 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: PEM1A
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology X significantly disturbed? Are "normal circumstances"
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? present? No

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 2

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Hydrology in this area had been disturbed due to adjacent grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Ulmus americana*	15	Y	FACW
2			
3			
4			
5			
	15 = Total Cover		
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across all Strata: 2 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	115	x 2 =	230
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	115 (A)		230 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-2W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	90	10YR 4/6	10	C	M	Mucky Loam	
8-11	10YR 4/1	90	10YR 4/6	10	C	M	Loam	
11-24	10YR 4/1	90	10YR 4/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	2
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-3U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 3 - 5 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30 ft Radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Rhamnus cathartica*	10	Y	FAC
2			
3			
4			
5			
	10 = Total Cover		
Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	70	Y	FAC
2 *Fragaria virginiana*	20	N	FACU
3 *Rubus idaeus*	10	N	FACU
4 *Solidago canadensis*	5	N	FACU
5			
6			
7			
8			
9			
10			
	105 = Total Cover		
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	80	x 3 =	240
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column totals	115 (A)		380 (B)

Prevalence Index = B/A = 3.30

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-3U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR 3/1	100					Clay Loam	
9-15	10YR 3/1	78	10YR 4/2	20	D	M	Clay Loam	
			10YR 4/6	2	C	M	Clay Loam	
15-24	10YR 3/1	75	2.5Y 5/2	20	D	M	Clay Loam	
			10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP2-3W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology X significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	f yes, optional wetland site ID: Wetland 2
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Hydrology in this area had been disturbed due to adjacent grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP2-3W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 4/2	90	10YR 4/6	10	C	M	Mucky Loam	
4-13	10YR 4/2	85	10YR 4/6	15	C	M	Sandy Clay Loam	
13-18	10YR 4/2	70	10YR 4/6	30	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	2
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP3-1U and SP5-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Flat Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 2 - 3 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	Y
Indicators of wetland hydrology present?	Y

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1	*Fraxinus pennsylvanica*	30	Y	FACW
2	*Ostrya virginiana*	25	Y	FACU
3				
4				
5				
		55	= Total Cover	
	Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1	*Zanthoxylum americanum*	25	Y	FACU
2	*Acer rubrum*	10	Y	FAC
3				
4				
5				
		35	= Total Cover	
	Herb stratum (Plot size: 5 ft Radius)			
1	*Geranium maculatum*	30	Y	FACU
2	*Carex blanda*	20	Y	FAC
3	*Alliaria petiolata*	10	N	FAC
4	*Hydrophyllum virginianum*	10	N	FAC
5	*Acer rubrum*	5	N	FAC
6				
7				
8				
9				
10				
		75	= Total Cover	
	Woody vine stratum (Plot size: 30 ft Radius)			
1				
2				
		0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	55	x 3 =	165
FACU species	80	x 4 =	320
UPL species	0	x 5 =	0
Column totals	165 (A)		545 (B)

Prevalence Index = B/A = 3.30

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- ____ Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: P3-1U and SP5-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Clay Loam	
10-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	14
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	8

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP3-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	f yes, optional wetland site ID: Wetland 3
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Rhamnus cathartica*	15	Y	FAC
2			
3			
4			
5			
	15	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Hydrophyllum virginianum*	30	Y	FAC
2 *Carex spp.*	20	Y	FACW
3 *Solidago gigantea*	15	Y	FACW
4 *Geranium maculatum*	10	N	FACU
5			
6			
7			
8			
9			
10			
	75	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	45	x 3 =	135
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	90 (A)		245 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Carex spp. assumed FACW or wetter.

SOIL

Sampling Point: SP3-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 2/1	100					Clay Loam	
5-12	10YR 4/1	90	10YR 4/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1
Water table present?	Yes	X	No		Depth (inches):	1
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP4-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Flat Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 2 - 3 | Lat: | Long: | Datum:

Soil Map Unit Name: Glencoe Clay Loam | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y	If yes, optional wetland site ID:	
Indicators of wetland hydrology present?	N		

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Sample point was taken within a tilled farm field that lacked crops at the time of the field visit, therefore vegetation was disturbed.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	0	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 0 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	0	(A)	0	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- Rapid test for hydrophytic vegetation
- Dominance test is >50%
- Prevalence index is ≤3.0*
- Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Sample point taken within a tilled farmfield. The area surrounding the sample point lacked vegetation at the time of the field visit.

SOIL

Sampling Point: SP4-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Clay Loam	
18-24	10YR 2/1	98	10YR 4/6	2	C	M	Clay Loam	
24-30	2.5Y 5/2	80	10YR 4/6	20	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	22
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	18

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP4-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Glencoe Clay Loam (Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	Wetland 4
Indicators of wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Sample point was taken within a tilled farm field that lacked crops at the time of the field visit, therefore vegetation was disturbed.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Persicaria pensylvanica*	20	Y	FACW
2 *Phalaris arundinacea*	10	Y	FACW
3 *Bidens frondosa*	5	N	FACW
4			
5			
6			
7			
8			
9			
10			
	35	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:			
OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	35 (A)		70 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Sample point taken within a tilled farmfield.

SOIL

Sampling Point: SP4-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	98	10YR 4/6	2	C	M	Clay Loam	
8-12	10YR 4/2	95	10YR 4/6	5	C	M	Clay Loam	
12-24	2.5Y 5/2	90	10YR 4/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	2
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP5-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	Y

Is the sampled area within a wetland? Y

If yes, optional wetland site ID: Wetland 5

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Hydrophyllum virginianum*	60	Y	FAC
2 *Galium aparine*	20	N	FACU
3 *Geranium maculatum*	15	N	FACU
4 *Athyrium filix-femina*	5	N	FAC
5 *Leonurus cardiaca*	5	N	UPL
6			
7			
8			
9			
10			
	105	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	65	x 3 =	195
FACU species	35	x 4 =	140
UPL species	5	x 5 =	25
Column totals	105 (A)		360 (B)

Prevalence Index = B/A = 3.43

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence index greater than 3.0

SOIL

Sampling Point: SP5-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/1	100					Clay Loam	
6-18	10YR 2/1	90	10YR 4/6	5	C	M	Clay Loam	
			10YR 4/1	5	C	M	Clay Loam	
18-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP6-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 3 - 5 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil X, or hydrology ____ significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Soils in this location were disturbed due to previous grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Bromus inermis*	30	Y	FACU
2 *Poa pratensis*	25	Y	FAC
3 *Phalaris arundinacea*	20	Y	FACW
4 *Solidago canadensis*	15	N	FACU
5			
6			
7			
8			
9			
10			
	90	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	25	x 3 =	75
FACU species	45	x 4 =	180
UPL species	0	x 5 =	0
Column totals	90 (A)		295 (B)

Prevalence Index = B/A = 3.28

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP6-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-16	10YR 3/2	98	10YR 4/6	2	C	M	Sandy Clay Loam	
16-24	10YR 4/3	100					Sandy Loam	Fill soil, contains gravel

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Soils in this location were disturbed due to previous grading of the site.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches):	___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP6-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 1 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: PEM1Ad

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology X significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 6

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Hydrology in this area had been disturbed due to adjacent grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP6-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/1	100					Mucky Loam	
6-9	10YR 4/2	95	10YR 4/6	5	C	M	Sandy Clay Loam	
9-22	10YR 4/2	80	10YR 4/6	20	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	2
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP7-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 3 - 4 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Zanthoxylum americanum*	20	Y	FACU
2 *Ostrya virginiana*	10	Y	FACU
3			
4			
5			
	30	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Hydrophyllum virginianum*	40	Y	FAC
2 *Carex pensylvanica*	15	Y	UPL
3 *Geranium maculatum*	10	N	FACU
4 *Ribes americanum*	10	N	FACW
5			
6			
7			
8			
9			
10			
	75	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 25.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	40	x 3 =	120
FACU species	40	x 4 =	160
UPL species	15	x 5 =	75
Column totals	105 (A)		375 (B)

Prevalence Index = B/A = 3.57

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP7-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR 2/1	100					Loam	
9-24	10YR 3/2	80	10YR 4/1	5	D	M	Clay Loam	
	10YR 2/1	15						

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP7-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID: Wetland 7
Indicators of wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Geranium maculatum*	10	Y	FACU
2 *Solidago gigantea*	10	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	20	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	20 (A)		60 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP7-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Loam	
10-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	4
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):	

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface water perched on top of clay soils. The water table was not observed within the 24 inch deep sample bore hole.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP8-1U
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear
Slope (%): 3 - 5 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30 ft Radius)			
1 *Fraxinus pennsylvanica*	5	Y	FACW
2			
3			
4			
5			
	5 = Total Cover		
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	50	Y	FAC
2 *Bromus inermis*	50	Y	FACU
3 *Solidago canadensis*	20	N	FACU
4			
5			
6			
7			
8			
9			
10			
	120 = Total Cover		
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet
Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across all Strata: 3 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet
Total % Cover of:

OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	50	x 3 =	150
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column totals	125 (A)		440 (B)

Prevalence Index = B/A = 3.52

Hydrophytic Vegetation Indicators:
- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence index is greater than 3.0

SOIL

Sampling Point: SP8-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-9	10YR 3/1	100					Clay Loam	
9-18	10YR 3/2	100					Sandy Clay Loam	
18-24	10YR 4/3	95	10YR 4/6	5	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	22
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	18

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP8-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Slight Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	Wetland 8

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP8-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-20	10YR 2/1	100					Clay Loam	
20-24	10YR 4/2	95	10YR 4/6	5	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	2
Water table present?	Yes	X	No	___	Depth (inches):	Surface
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP9-1U
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear
Slope (%): 3 - 5 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	N
Is the sampled area within a wetland?	N
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Ostrya virginiana*	30	Y	FACU
2 *Tilia americana*	15	Y	FACU
3			
4			
5			
	45	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Rhamnus cathartica*	20	Y	FAC
2			
3			
4			
5			
	20	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Hydrophyllum virginianum*	20	Y	FAC
2 *Rhamnus cathartica*	10	Y	FAC
3 *Ribes americanum*	10	Y	FACW
4 *Anemone quinquefolia*	5	N	FAC
5 *Leonurus cardiaca*	5	N	UPL
6 *Arisaema triphyllum*	2	N	FACW
7			
8			
9			
10			
	52	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across all Strata: 6 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	12	x 2 =	24
FAC species	55	x 3 =	165
FACU species	45	x 4 =	180
UPL species	5	x 5 =	25
Column totals	117 (A)		394 (B)

Prevalence Index = B/A = 3.37

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP9-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-12	10YR 2/1	100					Clay Loam	
12-24	10YR 4/1	90	10YR 4/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	18
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	13

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP9-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	Wetland 9

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Solidago gigantea*	50	Y	FACW
2 *Poa pratensis*	35	Y	FAC
3 *Fraxinus pennsylvanica*	5	N	FACW
4			
5			
6			
7			
8			
9			
10			
	90	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	55	x 2 =	110
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		215 (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP9-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/1	100					Clay Loam	
6-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	Surface
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP10-1U
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear
Slope (%): 3 - 5 | Lat: | Long: | Datum:
Soil Map Unit Name: Angus-Le Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	N
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Prunus serotina*	5	Y	FACU
2			
3			
4			
5			
	5	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	90	Y	FAC
2 *Solidago canadensis*	30	Y	FACU
3 *Bromus inermis*	10	N	FACU
4			
5			
6			
7			
8			
9			
10			
	130	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across all Strata: 3 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	45	x 4 =	180
UPL species	0	x 5 =	0
Column totals	135 (A)		450 (B)

Prevalence Index = B/A = 3.33

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP10-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/1	100					Clay Loam	
8-16	10YR 3/2	100					Sandy Clay Loam	
16-24	10YR 4/3	95	10YR 4/6	5	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	22
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	18

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP10-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus Le-Sueur Complex (Predominantly Non-Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	Wetland 10

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	100	Y	FAC
2 *Phalaris arundinacea*	20	N	FACW
3 *Carex stricta*	10	N	OBL
4			
5			
6			
7			
8			
9			
10			
	130	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	20	x 2 =	40
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	130 (A)		350 (B)

Prevalence Index = B/A = 2.69

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP10-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-16	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	
16-24	10YR 4/2	95	10YR 4/6	5	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	Surface
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP11-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 3 - 5 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil X, or hydrology ____ significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Soils in this area had been disturbed due to grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Juniperus virginiana*	5	Y	FACU
2 *Fraxinus pennsylvanica*	5	Y	FACW
3			
4			
5			
	10	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	80	Y	FAC
2 *Digitaria ischaemum*	15	N	FACU
3 *Solidago canadensis*	10	N	FACU
4			
5			
6			
7			
8			
9			
10			
	105	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	80	x 3 =	240
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column totals	115 (A)		370 (B)

Prevalence Index = B/A = 3.22

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP11-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Clay Loam	
10-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes ___	No	X	Depth (inches):	___
Water table present?	Yes ___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes ___	No	X	Depth (inches):	___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017
Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP11-1W
Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave
Slope (%): 0 - 2 | Lat: | Long: | Datum:
Soil Map Unit Name: Glencoe Clay Loam (Hydric) | NWI Classification: PEM1A/PEM1C
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology X significantly disturbed? Are "normal circumstances"
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? present? No

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 11

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Hydrology in this area had been disturbed due to adjacent grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1 *Fraxinus pennsylvanica*	5	Y	FACW
2			
3			
4			
5			
	5	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across all Strata: 2 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	105	x 2 =	210
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	105 (A)		210 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP11-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Clay Loam	
18-24	10YR 4/1	95	10YR 4/6	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP12-1U

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear

Slope (%): 3 - 5 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil X, or hydrology ____ significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	Y
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Soils in this area had been disturbed due to grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft Radius)			
1 *Poa pratensis*	80	Y	FAC
2 *Solidago canadensis*	20	Y	FACU
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	80	x 3 =	240
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column totals	100 (A)		320 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- ____ Dominance test is >50%
- ____ Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP12-1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 3/2	100					Loam	
6-13	2.5Y 4/2	70	10YR 4/6	10	C	M	Sandy Clay Loam	
	10YR 3/2	20					Sandy Clay Loam	
13-25	10YR 4/1	90	10YR 4/6	10	C	M	Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP12-1W

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0 - 2 | Lat: | Long: | Datum:

Soil Map Unit Name: Glencoe Clay Loam (Hydric) | NWI Classification: PEM1A/PEM1Cd

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology X significantly disturbed? Are "normal circumstances" present? No

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Y
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 12

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. Hydrology in this area had been disturbed due to adjacent grading of the site.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	80	Y	FACW
2 *Carex lacustris*	20	Y	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	20	x 1 =	20
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		180 (B)

Prevalence Index = B/A = 1.80

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP12-1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 2/1	100					Muck	
7-12	10GY 4/1	95	10YR 4/6	5	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Crow River Heights West | City/County: Hanover/Wright | Sampling Date: 5/3/2017

Applicant/Owner: Dennis Backes | State: MN | Sampling Point: SP-A

Investigator(s): B.Carlson, A.Krinke, A.Cameron | Section, Township, Range: S:34 T:120N R:24W

