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:**

   Hanover Cove

2. **Proposer:**
   Contact person: **Kent Roessler**
   Title: **Owner, Paxmar LLC**
   Planning LLC
   Address: **3495 Northdale Blvd. Suite 210**
   City, State, ZIP: **Coon Rapids, MN 55448**
   Phone: **(763) 753-6176**
   Fax:
   Email: **kent@paxmar.com**

3. **RGU**
   Contact person: **Cindy Nash**
   Title: **City Planner, Collaborative**

   Address: **P.O. Box 251**
   City, State, ZIP: **Medina, MN 55340**
   Phone: **(763) 473-0569**
   Fax:
   Email: **cnash@collaborative-planning.com**

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

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

   If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):

   Minn. Rule 4410.4300 Subpart 19B Residential Development

5. **Project Location:**
   County: **Wright**
   City/Township: **City of Hanover**
   PLS Location (¼, ¼, Section, Township, Range)**: SE ¼ of the NW ¼, SW ¼ of the NE ¼, NE ¼ of the SW ¼ , NW ¼ of the SE ¼, Section 36, Township 120 North, Range 24 West**
   Watershed (81 major watershed scale): **North Fork Crow River**
   GPS Coordinates: **latitude 45°09'35" longitude 93°39'21"**

Tax Parcel Numbers: **108500362400 and 108500361300**

At a minimum attach each of the following to the EAW:

- County map showing the general location of the project; **(See Figure 1 below)**
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); **(See Appendix A)**
- Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan. **(See Appendix B)**