Landform (hillslope, terrace, etc.): Excavated Trench | Local relief (concave, convex, none): Concave

Slope (%): 0 | Lat: | Long: | Datum:

Soil Map Unit Name: Angus-Cordova Complex (Partially Hydric) | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil X, or hydrology X significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Precipitation from Gridded Database Method within normal range. 30-day precipitation rolling total wetter than typical. The sample point was taken within a previously excavated road bed created in an area that was historic upland, therefore vegetation, soils, and hydrology were significantly disturbed.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft Radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft Radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft Radius)			
1 *Phalaris arundinacea*	20	Y	FACW
2 *Eleocharis obtusa*	20	Y	OBL
3 *Scirpus atrovirens*	15	Y	OBL
4 *Persicaria pensylvanica*	10	N	FACW
5			
6			
7			
8			
9			
10			
	65	= Total Cover	
Woody vine stratum (Plot size: 30 ft Radius)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	35	x 1 =	35	
FACW species	30	x 2 =	60	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	65	(A)	95	(B)

Prevalence Index = B/A = 1.46

Hydrophytic Vegetation Indicators:

- Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: SP-A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	2.5Y 5/4	98	10GY 5/0	2	C	M	Clay Loam	
4-24	2.5Y 5/4	98	10GY 5/0	2	C	M	Sandy Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Soil boring taken within an area that had been previously excavated for road construction, and left undeveloped.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	6
Water table present?	Yes	X	No		Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

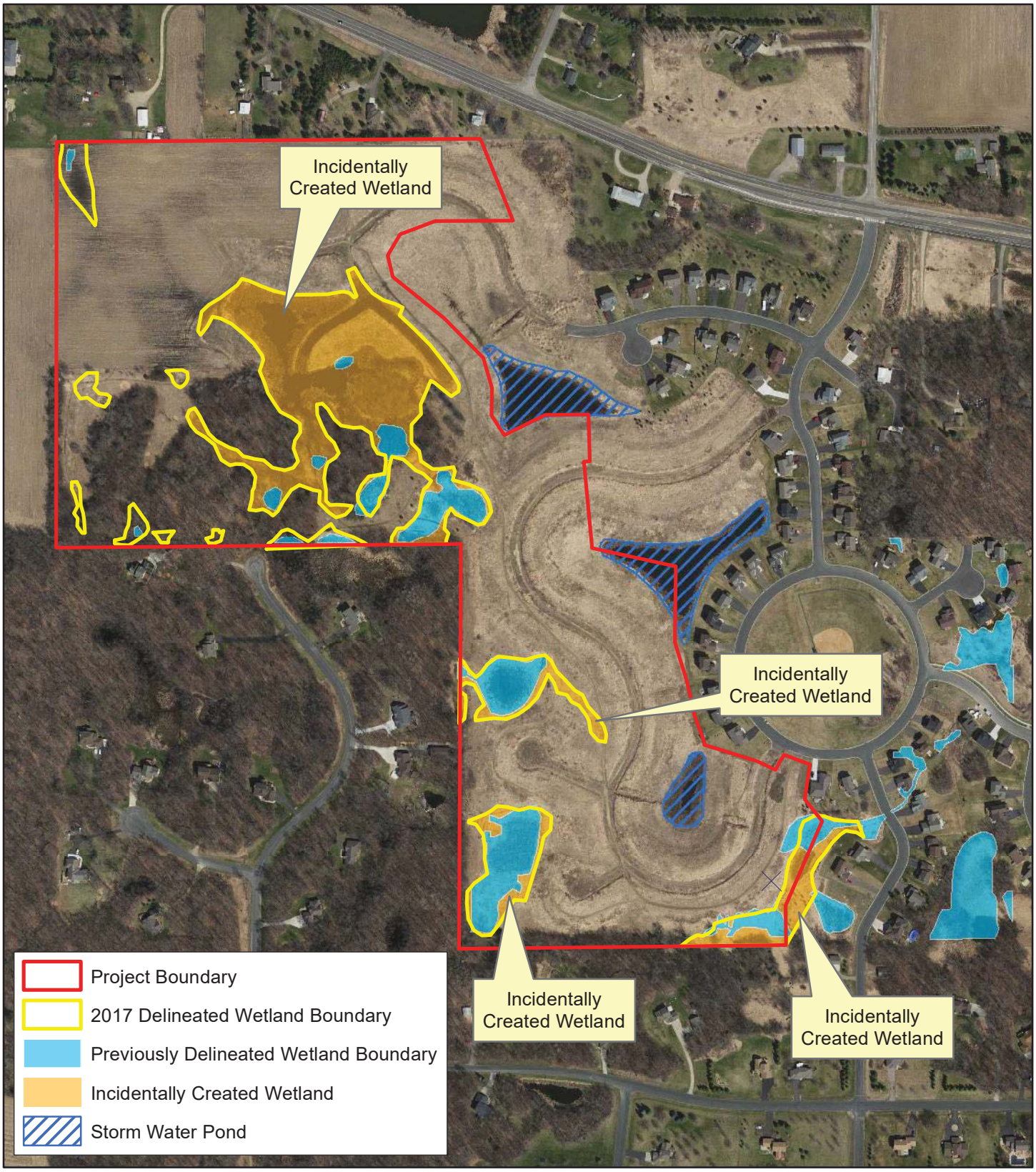
Remarks:

Crow River Heights West Site

Wetland Delineation Report

APPENDIX E

No-Loss Information



Appendix E - Delineation Boundary Comparison & Incidental Wetland Areas

N

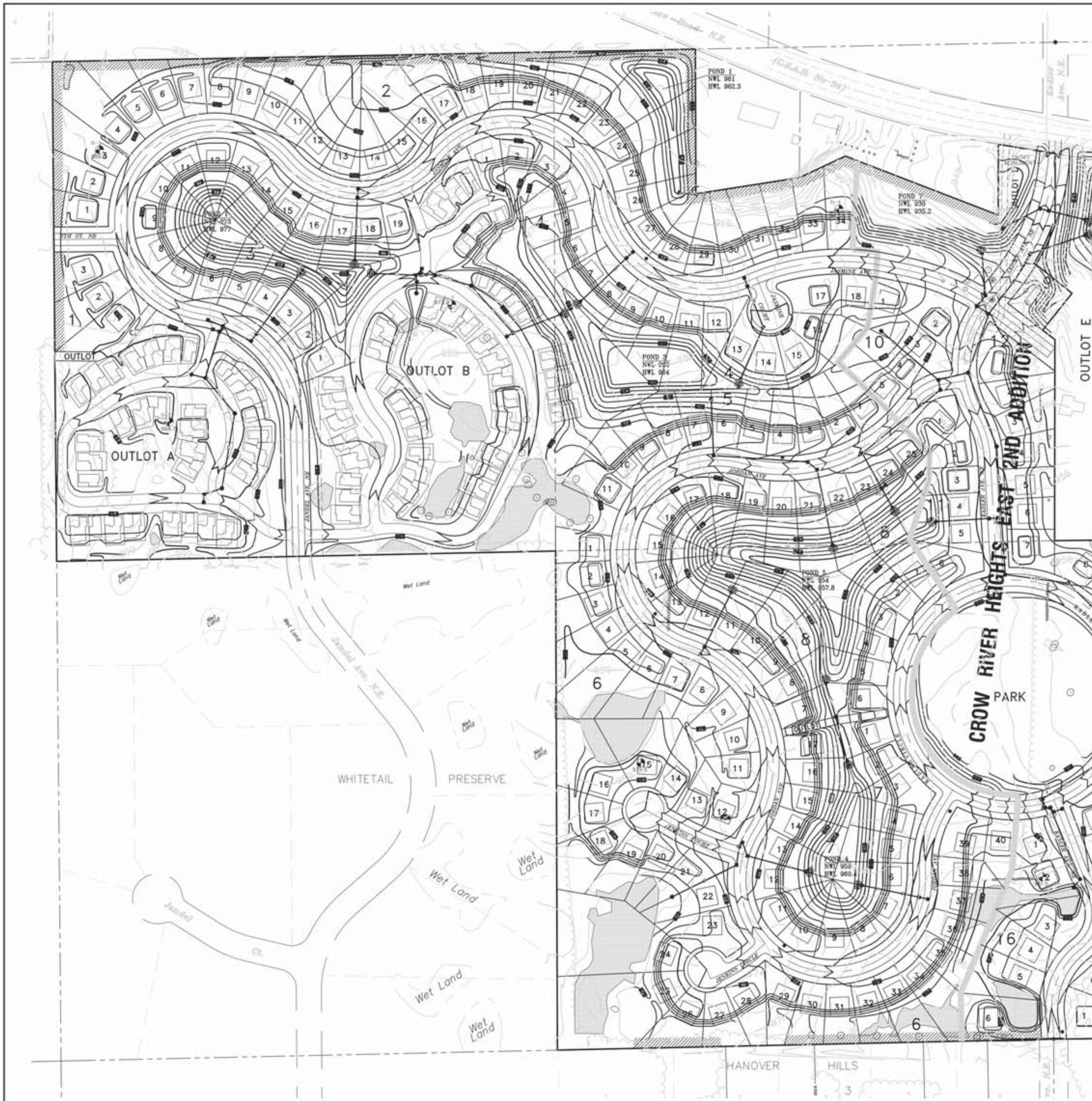
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

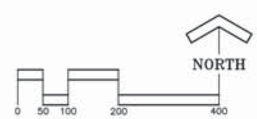
Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



NOTES:
1. EXISTING TOPOGRAPHY FROM WSB ASSOC. INC., MAY 1999
2. STREET WIDTH TO MEET CITY STANDARDS
3. STREET & PAD CORRECTIONS TO MEET REQUIREMENTS OF SOILS ENGINEER
4. EROSION CONTROL MEASURES TO BE UTILIZED WILL INCLUDE SILT FENCE, HAY BALES, TEMPORARY PONDING, STREET SWEEPING, SEEDING & MULCHING, AND OTHER METHODS AS NECESSARY

LEGEND

EXISTING CONTOURS
EXISTING STORM SEWER
EXISTING WETLANDS
PROPOSED SPOT ELEVATION — X 1207.5
PROPOSED CONTOUR — 1210
PROPOSED STORM SEWER — ST
DENOTES SOIL BORING LOCATION — B-3 962.4
DENOTES WETLANDS AS DELINEATED BY KJOLHAUG ENVIRONMENTAL SERVICES 6-99



Engineering • Planning • Surveying

MFRA
McCombs Frank Roos Associates, Inc.

15050 23rd Avenue North • Plymouth, Minnesota • 55447
phone 612/476-6010 • fax 612/476-8532
E-Mail: cadd@mfra.com

Client

Gold Nugget Development, Inc.

Project

Crow River Heights West
Hanover, MN.

Sheet Title

Preliminary Grading & Drainage Plan

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

Name: Daniel M. Parks (signature) DANIEL M. PARKS
Date: 1-21-00
Registration Number: 18919

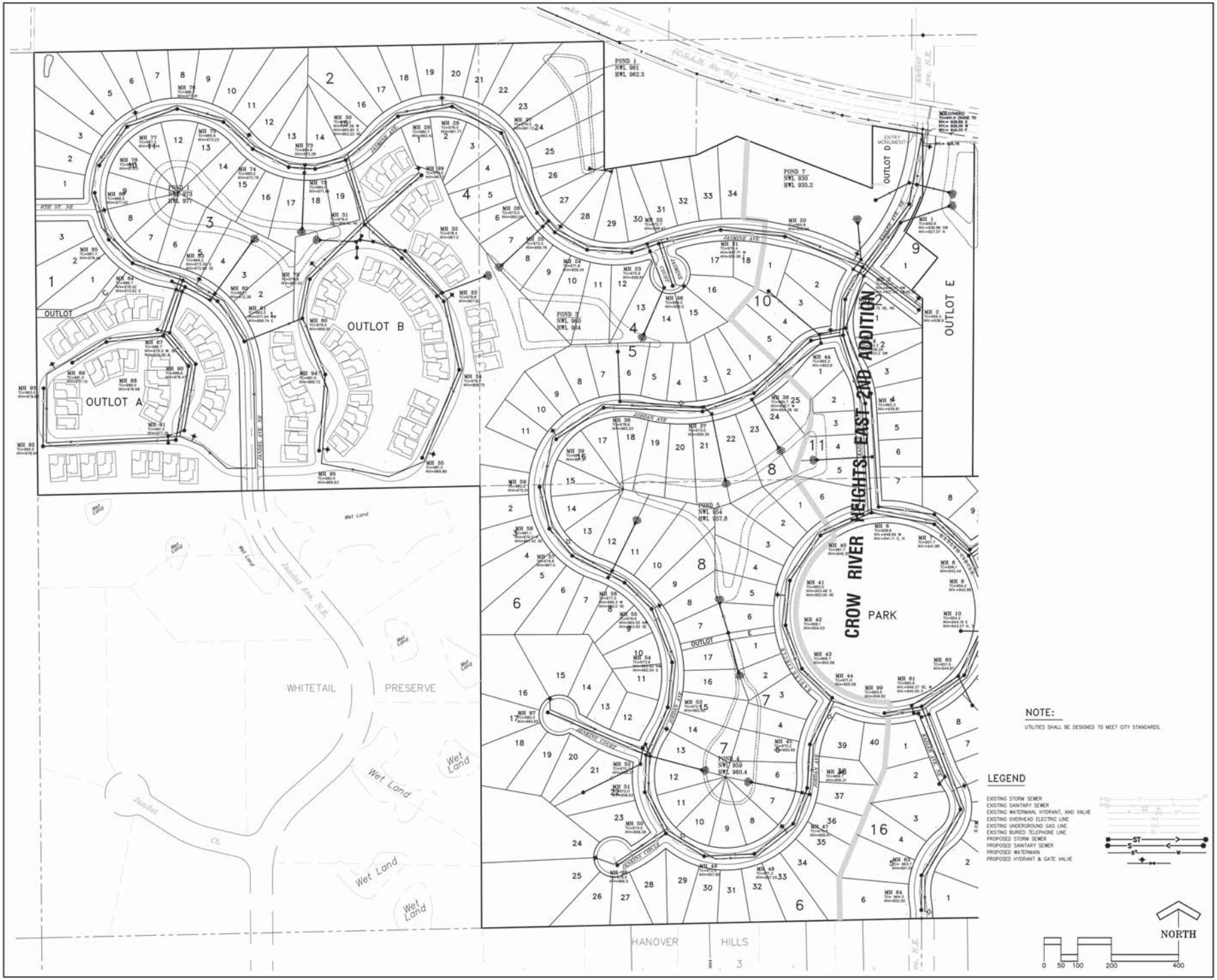
Designed | Checked DMP
Drawn DJD/DWS | Approved DMP
Date 1-21-00

Revisions

No.	Date	By	Remarks
A	5/4/00	AMB	Revised North Entrance

Sheet: 5/10
Revision: A

MFRA FILE NO.: 12724



Engineering • Planning • Surveying

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15050 23rd Avenue North • Plymouth, Minnesota • 55447
phone 612/476-6010 • fax 612/476-8532
E-Mail: cadd@mfra.com

Client

Gold Nugget Development, Inc.

Project

Crow River Heights West
Hanover, MN.

Sheet Title

Preliminary Utility Plan West End

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

Name Daniel M. Parks (SIGNED IN PENCIL)
Date 1-21-00
Registration Number 18919

Designed	LSJ/DMP	Checked	DMP
Drawn	DJD	Approved	DMP
Date	1-21-00		

Revisions

No.	Date	By	Remarks
A	5/4/00	AMB	Revised North Entrance

Sheet 7/10 **Revision** A

MFRA FILE NO.: 12724

Crow River Heights West Site

Wetland Delineation Report

APPENDIX F

Aerial Review for
Offsite Hydrology Assessment

Figure 7 - Offsite Hydrology Assessment Areas (2013 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

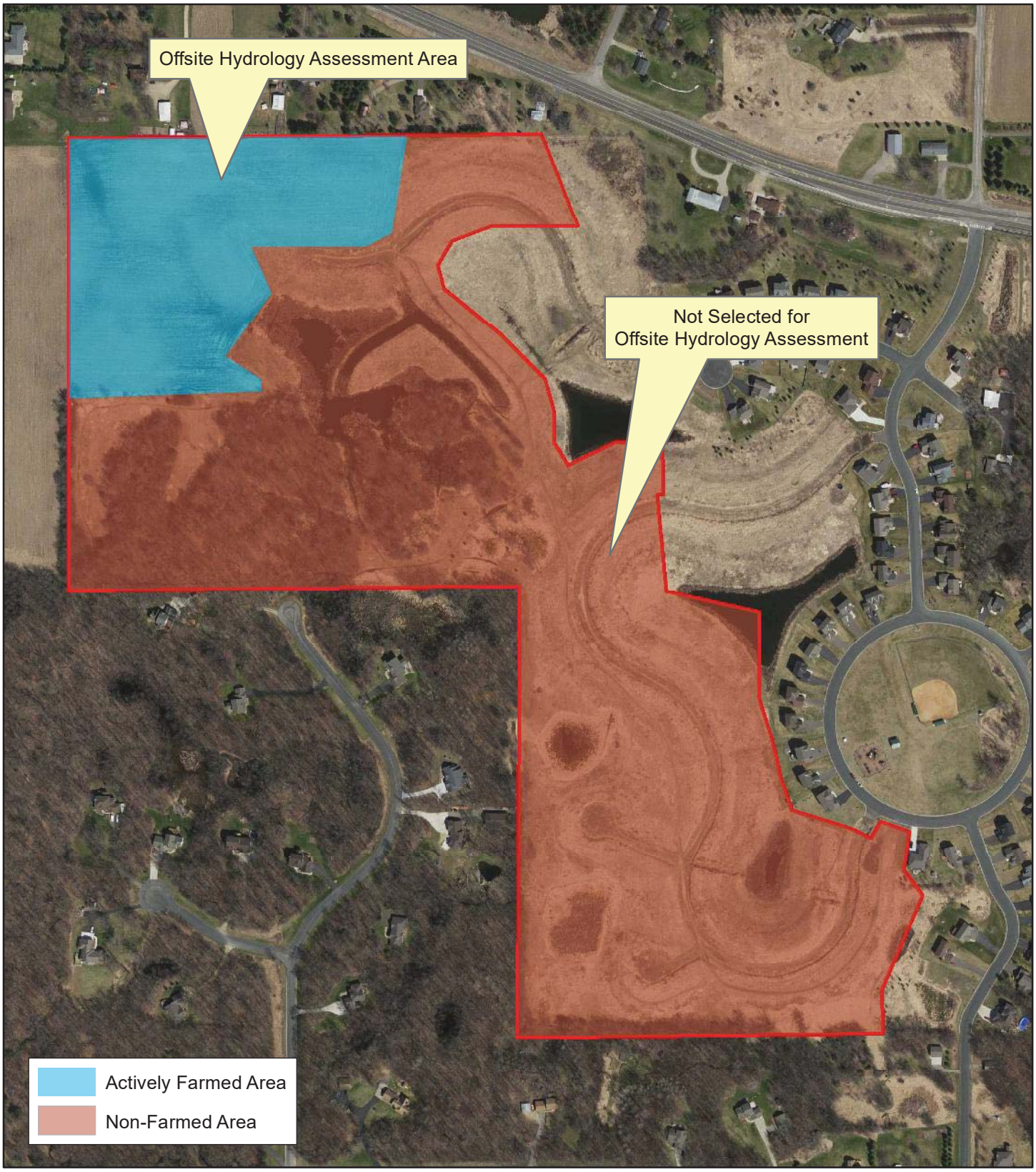


Figure 7A - Offsite Hydrology Assessment Areas

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Hydrology from Aerial Imagery – Recording Form

Project Name: Crow River Heights West **Date:** 9/29/2017 **County:** Wright

Investigator: A.Cameron **Legal Description (S, T, R):** S:34 T:120N R:24W

Date Image Taken (M-D-Y)	Image Source	Climate Condition (wet, dry, normal)[1]	Image Interpretation(s)				
			Area: A	Area:	Area:	Area:	Area:
July 1, 1979	FSA	Wet	CS				
July 1, 1980	FSA	Normal (1)	DO/CS (1)				
July 1, 1981	FSA	Normal (2)	NV				
July 1, 1982	FSA	Normal (3)	DO/CS (2)				
July 1, 1983	FSA	Normal (4)	NV				
July 1, 1984	FSA	Wet	WS				
July 1, 1985	FSA	Wet	NV				
July 1, 1986	FSA	Normal (5)	DO/CS (3)				
July 1, 1987	FSA	Dry	NV				
July 1, 1988	FSA	Dry	NV				
July 1, 1989	FSA	Normal (6)	NV				
July 1, 1990	FSA	Wet	DO				
July 1, 1991	FSA	Wet	DO/CS				
July 1, 1992	FSA	Dry	DO/CS				
July 1, 1993	FSA	Wet	WS				
July 1, 1994	FSA	Normal (7)	DO/CS (4)				
July 1, 1995	FSA	Normal (8)	DO/CS (5)				
July 1, 1996	FSA	Normal (9)	DO/CS (6)				
July 1, 1997	FSA	Dry	DO/CS				
July 1, 1998	FSA	Normal (10)	DO (7)				
July 1, 1999	FSA	Normal (11)	DO/CS (8)				
July 1, 2000	FSA	Normal (12)	NV				
July 1, 2003	FSA	Wet	DO				
July 1, 2006	FSA	Dry	WS				
July 1, 2008	FSA	Normal (13)	NV				
July 1, 2009	FSA	Dry	NV				
July 1, 2010	FSA	Wet	DO				
July 1, 2013	FSA	Wet	DO				
July 1, 2015	FSA	Normal (14)	WS (9)				
April 15, 2016	MN GEO	Normal (15)	SS (10)				
Normal Climate Condition			**Area: A**	**Area:**	**Area:**	**Area:**	**Area:**
Number of normal years			15				
Number with wet signatures			10				
Percent with wet signatures			67%				

KEY		
WS - wetland signature	SS - soil wetness signature	CS - crop stress
NC - not cropped	AP - altered pattern	NV - normal vegetative cover
DO - drowned out	SW - standing water	NSS – no soil wetness signature
Other labels or comments:		

- Use above key to label image interpretations. It is imperative that the reviewer read and understand the guidance associated with the use of these labels. If alternate labels are used, indicate in box above.
- If less than five (5) images taken during normal climate conditions are available, use an equal number of images taken during wet and dry climate conditions and use as many images as you have available. Describe the results using this methodology in your report.

[i] Use MN State Climatology website to determine climate condition when image was take

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Determination from Aerial Imagery – Recording Form

Project Name: Crow River Heights West **Date:** 9/29/2017 **County:** Wright

Investigator: A.Cameron **Legal Description (S, T, R):** S:34 T:120N R:24W

Use the Decision Matrix below to complete Table 1.

Hydric Soils present[1]	Identified on NWI or other wetland map[2]	Percent with wet signatures from Exhibit 1	Field verification required[3]	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<30%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<30%	No	No
No	Yes	>50%	No	Yes
No	Yes	30-50%	No	Yes
No	Yes	<30%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<30%	No	No

[1] The presence of hydric soils can be determined from the "Hydric Rating by Map Unit Feature" under "Land Classifications" from the Web Soil Survey. "Not Hydric" is the only category considered to not have hydric soils. Field sampling for the presence/absence of hydric soil indicators can be used in lieu of the hydric rating if appropriately documented by providing completed field data sheets.

[2] At minimum, the most updated NWI data available for the area must be reviewed for this step. Any and all other local or regional wetland maps that are publically available should be reviewed.

[3] Area should be reviewed in the field for the presence/absence of wetland hydrology indicators per the applicable 87 Manual Regional Supplement, including the D2 indicator (geomorphic position).

Table 1.

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present[1]	Wetland?
A	Yes	No	67	Yes	Yes

[1] Answer "N/A" if field verification is not required and was not conducted.

Offsite Hydrology Assessment Areas (1979 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1980 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1981 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1982 FSA Photo)

N

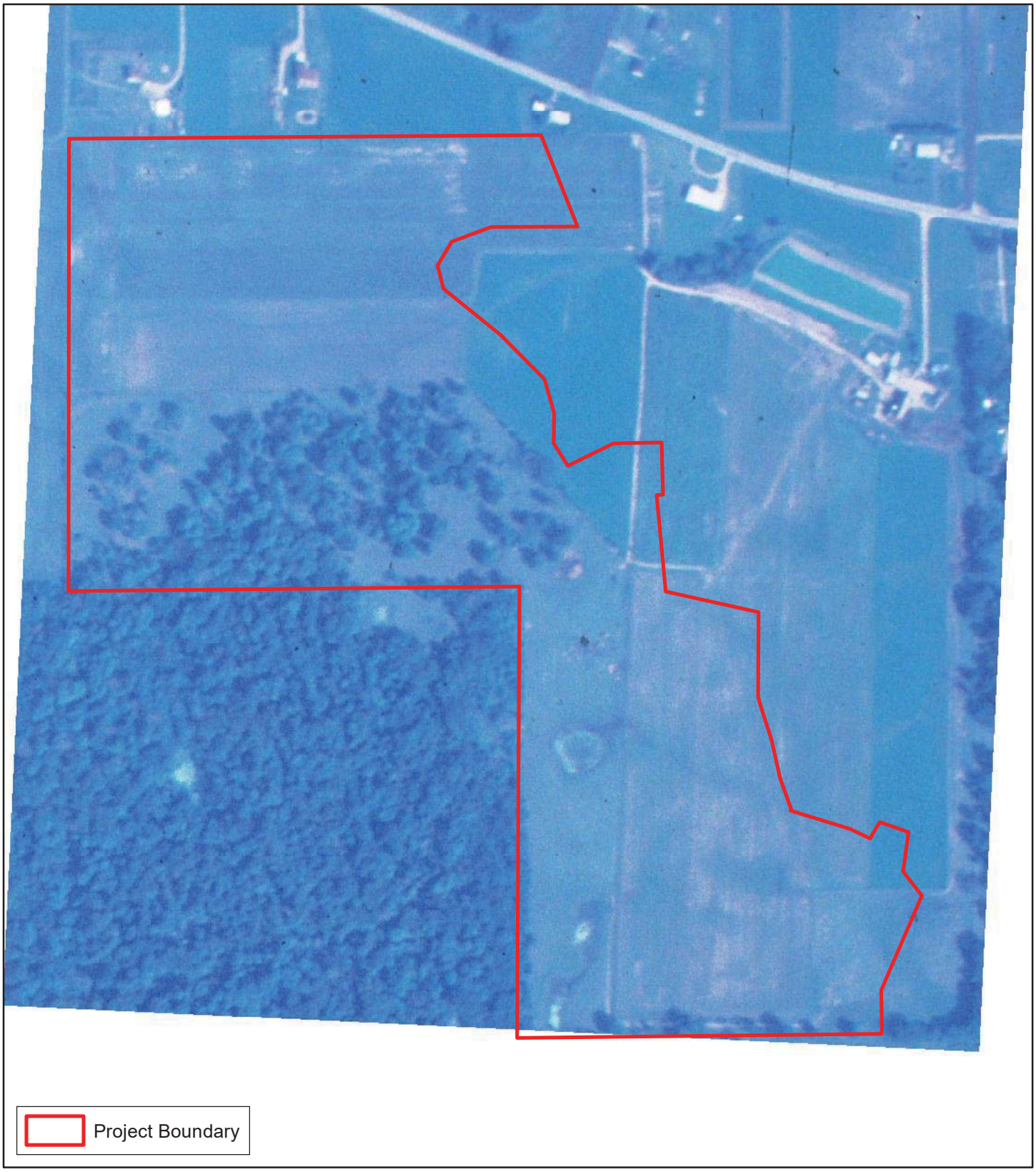
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (1983 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1984 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1985 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1986 FSA Photo)

N

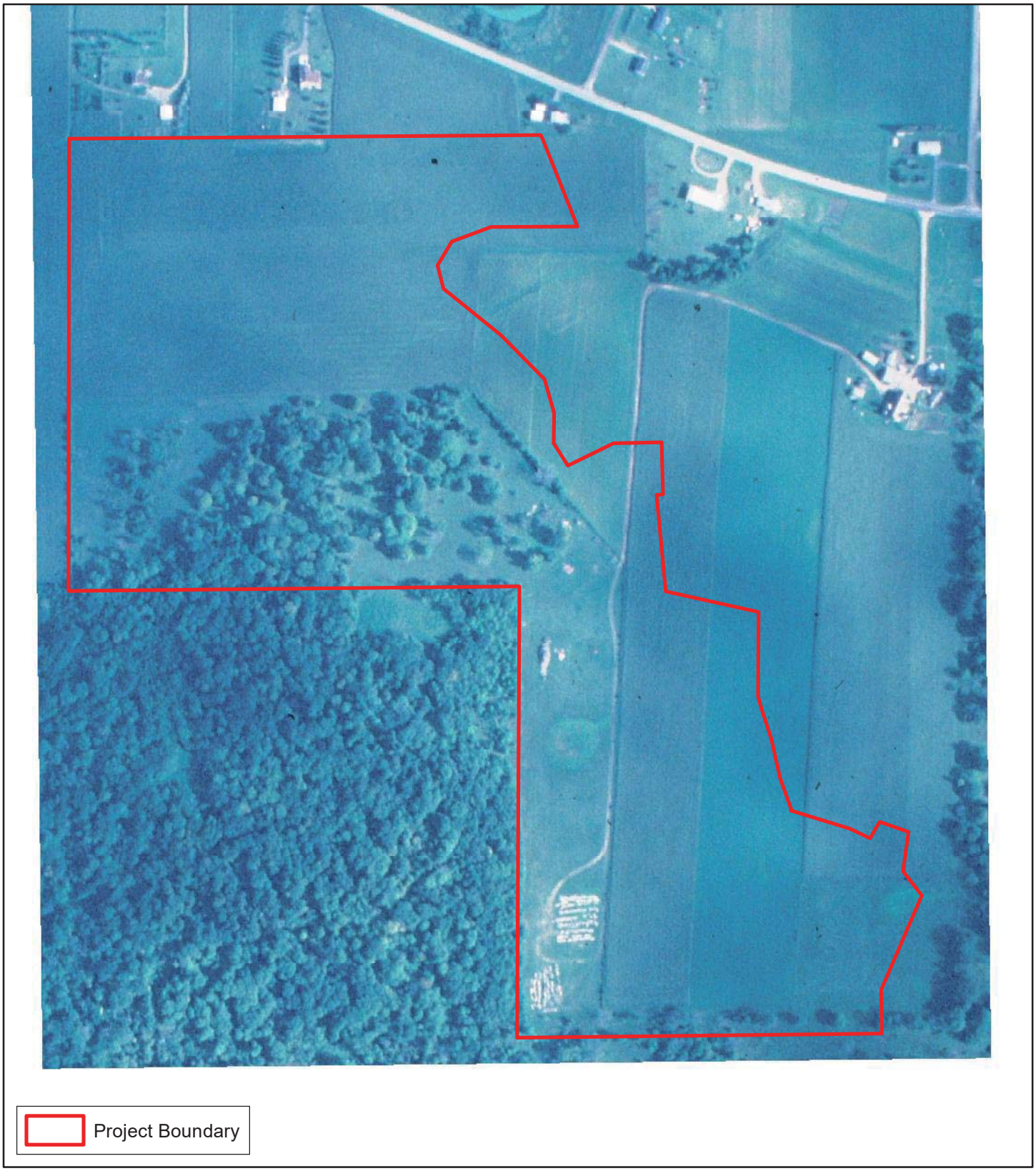
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (1987 FSA Photo)