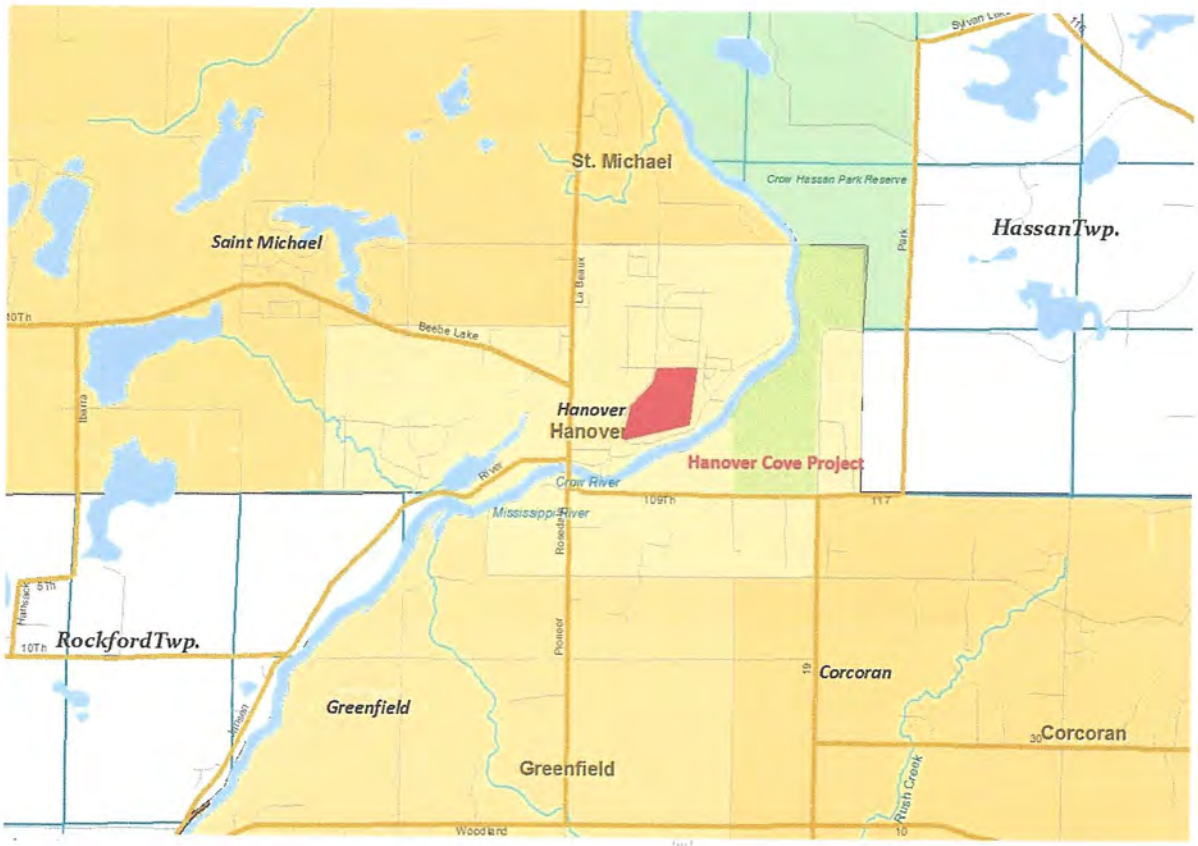


Figure 1 General Location Map

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

      Paxmar, LLC is proposing to develop two parcels containing approximately 86.2 acres within the City of Hanover into a residential planned-unit development. This project will include a total of 286 unattached units, including a mixture of traditional single family and patio homes.

   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.

      Paxmar, LLC is proposing to construct a 286-unit residential development in the City of Hanover. This proposed development lies on two parcels totaling 86.2 acres, the majority of which currently consists of unreclaimed gravel pit and agricultural grass land. These parcels will be developed into a residential planned-unit development, consisting of several different residential housing types throughout the property, including approximately 127 traditional single family homes, 138 patio homes, and 21 flex lots that may be patio homes or multi-level homes, depending on market factors.

      The proposer is proposing adding approximately 0.5 acre of additional land to an existing City park that is located on the eastern boundary of the proposed development.

      Infiltration basins and a large engineered pond (approx. 5 acres) are proposed to serve as the storm water management basins for the residential site. The pond will be landlocked but will have an emergency overflow to the southeast at an approximate 906.0 elevation which will connect to the Crow River through an 18" pipe.

      Approximately 10,855 LF of public roads will be constructed to serve this project, along with all required storm sewer, sanitary sewer, and water main utilities. One aged pole shed (60'x40') will need to be demolished to accommodate the project.

      The project will be completed in several (possibly 5-6) phases; however, the mass grading of the entire development will be completed in one project prior to the construction of the remaining improvements. The proposer anticipates completing all phases of the project within 6 years with mass grading commencing in fall of 2018

      Typical construction methods will be used to complete this project, incorporating City of Hanover standard plans and specifications. A total of approximately 600,000 CY of earth will be moved, all of which will originate onsite, as the project will be set up to balance the cuts and fills. All underground utilities and surfacing materials will be trucked into the site for installation using standard industry practices.

   c. Project magnitude:

Total Project Acreage	**86.2 acres**
Linear project length	**N/A**
Number and type of residential units	**Single Family 127** **Patio Homes 138** **Flex 21** **Total 286**
Commercial building area (in square feet)	**N/A**
Industrial building area (in square feet)	**N/A**
Institutional building area (in square feet)	**N/A**
Other uses – specify (in square feet)	**Park - 22,934 square feet**
Structure height(s)	**N/A**

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 purpose of this project is to provide additional housing options within the City of Hanover, which is needed to accommodate the anticipated growth within the area.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes ☒ 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? ☐ Yes ☒ No
If yes, briefly describe the past development, timeline and any past environmental review.

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	**0**	**0**	Lawn/landscaping	**1.5**	**37.8**
Deep water/streams			Impervious surface		**32.0**
Wooded/forest			Stormwater Pond		**8.9**
Brush/Grassland	**11.6**	**3.9**	Depleted Gravel Pit	**71.0**	
Cropland			8th St/River Road right of way	3.6	3.6
			TOTAL	**86.2**	**86.2**

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
State		
MPCA	**NPDES Construction Permit**	**To be obtained**
MPCA	**Sewer Extension Permit**	**To be obtained**
MPCA	**Notice of Intent to Perform a Demolition**	**To be obtained**
MPCA	**Notice of Intent to Perform an Asbestos Abatement Project**	**To be obtained** (if needed)
Dept of Health	**Water Main Extension Permit**	**To be obtained**
Dept of Natural Resources	**Temporary Water Appropriations Permit** (for utility and pond construction)	**To be obtained**
Local		
Wright SWCD	**Wetland No-Loss Determination**	**Completed**
City of Hanover	**Comprehensive Plan Amendment**	**Completed**
City of Hanover	**Concept Plan Approval**	**Completed**
City of Hanover	**Plat Approval**	**To be obtained**
City of Hanover	**Planned Unit Development**	**To be obtained**
City of Hanover	**Grading Permit**	**To be obtained**
City of Hanover	**Rezoning**	**To be obtained**
City of Hanover	**Building Permit**	**To be obtained**
City of Hanover	**Work in right-of-way**	**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 Hanover Cove site is located north of the Crow River. The site is bound on the west by River Road NE, the north by 8th Street, on the East by the Pheasant Run housing addition (along Meander Road), and on the south by the Cleveland's 1st