N

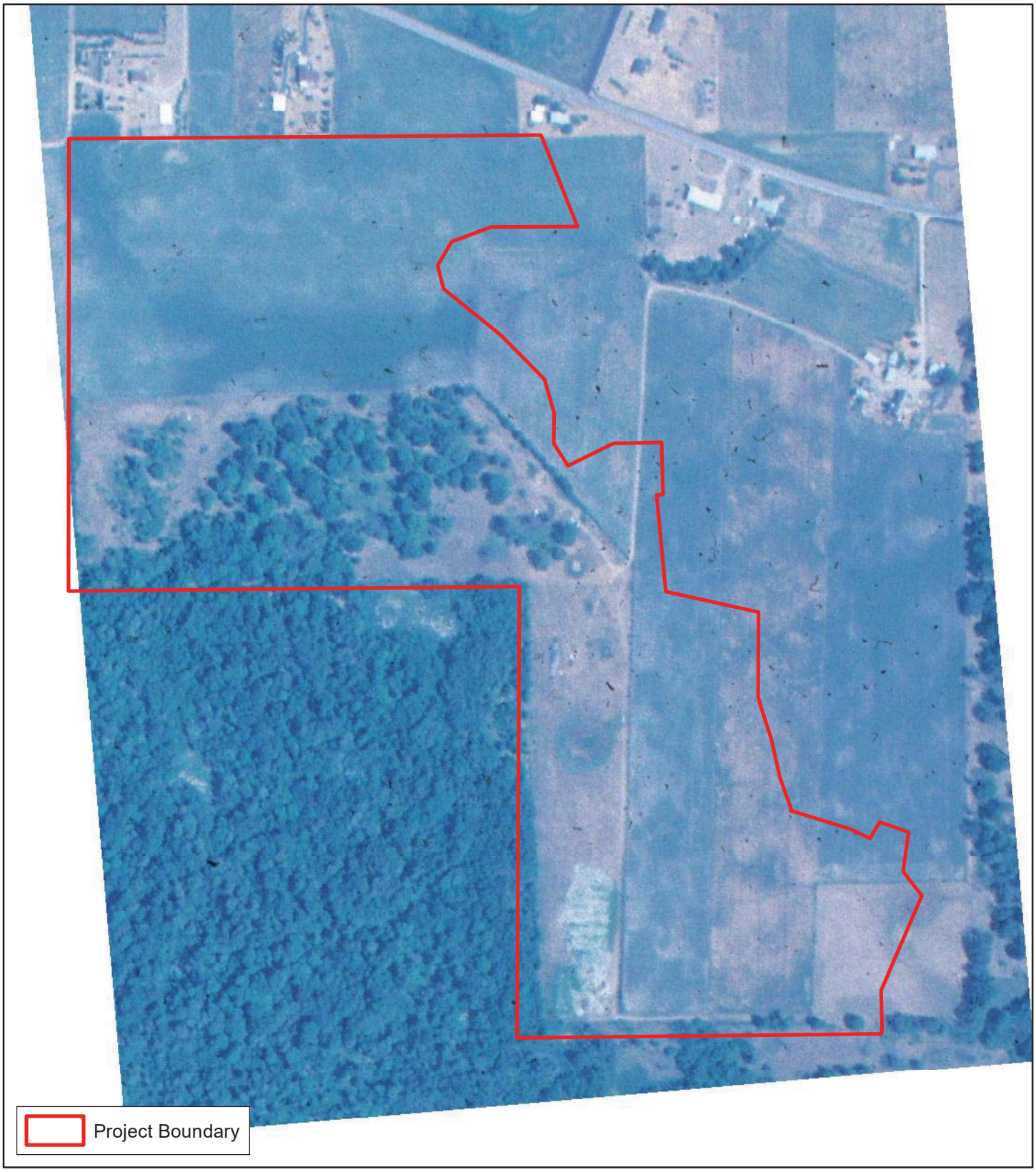
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (1988 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1989 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1990 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1991 FSA Photo)

N

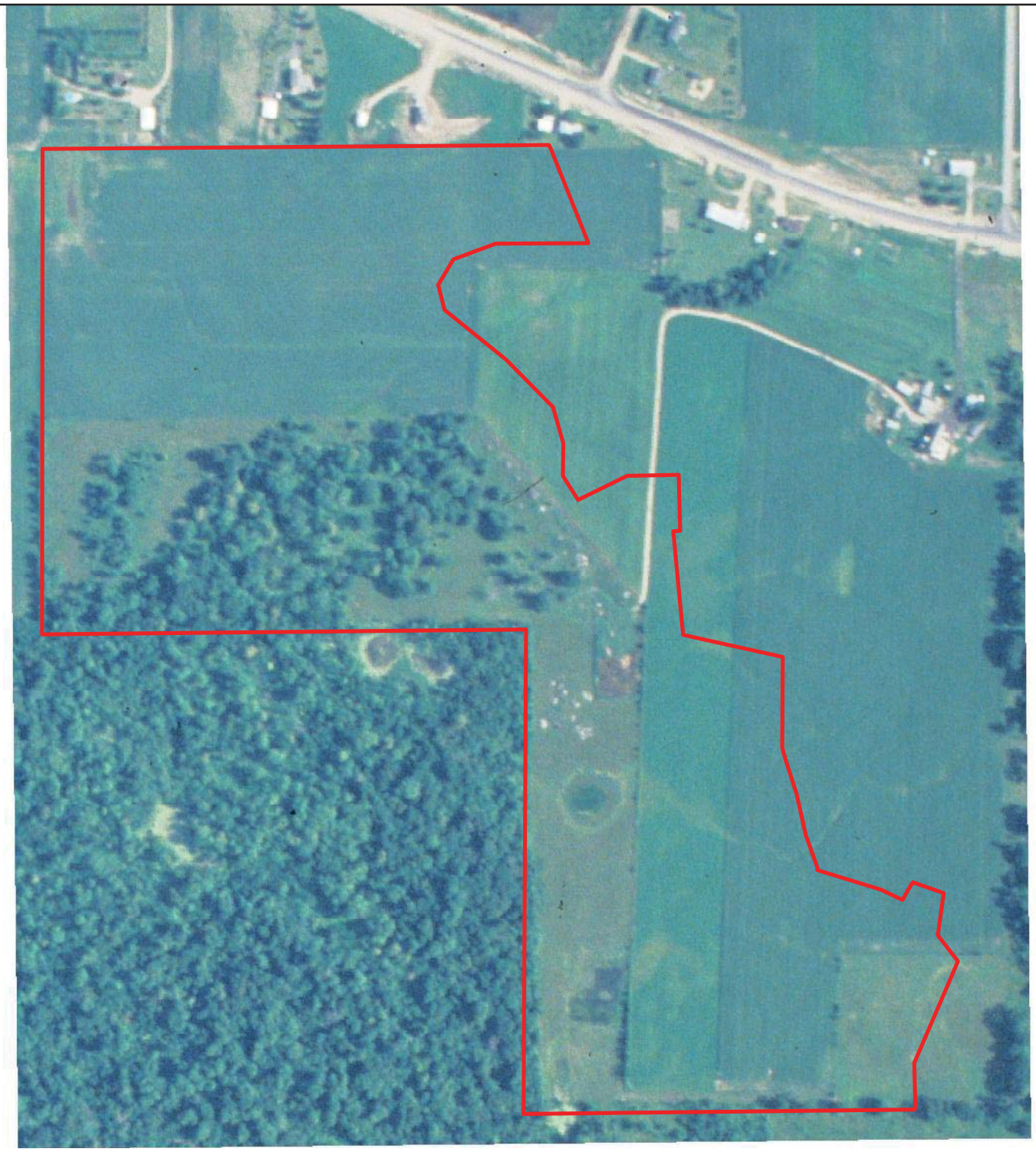
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (1992 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1993 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1994 FSA Photo)

N

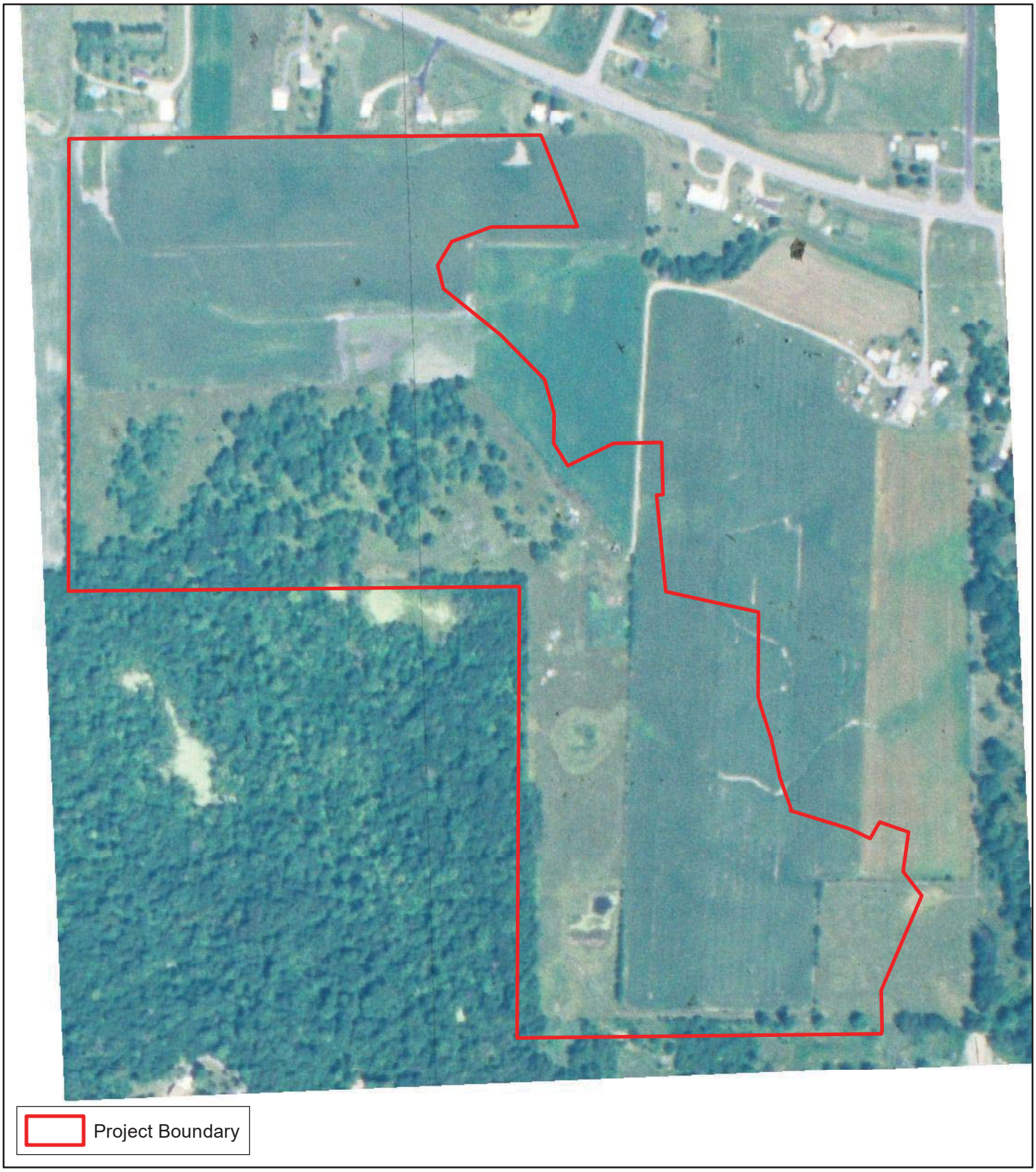
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (1995 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1996 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1997 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1998 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (1999 FSA Photo)

N

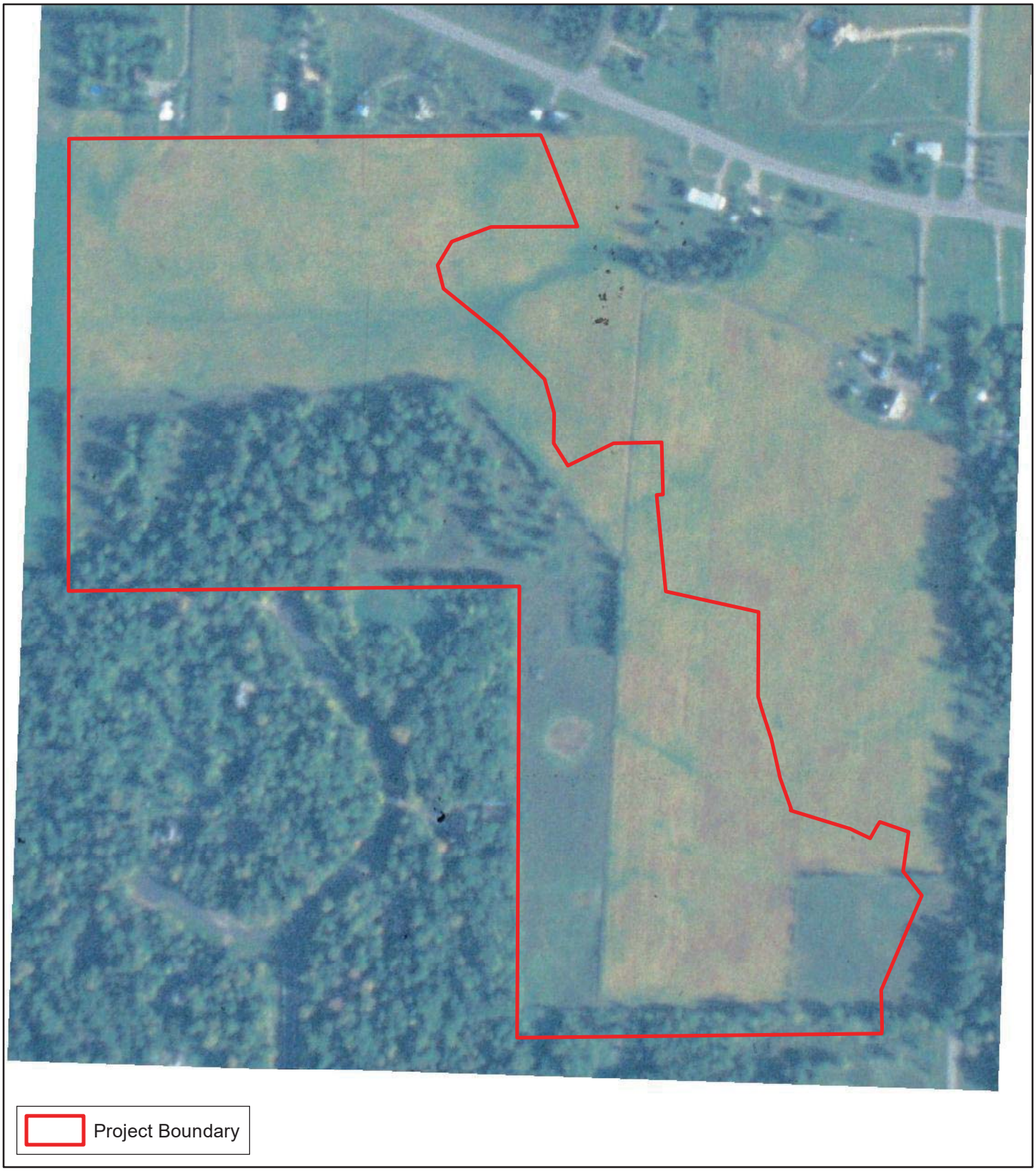
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (2000 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (2003 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (2006 FSA Photo)

N

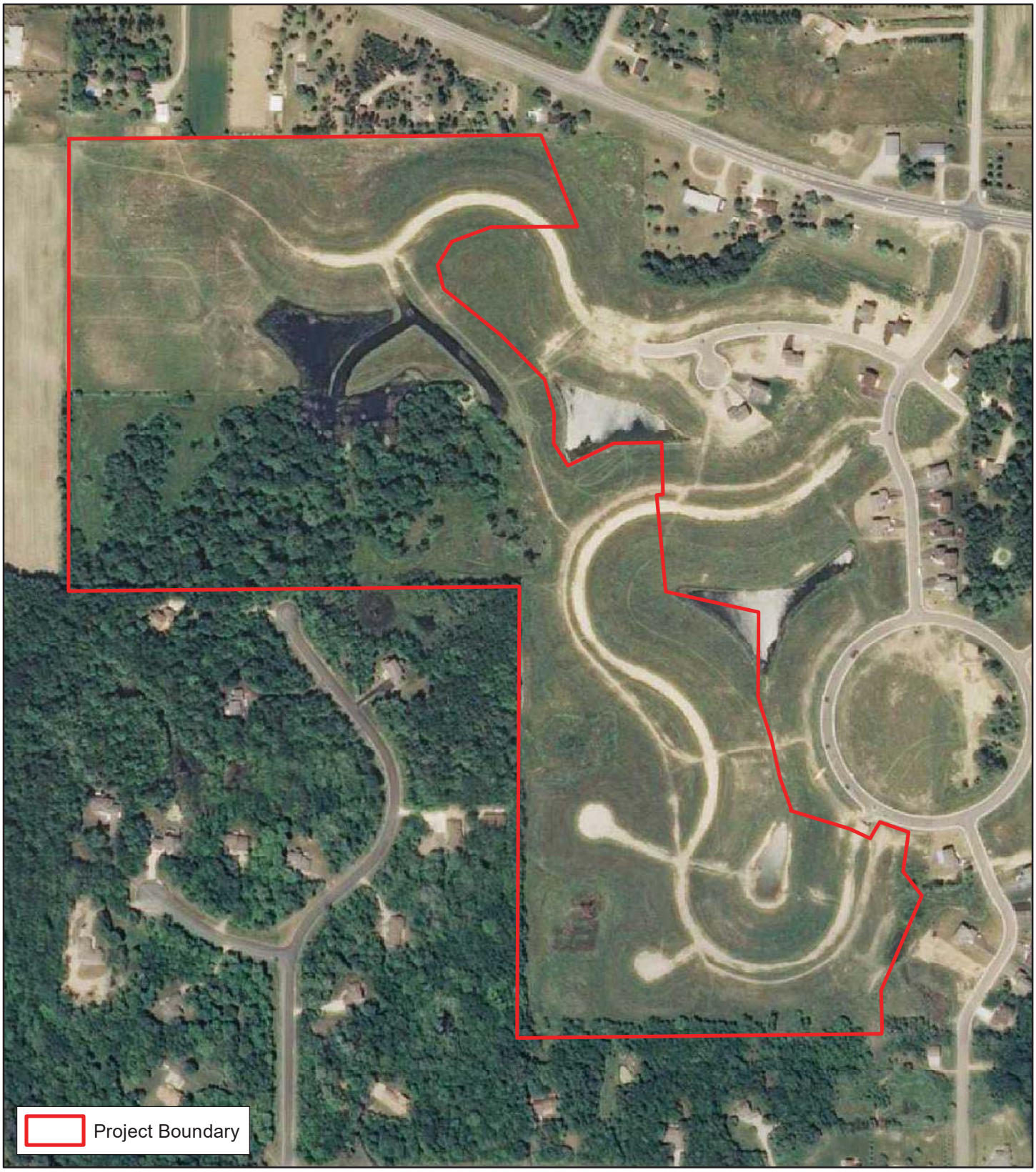
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (2008 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (2009 FSA Photo)

N

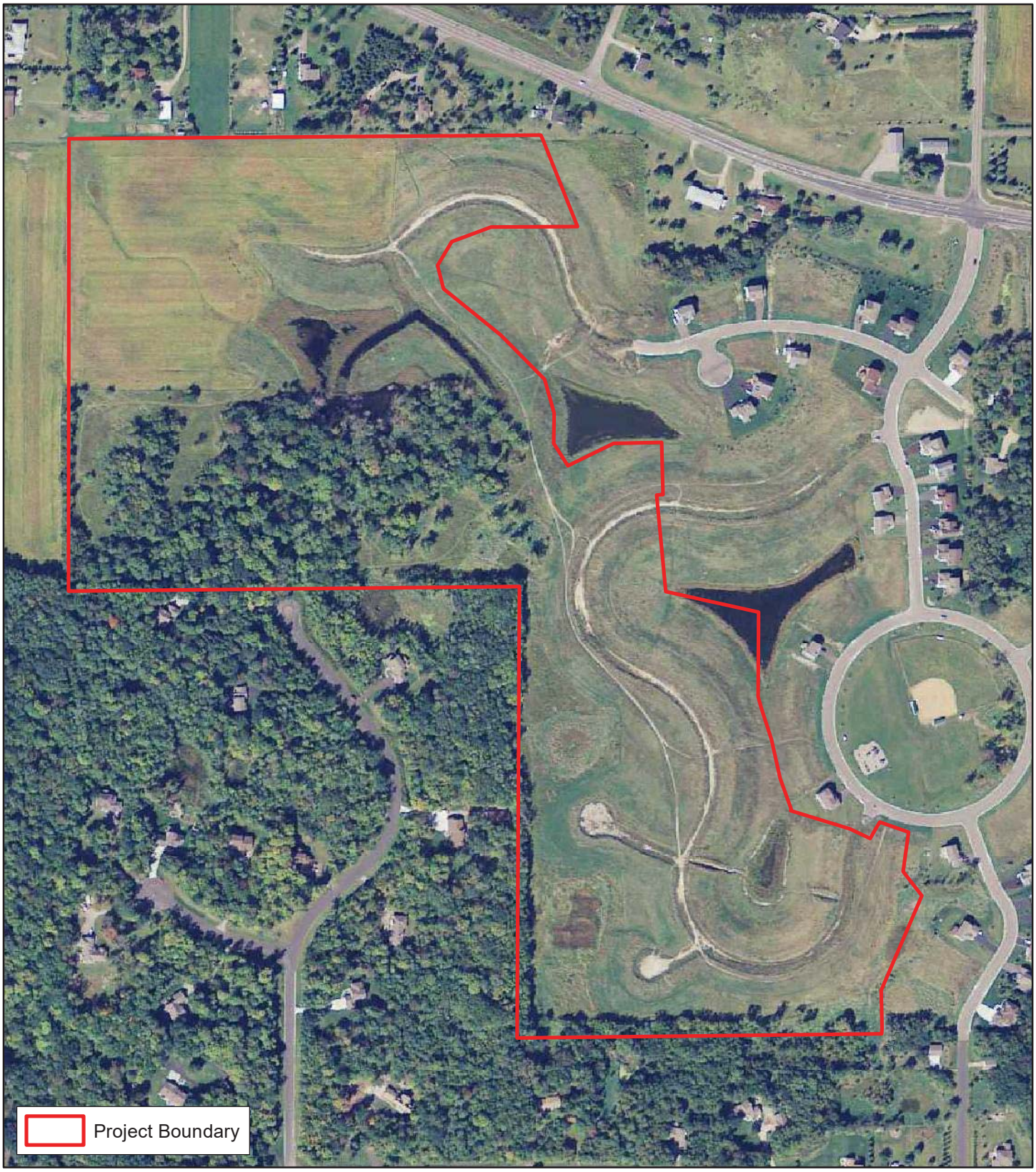
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (2010 FSA Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Offsite Hydrology Assessment Areas (2013 FSA Photo)

N

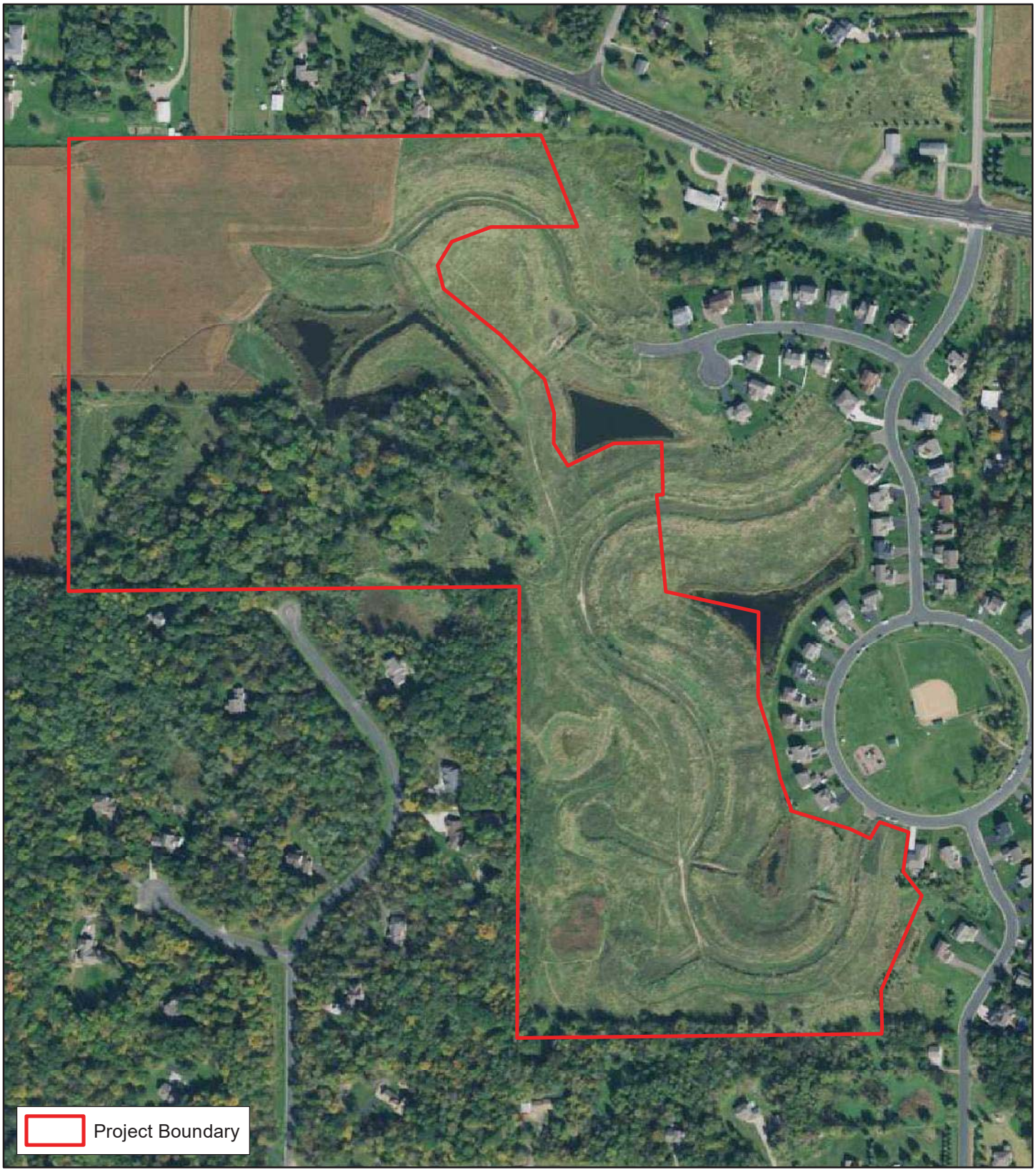
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (2015 FSA Photo)