Addition (along Riverview Road). Based upon historic aerial photographs, the subject property and all adjoining properties were in agricultural production from at least 1937 until sometime between 1957 and 1963. Around this time, Riverview Road was constructed, and single-family residences were constructed on the adjoining property to the south. The subject property and adjoining properties to the north, east, and west remained in agricultural production. Between 1959 and 1979, a gravel mine was excavated northwest of the subject property but has since been converted into industrial use. Between 1984 and 1991, the adjoining property to the east was developed as single family residential land use. Around the same time, the adjoining property to the northwest was developed as industrial. Between 1997 and 2003, the adjoining property to the north was developed as single-family residential land use. Today, all adjoining properties have been developed.

Between 1984 and 1991, mining of sand and gravel began on the subject property. Mining ceased at the site around 2005; however, the site remains unreclaimed to date. As such, the terrain where gravel has been removed is steep, with approximately 45' of elevation difference between the high point to low point in the middle of the site. The vegetation in the mined areas consists of volunteer grasses and trees. The western portion of the site has not been mined and consists of various grasses and legumes, with a few trees interspersed.

As there are no structures except for a tin shed currently on the site, nor were there any structures on the site from at least 1937, it is unlikely that there are any significant environmental hazards resulting from the storage or production of hazardous materials. There may have temporarily been above ground storage tanks on the site during the operation of the gravel mine; however, none were observed during the site visit.

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 2008 Comprehensive Plan (amended in 2018) identifies the area to be developed as a Neighborhood Residential (the South half was amended from Industrial to Neighborhood Residential in 2018). This subdivision will be submitted as a Planned Unit Development within the R-1A Single Family Residential land use classification.

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

The Hanover Zoning Map identifies the north area as R-1A, Single Family Residential, the southwest portion as I-1, Limited Industrial, and the southeast portion as I-2, General Industrial. Through the process of developing the property, we would anticipate a rezone of the entire property to R-1A, which will be consistent with the Comprehensive Plan.

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

As described in 9a, nearly the entire site is surrounded by residential land use. Development of the property into a residential use, and the associated rezoning of the property from industrial to residential, will significantly increase the compatibility with the existing residential land uses. Furthermore, the potential for significant environmental effects will be reduced by this change as well.

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

The housing density of the site has been reduced during the concept plan review process in order to be compatible with the densities required in the Hanover Zoning ordinance.

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.

According to the Minnesota Geological Survey, the sea level elevation of the bedrock at this site ranges from 805 ft (southwest end) to 832 ft (northeast end), which corresponds to depths from natural ground level of 121 feet and 96 feet, respectively. In the interior of the site, where soil has been excavated, the depth to the bedrock is roughly 75 feet. The Paleozoic era bedrock is made up of Late Cambrian rock. There is an unconfined aquifer that is exposed at the bottom of the mining pit at an elevation of approximately 894 ft above sea level. Other than the need to temporarily lower the water table to construct the engineered pond that is part of this development, this does not limit the viability of the project, as excavating beneath the ground water table is common in the construction industry and common practices have been set up to ensure that the health, safety, and general welfare of the general public is preserved. When excavation is going to be done below the water table and water must be pumped, a water appropriation permit will be obtained from the Minnesota Department of Natural Resources. This permit ensures that there are no adverse effects to water quality or quantity due to any appropriation procedures. There are no other susceptible geologic features such as sinkholes, shallow limestone formations, or karst conditions that would be of concern here.

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.

Excavated Area: **82.6 acres**
Volume: **600,000 CY**

To determine the NRCS classifications of the onsite soils, the NRCS Web Soil Survey (WSS) was used. The map shown in Figure 2 and the charts shown in Figures 3 and 4 were produced from the WSS service.