N

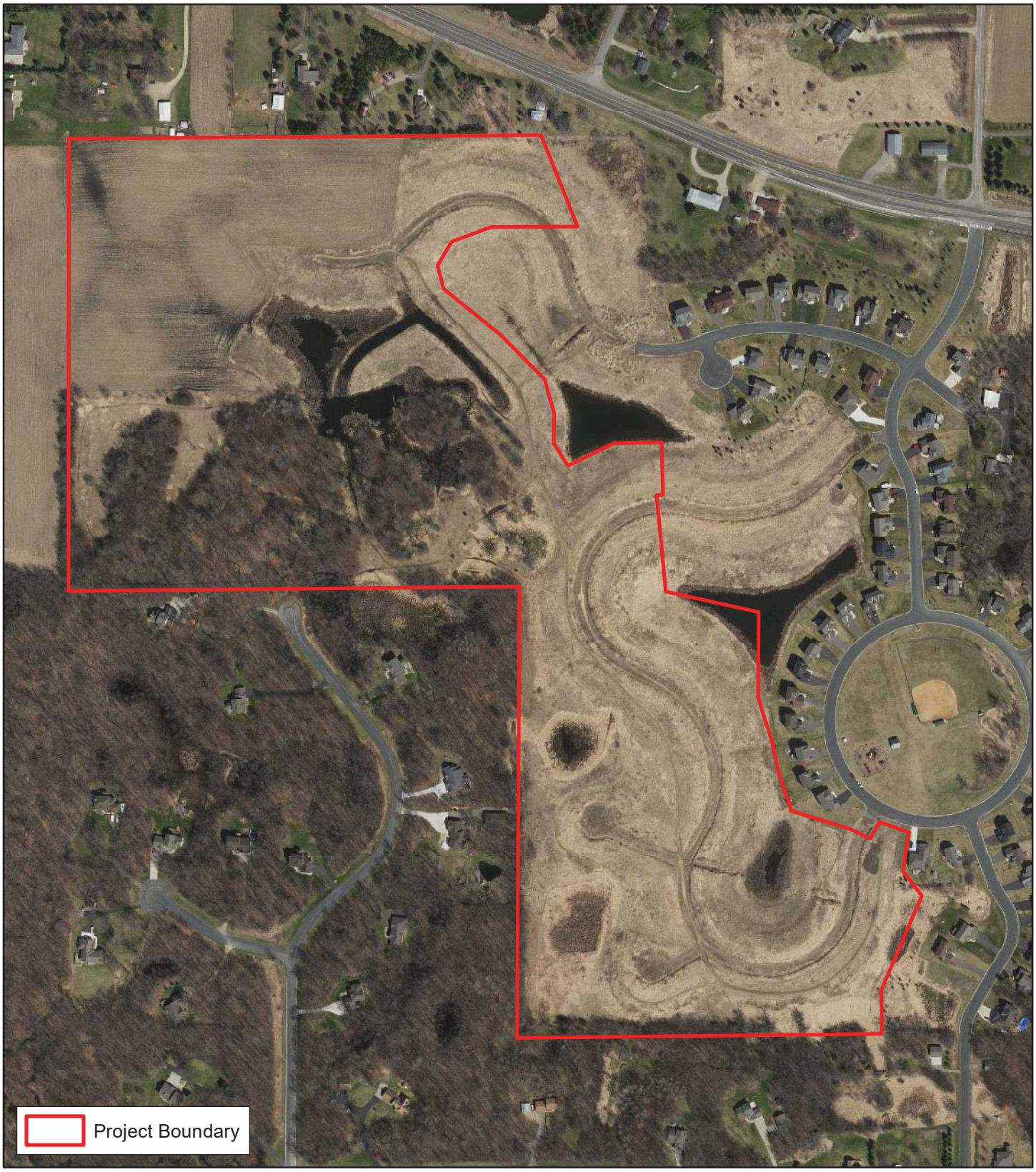
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Offsite Hydrology Assessment Areas (2016 MN GEO Photo)

N

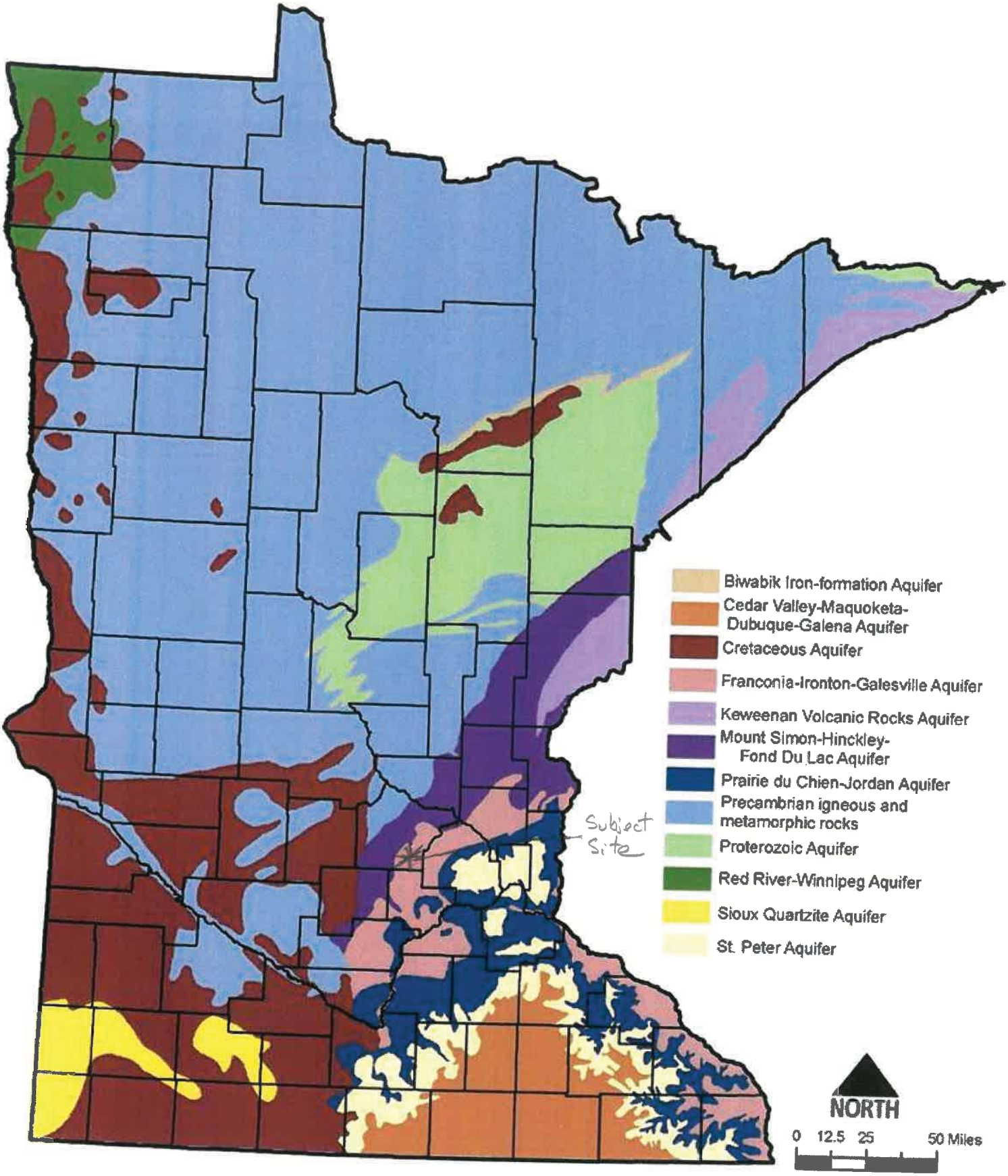
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Crow River Heights West (KES 2017-052)
Hanover, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



October, 2005

Sources: MGS (major aquifers from Minnesota's Bedrock Hydrogeology by Roman Kanivetsky, 1979; GIS data available at http://www.lmic.state.mn.us/chouse/metadata/hydqgeo.html), DNR (GIS data available at http://deli.dnr.state.mn.us/)

ATTACHMENT 11

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

March 30, 2018
Correspondence # ERDB 20180366

Mr. Tom Goodrum
Loucks Associates
7200 Hemlock Lane, Ste 300
Maple Grove, MN 55369

RE: Natural Heritage Review of the proposed West Crow River Heights,
T120N R24W Section 34; Wright County

Dear Mr. Goodrum,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, please visit the Rare Species Guide Website for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following rare features may be adversely affected by the proposed project:

- Blanding's turtles (*Emydoidea blandingii*), a state-listed threatened species, have been reported in the vicinity of the proposed project and may be encountered on site. Blanding's turtles use wetlands as well as upland areas up to and over a mile distant from wetlands. Uplands are used for nesting, basking, periods of dormancy, and traveling between wetlands. Factors believed to contribute to the decline of this species include collisions with vehicles, wetland drainage and degradation, and the development of upland habitat. Any added fatality can be detrimental to populations of Blanding's turtles, as these turtles have a low reproduction rate that depends upon a high survival rate to maintain population levels.

  This project has the potential to impact this rare turtle through direct fatalities or habitat disturbance/destruction due to dewatering, excavation, fill, or other construction activities associated with the project. Actions to avoid or minimize disturbance to this state-protected turtle may include, but are not limited to, the following recommendations:

  - Avoid Type 2 & 3 wetlands,
  - To avoid any incidental takings, avoid filling or dewatering wetlands during the winter,
  - Implement stringent sediment and erosion control methods,
  - Use wildlife-friendly erosion control methods (see enclosed fact sheet),

- Monitor for turtles during construction and report any sightings to the DNR,
- Refer to the first list of recommendations in the enclosed Blanding's Turtle Fact Sheet. If greater protection for turtles is desired, the second list of recommendations can be implemented as well. The fact sheet contains specific recommendations regarding roads, utilities, and landscaping that will pertain to this project.
- For specific recommendations pertaining to transportation projects, please refer to Curb Design and Small Animals, Preventing Entanglement, & Reducing Wildlife Vehicle Collisions in Chapter One of the Minnesota Department of Transportation's Best Practices Manual.
- If further assistance is needed, please contact the DNR Regional Nongame Specialist, Erica Hoaglund at 651-259-5772 or Erica.Hoaglund@state.mn.us.

The attached flyer should be given to all contractors working in the area. If Blanding's turtles are encountered on site, please remember that state law and rules prohibit the destruction of threatened or endangered species, except under certain prescribed conditions. If turtles are in imminent danger they must be moved by hand out of harm's way, otherwise they are to be left undisturbed.

- The Environmental Assessment Worksheet should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Sufficient information should be provided so the DNR can determine whether a takings permit will be needed for any of the above protected species.

- Please include a copy of this letter in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. If needed, please contact your DNR Regional Environmental Assessment Ecologist to determine whether there are other natural resource concerns associated with the proposed project. Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

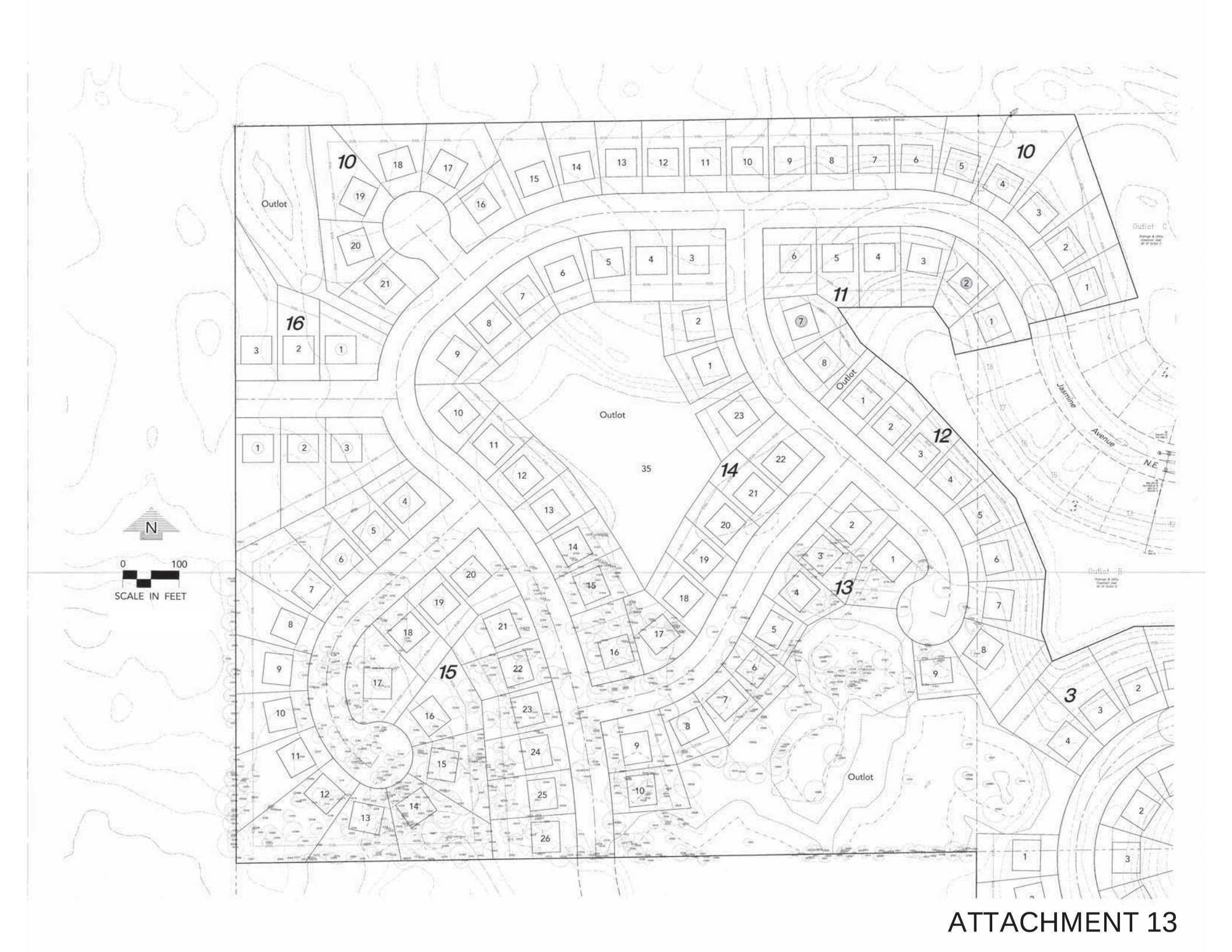
Sincerely,

Samantha Bump
Natural Heritage Review Specialist
Samantha.Bump@state.mn.us

Enc. Wildlife Friendly Erosion Control
Blanding's Turtle Fact Sheet & Flyer

Links: Rare Species Guide
http://www.dnr.state.mn.us/rsg/index.html
Chapter One of the Minnesota Department of Transportation's Best Practices Manual
http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html
DNR Regional Environmental Assessment Ecologist Contact Info
http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html

Cc: Becky Horton
Leslie Parris
Erica Hoaglund



ATTACHMENT 13

Tom Goodrum

From:	Jesse Kling <jesse.kling@mnhs.org>
Sent:	Wednesday, January 10, 2018 2:40 PM
To:	Data Requests to SHPO
Cc:	Todd McLouth; Tom Goodrum
Subject:	Re: database search for historic properties
Attachments:	WrightArchaeology.xls

THIS EMAIL IS NOT A PROJECT CLEARANCE

This information has recently been updated, please read the note below carefully.

This message simply reports the results of the cultural resources database search you requested. The database search produced results for only previously known archaeological sites and historic properties.

No historic structures were identified in a search of the Minnesota Archaeological Inventory and Historic and Architectural Inventory for the search area requested. **A report containing the archaeological sites identified is attached.**

The result of this database search provides a listing of recorded archaeological sites and historic/architectural properties that are included in the current MN SHPO databases. Because the majority of archaeological sites in the state and many historic/architectural properties have not been recorded, important sites or properties may exist within the search area and may be affected by development projects within that area. Additional research, including field survey, may be necessary to adequately assess the area's potential to contain historic properties.

Properties that are listed in the National Register of Historic Places (NRHP) or have been determined eligible for listing in the NRHP are indicated on the reports you have received. The following codes on the reports you received are:

NR – National Register listed. The properties may be individually listed or may be within the boundaries of a National Register District.

CEF – Considered Eligible Findings are made when a federal agency has recommended that a property is eligible for listing in the National Register and MN SHPO has accepted the recommendation for the purposes of the Review and Compliance Process. There properties need to be further assessed before they are officially listed in the National Register.

SEF – Staff eligible Findings are those properties the MN SHPO staff considers eligible for listing in the National Register, in circumstances other than the Review and Compliance process.

ATTACHMENT 14

DOE – Determination of Eligibility is made by the National Park Service and are those properties that are eligible for listing in the National Register, but have not been officially listed.

CNEF – Considered Not Eligible Findings are made during the course of a Review and Compliance process. For the purposes of the review a property is considered not eligible for listing in the National Register. These properties may need to be reassessed for eligibility under additional or alternate contexts.

Properties without **NR, CEF, SEF, DOE, or CNEF** designations in the reports you received may not have been evaluated and therefore no assumption to their eligibility can be made. Integrity and contexts change over time, therefore any eligibility determination made ten (10) or more years for the date of the current survey are considered out of date and the property will need to be reassessed.

If you require a comprehensive assessment of a project's potential to impact archaeological sites or historic/architectural properties, you may need to hire a qualified archaeologist and/or historian. If you need assistance with a project review, please contact Kelly Gragg-Johnson in Review and Compliance @ 651-259-3455 or by email at kelly.graggjohnson@mnhs.org.

The Minnesota SHPO Survey Manuals and Database Metadata can be found at http://www.mnhs.org/shpo/survey/inventories.htm

MN SHPO research hours are 8:30 AM – 4:00 PM Tuesday-Friday. Please call ahead at 651-59-3450 to ensure staff is available to assist you, if necessary.

The Office is closed on Mondays.

On Wednesday, January 10, 2018 at 2:19:27 PM UTC-6, Tom Goodrum wrote:

Jesse,

Leslie Coburn directed me to you to request an EAW database search for historic properties at a site in the city of Hanover, Wright County. The site is located at

- Township – 120N, Range – 24W, Section – 34 (NE)
- South of CSAH 34, west of CSAH 19 and north of the Crow River
- Also see attached site location map

The EAW is an update to a previously approved EAW in 1999 for a 112.5 acre site to be developed into 274 single family lots. The developer completed over 100 of the lots before 2007 when the project stopped. In 2017 a new developer decided to finish the project. The city allowed him to develop 30 of the remaining lots but is requesting an EAW update for the rest. We did receive DNR Natural Heritage letter (reference #990724) The project name is West Crow River Heights.

Please let me know if you need anything else and the timing of your response.

COUNTY	SITENUM	SITENAME	TOW	RAN	SEC	XQUARTERS	ACR	WORI	DESCRIPT	TRADIT	CONTE:	ReportNum	Nati	CEF	DOE
Wright	21WRav	Schirmers	120	24	34	NE-NW	0		LS						

CROW RIVER HEIGHTS WEST

RESIDENTIAL DEVELOPMENT

STS

Swing Traffic Solutions

TRAFFIC IMPACT STUDY

in

HANOVER, MN

February 19, 2018

ATTACHMENT 15

Crow River Heights West Residential Development

Hanover, MN

TRAFFIC IMPACT STUDY

PROJECT NO. 2017023

February 19, 2018

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 Professional Engineer under the laws of the State of Minnesota:

Vernon E. Swing, P.E.

Date: 2-19-2018 Lic. No.: 41417

TRAFFIC IMPACT STUDY

Crow River Heights West Residential Development

Hanover, MINNESOTA

February 19, 2018

Prepared For:

Backes Companies
11413 Ashbury Circle N.
Champlin, MN 55316

Prepared By:

Swing Traffic Solutions, LLC
4290 Norwood Lane North
Plymouth, MN 55442
612-968-4142

Project No. 2017023

TABLE OF CONTENTS

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TECHNICAL APPENDICES

(Available upon Request)

I. INTRODUCTION

Backes Companies proposes to complete development of the remaining approximately 75-acres of the larger site referred to as Crow River Heights West in Hanover, Minnesota as single family detached residential homes. The remaining project will consist of 166 units. For the purposes of this study, it is anticipated that construction will be complete, and the facilities fully occupied by 2025.

The remainder of Crow River Heights West is located to the south of Beebe Lake Road NE, and is generally west of Kadler Avenue NE. It is located approximately ½ mile north of River Road NE, and about ½ mile west of Kayla Lane. The site location is illustrated on Figure 1, "Vicinity Map".

Access to the site is proposed via Kadler Avenue NE from the north and via an extension of Kadler Avenue NE to the south as well as via an extension of Jandel Avenue NE to the south. The location of these accesses are illustrated on the Concept Site Plan, Figure 2.

The purpose of this study is to support to the EAW completed for the Crow River Heights West development, particularly to evaluate the impact of traffic generated by the proposed continued development of Crow River Heights West on the operations and safety of the adjacent roadway network. The study focuses on the roads and intersections that provide direct and indirect access into the site. This study details the existing and future roadway conditions at studied intersections and includes traffic volumes, lane geometrics and traffic operational analysis results. Recommendations regarding roadway improvements to accommodate the anticipated growth in background traffic are included as necessary.

PROJECT LOCATION
CROW RIVER HEIGHTS WEST
HANOVER, MN
VICINITY MAP
FIGURE 1
STS
Swing Traffic Solutions
Hanover
St Michael
Greenfield
Crow-Hassan Park Reserve
Bertram Mill
Mary Schmidt Crawford Woods Scientific
Jack Orchards
Google

Beebe Lake Rd NE
(CSAH 34)
City of Hanover
Kadler Ave NE
4TH St NE
CROW RIVER HEIGHTS WEST
HANOVER, MN
SITE MAP
FIGURE 2
STS
Swing Traffic Solutions

I. Existing Conditions

A. Data Collection

The existing conditions of the nearby roadway system were documented by a field inventory conducted during the week of January 22, 2018. The purpose was to identify features that affect roadway capacity, including traffic control, sight distances, turn lanes, speed limits, etc. In addition, turning movement traffic counts were conducted revealing the AM Peak hour occurs at 6:45 – 7:45 AM and the PM Peak hour at 4:00 – 5:00 PM at the following intersections:

- Beebe Lake Road NE and Kadler Avenue NE
- Beebe Lake Road NE and Kayla Lane
- Beebe Lake Road NE and Labeaux Avenue NE
- Labeaux Avenue NE and River Road NE
- River Road NE and Division Street E

Figure 3 illustrates the existing AM and PM Peak hour turning movement counts. Also, the average daily traffic volume for Beebe Lake Road NE, River Road NE, and Labeaux Avenue NE has been collected and published by MnDOT as 4,700 vehicles per day, 3,450 vehicles per day, and 11,600 vehicles per day, respectively.

B. Roadway Descriptions

The existing geometrics of the Study Area Roadway Network have been document based on a field review. The discussion that follows details specific items such as lane and shoulder layout, roadway classifications, and turn lane storage lengths.

- **Beebe Lake Road NE,** which runs east/west along the northern border of the site, is a County

State Aid Highway (CSAH 34) and is functionally classified as a Major Collector. It provides direct access to the site at Kadler Avenue NE and indirectly at Kayla Lane. In the study area, Beebe Lake Road NE is a two-lane undivided facility including right and left turn lanes at critical intersections. It has a rural cross-section and is a 55-mph speed limit facility.

- **Lebeaux Avenue NE,** which runs north south in the study area is a County State Aid Highway (CSAH 19) and is classified as a B Minor Arterial. It has an undivided three-lane footprint with a rural cross-section beginning at Beebe Lake Road NE and continuing to the south to just north of 5th Street NE. From north of 5th Street NE the cross-section changes to an urban 3-lane cross-section which continues to the south across the Crow River Bridge. There are left and right turn lanes at critical intersections. It is signed for 30 mph through the heart of town. Labeaux Avenue NE provides access to the region and indirect access to the site via its intersections with Beebe Lake Road NE and River Road NE.

- **River Road NE,** which runs east west in the study area is a County State Aid Highway (CSAH 20) and is classified as a Major Collector. It has an undivided two-lane footprint with a rural cross-section and is signed for 30 mph from its intersection with Labeaux Avenue NE to approximately ½ mile east of Division Street E then changes to 55 mph. It provides indirect access to the site via its intersection with Division Street E. (See Figure 2).

- **Kadler Avenue NE and Kayla Lane,** run north south and are local streets that provide direct access to site. They are two lane roads with undivided urban cross-sections and are 30 mph facilities.

- **Division Street E and Jandel Avenue NE,** are local streets expected to provide access to the site from the south via the intersection of Division Street E with River Road NE, and the intersections of Division Street E with Kadler Avenue NE and Jandel Avenue NE.

CROW RIVER HEIGHTS WEST
HANOVER, MN
EXISTING PEAK HOUR VOLUMES
FIGURE 3
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
Labeaux Ave NE
(CSAH 19)
(CSAH 20)
(CSAH 34)
River Rd NE
Division St E
Kadler Ave NE
Beebe Lake Rd NE
Kayla Ln

C. Intersection Descriptions

- **Kadler Avenue NE and Beebe Lake Road NE,** form a four-legged unsignalized intersection north of the site. All Kadler Avenue NE approaches are two lanes, one lane entering and one lane exiting the intersection and are stop controlled. The Beebe Lake Road NE approaches are free flowing and include left and right turn lanes.

- **Kayla Lane and Beebe Lake Road NE** form a three-legged unsignalized intersection north and east of the site. The Kayla Lane approach is stop controlled and has two lanes, one lane entering and one lane exiting the intersection. The Beebe Lake Road NE approaches are free flowing, and the eastbound approach provides a through lane and a right turn lane, while the westbound approach includes a through lane and left turn by-pass lane.

- **Beebe Lake Road NE and Labeaux Avenue NE** form a three-legged signalized intersection east of the site. All approaches are three lanes, two lanes entering and one lane exiting the intersection. The Beebe Lake Road NE approach includes a left turn and a right turn lane. The northbound Labeaux Avenue NE approach includes a left turn lane and a through lane, while the southbound approach includes a right turn lane and a through lane.

- **Labeaux Avenue NE and River Road NE** form a four-legged, signalized intersection southeast of the site. The west approach includes a dedicated left turn lane, and a shared through/right lane entering the intersection and one lane leaving the intersection. The south and east approaches are the same. The north approach to the intersection includes a dedicated right turn and a dedicated left turn lane and one through lane entering the intersection, and one lane exiting the intersection.

- **River Road NE and Division Street E** form a three-legged unsignalized intersection south of the site. The Division Street E approach is stop controlled and has two lanes, one lane entering and one lane exiting the intersection. The River Road NE approaches are free flowing, and the westbound approach provides a through lane and a right turn lane, while the eastbound approach includes a through lane and left turn by-pass lane.

III. NO-BUILD ALTERNATIVE

To address the impacts of a development on the surrounding roadway system, it is necessary to predict the traffic that would be present on the roadway system at the time (the design year) of completion of the proposed development, without the inclusion of the proposed development. This is considered the No-Build scenario, and serves as a basis with which to compare Build scenarios. In this study two design years were analyzed 2025, the year after the development is fully built and occupied, and 2040, the current planning year horizon.

A. Background Growth

Review of the original EAW completed for Crow River Heights, the latest City of Hanover Comprehensive Transportation Plan, and historical traffic counts results in differing estimates of future conditions. The traffic growth rates utilized in the original EAW, completed in 1999, suggest traffic over the twenty-year time horizon would grow at an annual rate of 1.6 percent per year. The City of Hanover Comprehensive Transportation Plan completed in 2006 suggested traffic counts would grow at an annual rate of 6.5 percent per year. Review of historical counts from MnDOT indicate traffic has actually grown at 1.67 percent per year from 1998 to 2016. Swing Traffic Solutions utilized an annual rate of 2 percent per year to predict and model the 2025 and 2040 no build conditions to ensure a conservative estimate. Figures 4 and 5 reflects the estimated future background volumes for the 2025 and 2040 design years.

B. Anticipated Improvements for No-Build Conditions

The 2006 Hanover Comprehensive Transportation Plan identified road improvements that would be required to manage the anticipated growth in traffic. At this time no improvements are expected to occur to study area intersections or roadways prior to 2025.

C. Results of Analysis

The study area intersections identified in Section II were analyzed for the 2025 and 2040 No-Build scenarios. Complete discussion of the results of these analyses is provided in Section IV, where a comparison with corresponding design year Build alternatives are made.

CROW RIVER HEIGHTS WEST 2025 NO BUILD AM & PM PEAK HOUR TRAFFIC
HANOVER, MN
FIGURE 4
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
(CSAH 19)
Labeaux Ave NE
(CSAH 34)
(CSAH 20)
Kayla Ln
Beebe Lake Rd NE
Kadler Ave NE
River Rd NE
Division St E

CROW RIVER HEIGHTS WEST 2040 NO BUILD AM & PM PEAK HOUR TRAFFIC
HANOVER, MN
FIGURE 5
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
(CSAH 19)
Labeaux Ave NE
(CSAH 20)
River Rd NE
(CSAH 34)
Beebe Lake Rd NE
Kayla Ln
Kadler Ave NE
Division St E

IV. BUILD ALTERNATIVE

A. Site-Generated Traffic

The number of vehicle trips generated by the remaining 166 units to be developed as part of the Crow River Heights West residential development were estimated for the weekday daily, and AM and PM traffic peak hours using the data and methodologies contained in the 10th Edition of Trip Generation, published by the Institute of Transportation Engineers (ITE). Table 1 summarizes the trip generation estimates.

Table 1
Trip Generation

Land Use	AM Peak Hour		PM Peak Hour		Daily Trips
	Enter	Exit	Enter	Exit	
Single Family Homes (166 Homes)	31 Trips	92 Trips	104 Trips	61 Trips	1,567 Trips
TOTAL	**123 Trips**		**165 Trips**		**1,567 Trips**

1. Per the data and methodologies in Trip Generation, 10th Edition, published by ITE.

B. Trip Distribution and Assignment

The distribution of site-generated traffic from and to the adjacent street system was based on existing traffic patterns. Figure 6, titled "Trip Distribution," depicts the distribution of the estimated site-generated traffic entering and exiting the study area roadway network. Traffic was assigned to the roadway network on the route that would minimize travel time. Figure 7, titled "Trip Assignment," illustrates the estimated changes in traffic volume on the study area roadways associated with the proposed redevelopment.

CROW RIVER HEIGHTS WEST
HANOVER, MN
TRIP DISTRIBUTION
FIGURE 6
STS
Swing Traffic Solutions
City of Hanover
Labeaux Ave NE
(CSAH 19)
(CSAH 34)
(CSAH 20)
River Rd NE
Kayla Ln
Beebe Lake Rd NE
Kadler Ave NE
Division St E
15%
20%
5%
60%

TRIP ASSIGNMENT
FIGURE 7
CROW RIVER HEIGHTS WEST
HANOVER, MN
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
Labeaux Ave NE
(CSAH 19)
(CSAH 34)
(CSAH 20)
Beebe Lake Rd NE
Kayla Ln
Kadler Ave NE
River Rd NE
Division St E

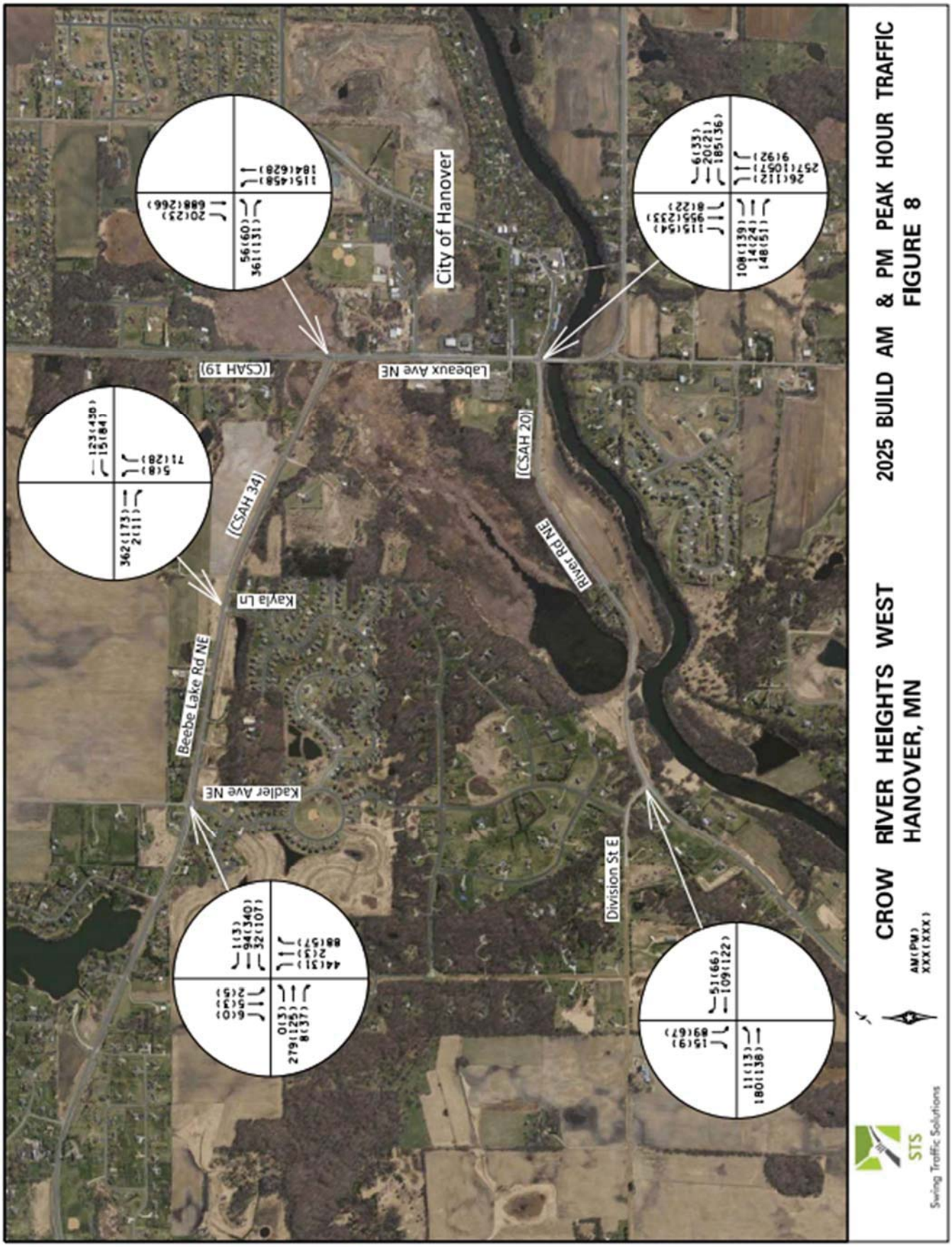
C. Build Traffic Volumes

When combined, the site-generated traffic volumes and No-Build scenario traffic volumes result in the Build scenario traffic volumes, shown on Figures 8 and 9 for the 2025 and 2040 design years, respectively.

D. Intersection Operational Analysis Description

The operating conditions of transportation facilities, such as roadways, traffic signals and stop-controlled intersections, are evaluated based on the relationship of the theoretical capacity of a facility to the actual traffic volume on that facility. Various factors affect capacity including travel speed, roadway geometry, grade, number of travel lanes, and intersection control. The current standards for evaluating capacity and operating conditions are contained in the 6th Edition of Highway Capacity Manual, published by the Transportation Research Board. The procedures describe operating conditions in terms of driver delay represented as a Level of Service (LOS). Operations are given letter designations with "A" representing the best operating conditions and "F" representing the worst. Generally, level of service “D” represents the threshold for acceptable overall intersection operating conditions during a peak hour.

A final fundamental component of operational analyses is a study of vehicular queuing, or the line of vehicles waiting to pass through an intersection. An intersection can operate with an acceptable Level of Service, but if queues from the intersection extend back to block entrances to turn lanes or accesses to adjacent land uses, unsafe operating conditions could result. In this report, the Industry Design Standard 95th percentile queue length is used. The 95th Percentile Queue Length refers to that length of vehicle queue that has only a five-percent probability of occurring during an analysis hour.


CROW RIVER HEIGHTS WEST
HANOVER, MN
2025 BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 8
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
Labeaux Ave NE
(CSAH 19)
(CSAH 34)
(CSAH 20)
Beebe Lake Rd NE
Kayla Ln
Kadler Ave NE
River Rd NE
Division St E

CROW RIVER HEIGHTS WEST
HANOVER, MN
2040 BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 9
AM(PM)
XXX(XXX)
STS
Swing Traffic Solutions
City of Hanover
Labeaux Ave NE
(CSAH 19)
(CSAH 34)
(CSAH 20)
Beebe Lake Rd NE
Kadler Ave NE
Kayla Ln
River Rd NE
Division St E

E. Results of Analysis

This section contains the results of the intersection operational analyses and provides recommendations, as necessary to mitigate the impacts. Table 2 and Table 3 summarize the results of the operational analyses for the 2025 No Build and Build scenarios, respectively.

Table 2
2025 No-Build Operations

Intersection	Overall LOS		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Kadler Ave NE and Beebe Lake Rd NE	a (b nb)	a (b sb)	NB Q is 45 ft in AM
Kayla Ln and Beebe Lake Rd NE	a (b nb)	a (b nb)	NB Q is 61 ft in AM
Labeaux Ave NE and Beebe Lake Rd NE	B (C eb)	A (C eb)	SB Q is 397 ft in AM
Labeaux Ave NE and River Rd NE	C (D wb)	C (D eb)	SB Q is 912 ft in AM; NB Q is 785 ft in PM
River Rd NE and Division St E	a (b sb)	a (b sb)	SB Q is 55 ft in AM

1. Overall Level of Service reported from Synchro 10, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 2 indicate all intersections are expected to operate at acceptable overall LOS in 2025 without the proposed project. That said, the southbound movement at the intersection of Labeaux Avenue NE and River Road NE will be operating with long vehicle queues during the AM peak traffic hour, and similarly the northbound movement will be operating with long queues during the PM peak traffic hour. Review of the SimTraffic simulation suggests these queues are managed during each signal cycle, however, this is indicative that additional capacity should be considered for north and southbound traffic on Labeaux. This intersection should be monitored over the coming years as traffic volumes increase for potential improvements such as the installation of an additional through lane in each direction from Beebe Lake Rd to the south across the Crow River Bridge.

The 2025 Build analysis includes traffic from the proposed development. Table 3 contains a summary of the analysis results.

Table 3
2025 Build Operations

Intersection	Overall LOS		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Kadler Ave NE and Beebe Lake Rd NE	a (b nb)	a (c sb)	NB Q is 61 ft in AM
Kayla Ln and Beebe Lake Rd NE	a (b nb)	a (b nb)	NB Q is 59 ft in AM
Labeaux Ave NE and Beebe Lake Rd NE	B (C eb)	A (C eb)	SB Q is 400 ft in AM
Labeaux Ave NE and River Rd NE	C (D wb)	C (D eb)	SB Q is 940 ft in AM; NB Q is 780 ft in PM
River Rd NE and Division St E	a (b sb)	a (b sb)	SB Q is 74 ft in AM

3. Overall Level of Service reported from Synchro 10, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection.
4. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

Again, the results shown in Table 3 indicate all intersections are expected to operate at acceptable overall LOS in 2025 with the proposed project. In particular, the intersections providing access to the site are expected to operate at LOS A with all approaches at LOS B or better with short vehicle queues, which suggests the drivers at these intersections will experience very little delay and is indicative of appropriate access for the site. Again, the southbound movement at the intersection of Labeaux Avenue NE and River Road NE will be operating with long vehicle queues during the AM peak traffic hour, and similarly the northbound movement will be operating with long vehicle queues during the PM peak traffic hour. This intersection should be monitored over the coming years as traffic volumes increase for potential improvements.

F. 2040 Operations

The long-range planning horizon year is 2040, as mentioned in the No-Build section. The results of the analysis of the 2040 No-Build traffic conditions, which continue to reflect a 2 percent annual growth rate are summarized in Table 4.

Table 4
2040 No-Build Operations

Intersection	Overall LOS		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Kadler Ave NE and Beebe Lake Rd NE	a (b nb)	a (c sb)	NB Q is 62 ft in AM
Kayla Ln and Beebe Lake Rd NE	a (b nb)	a (b nb)	NB Q is 61 ft in AM
Labeaux Ave NE and Beebe Lake Rd NE	C (D eb)	A (C eb)	EB Q in the AM is 1,669 ft, and SB Q is 1,167 ft in AM
Labeaux Ave NE and River Rd NE	D (F wb)	E (E eb)	SB Q is 2,892 ft in AM; NB Q is 1,898 ft in PM
River Rd NE and Division St E	a (b sb)	a (b sb)	SB Q is 79 ft in PM

5. Overall Level of Service reported from Synchro 10, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection
6. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 4 indicate some of the approaches to the intersection of Labeaux Avenue NE and River Road NE are at or over capacity during the 2040 AM and PM peak hours. Further, the intersections of Beebe Lake Road NE and River Road NE with Labeaux Avenue NE will experience very long vehicle queues that are not able to clear during each signal cycle. It is suggested that Labeaux Avenue NE be improved to provide an additional through lane in each direction beginning just to the north of the intersection with Beebe Lake Road and continuing to the south beyond the Crow River bridge, with left turn lanes at critical intersections. Figure 10 conceptually illustrates potential improvements.

It is assumed that capacity improvements will occur between now and 2040 that will result in improved operations. Traffic operations have been tested for the suggested improvements, and the results for the mitigated 2040 No-Build conditions are summarized in Table 5.

PROPESED CONDITION
Labeaux Ave NE
Beebe Lake Rd NE
(CSAH 34)
Labeaux Ave NE
Labeaux Ave NE
River Rd NE
(CSAH 20)
CURRENT CONDITION
Labeaux Ave NE
Beebe Lake Rd NE
(CSAH 34)
Labeaux Ave NE
Labeaux Ave NE
River Rd NE
(CSAH 20)
CROW RIVER HEIGHTS WEST
HANOVER, MN
AM (PM)
XXX (XXX)
STS
Swing Traffic Solutions
PROPOSED IMPROVEMENTS
FIGURE 10

Table 5
2040 Mitigated No-Build Operations

Intersection	Overall LOS		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Kadler Ave NE and Beebe Lake Rd NE	a (b nb)	a (c sb)	NB Q is 62 ft in AM
Kayla Ln and Beebe Lake Rd NE	a (b nb)	a (b nb)	NB Q is 57 ft in AM
Labeaux Ave NE and Beebe Lake Rd NE	B (C eb)	A (C eb)	NB Q is 313 ft in PM
Labeaux Ave NE and River Rd NE	C (D wb)	B (D eb)	SB Q is 429 ft in AM; NB Q is 332 ft in PM
River Rd NE and Division St E	a (b sb)	a (b sb)	SB Q is 69 ft in AM

7. Overall Level of Service reported from Synchro 10, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection.
8. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 5 indicate all intersections are expected to operate at acceptable overall LOS in the Mitigated 2040 No-Build scenario. It is noted, the 95th percentile queues at all intersection are shorter than the 2025 No-Build scenario and dissipate during each traffic signal cycle.

The analyses of the 2040 Build conditions assume capacity improvements have been made along Labeaux Avenue NE as reflected in the Mitigated 2040 No-Build scenario. Table 6 summarizes the results of the 2040 Build analysis.

Table 6
2040 Build Operations

Intersection	Overall LOS		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Kadler Ave NE and Beebe Lake Rd NE	a (c nb)	a (c sb)	NB Q is 72 ft in AM
Kayla Ln and Beebe Lake Rd NE	a (b nb)	a (b nb)	NB Q is 53 ft in AM
Labeaux Ave NE and Beebe Lake Rd NE	B (C eb)	A (C eb)	NBL Q is 334 ft in PM
Labeaux Ave NE and River Rd NE	C (D wb)	B (D eb)	SB Q is 435 ft in AM; NB Q is 382 ft in PM
River Rd NE and Division St E	a (b sb)	a (b sb)	SB Q is 73 ft in AM

9. Overall Level of Service reported from Synchro 10, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection.
10. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

Again, the results shown in Table 6 indicate all intersections are expected to operate at acceptable overall LOS in the Build 2040 scenario, with manageable queues.

V. SUMMARY AND SUGGESTIONS

The preceding analysis has evaluated the potential traffic impacts of the proposed completion of the Crow River Heights West development as residential units, on the operations of the study area intersections. The site is located along the south side of Beebe Lake Road generally west of Kadler Avenue NE in the City of Hanover, Minnesota.

Two design years were considered in this study, 2025 to correspond to the year after build out and 2040 to remain consistent with the long range planning horizon. For both design years a No-Build and Build scenario, was analyzed and compared to assess the development's impact, and the area's future infrastructure needs. Development of the residential homes on the remaining Crow River Heights West site by 2025 is expected to result in approximately 1,567 new vehicle trips on the study area roadway network per average weekday. Peak hour trips generated by the development are estimated at 123 during the AM peak hour and 165 during the PM peak hour. These trips were distributed through the site access routes to the regional roadways according to existing regional patterns. Growth in background traffic at rate of 2 percent per year was accounted for in the analysis.

Results of the operational analyses in the 2025 and 2040 No-Build and 2025 and 2040 Build scenarios indicate there is no change in overall traffic operations at the study area intersections associated with the build out of the remainder of the West River Heights development. However, by 2025 the intersection of Labeaux Avenue NE and River Road West will experience long vehicle queues in the southbound direction in the AM and in the northbound direction in the PM. This is due to the large directional peaking characteristic of home to work drivers. It is suggested Labeaux Avenue NE be improved to include 2 through traffic lanes in each direction from Beebe Lake Road on the north, to the south side of the Crow

River Bridge on the south to manage No-Build traffic conditions after the year 2025. Comparison of mitigated 2040 No-Build and Build conditions shows there is no change in traffic operations at the study are intersections associated with the build out of the project.