Figure 2 Soils Map

Permeability

As can be seen by the chart in Figure 3, the surficial soils at the site which have not been disturbed have a hydrologic soil rating of "A," which means they have a high infiltration rate. However, the depth to the groundwater in these areas is 20-30 ft, which will limit the susceptibility to groundwater pollution. The majority of the previously mined area, denoted as "1030 Pits, gravel-Udipsamments complex" on the map will also have a hydrologic soil rating of "A," as it primarily consists of sand and gravel. In these areas, where the grade is near, or below, the static water table, there would be a higher susceptibility to groundwater pollution. One such area is the large engineered stormwater pond proposed near the north end of the site. In this area, previous mining below the static water table has resulted in ponding. This ponding is land-locked and has no natural outlet offsite, but rather any runoff that enters the pond either infiltrates into the "A" soils and/or leaves the basin through evapotranspiration. The proposed development of this area will

expand the pond, both in depth and surface area. The main potential for negative impacts to the pond consists of sediment laden runoff entering the basin, which will be mitigated through best management practices throughout construction. This will include a number of measures, including placement and maintenance of silt fence around the entire pond perimeter, inlet protection for all drainage inlets, erosion control blanket of all slopes steeper than 3:1, and establishment of vegetation on all disturbed surfaces not otherwise hard-surfaced.

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1015	Udipsamments (cut and fill land)		0.1	0.2%
1030	Pits, gravel-Udipsamments complex		61.9	78.0%
1066B	Malardi-Hawick complex, 1 to 6 percent slopes	A	17.4	21.9%
Totals for Area of Interest			79.4	100.0%

Figure 3 Soil Permeability Data

Erodibility

As evident on the chart in Figure 4, there are no highly erodible undisturbed soils on the site (indicated by a K factor >0.4) on the site; however, approximately 78% of the site is classified as "1030 Pits, gravel-Udipsamments complex," which has slopes between 0% and 25% slopes. Currently, approximately 71 acres (82% of the site), does not run off, but infiltrates and/or collects onsite. For the undisturbed area along the west end that does currently run off, best management practices (BMP's) will be implemented to protect any adjacent waters or properties from all land disturbing activities associated with the construction of this development. These BMP's will include silt fence, rock checks, vegetated buffers, or other means, as needed to control erosion. In general, completed banks onsite will be sloped at a maximum 3:1 and seeded (and blanketed if steeper than 3:1) as part of the development plan, reducing any erosion and sedimentation that might currently be happening. In addition, as grading progresses throughout the site, the majority of the runoff will be directed to temporary ponds onsite, where sediment can settle out. BMP's will be monitored weekly and after each rainfall event to ensure BMP's are in proper working condition and that silt-laden runoff is not being discharged from the site.

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1015	Udipsamments (cut and fill land)		0.1	0.2%
1030	Pits, gravel-Udipsamments complex		61.9	78.0%
1068B	Malardi-Hawick complex, 1 to 6 percent slopes	.24	17.4	21.9%
Totals for Area of Interest			79.4	100.0%

Figure 4 Soil Erosion Potential

To further explore the specific properties of the soils that are present on the site, borings were completed at 16 locations throughout this parcel, as well as 1 location offsite in the city land to the west. The depth of the borings on this site were generally 21 feet. They showed that, for the most part, the soils were of a sand and gravel nature, with 1-2 feet of topsoil present in the unmined areas on the western side of the property. Water was encountered in some of the borings at 6-14 feet. With excavation depths up to 36 feet, it is anticipated that groundwater will likely be encountered in the area of the proposed stormwater pond. As excavation is completed in this area, it is likely that water will need to be pumped out of the site. To accommodate this, a water appropriation permit will be obtained from the Minnesota Department of Natural Resources. This permit ensures that there are no adverse effects to water quality or quantity due to any appropriation procedures. This permit will be obtained prior to any pumping of groundwater off the site.

Given the nature of the geology and the soils at this site, as well as the safeguards that have been discussed, there is not significant potential for adverse impacts from site development. A copy of the soil report and boring log is found in Appendix C.

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 lakes in close proximity to this site. The Crow River runs southwest to northeast approximately 400-500 feet southeast of the site. This river segment has an EPA-approved impairment for Fecal Coliform; Turbidity, Aquatic Macroinvertebrate Bioassessments; Fishes Bioassessments, and Dissolved Oxygen. A Total Maximum Daily Load (TMDL) Report was prepared for this stretch of river, dated May, 2013.

Onsite, there are two wet areas which were created by previous mining. However, the Wright SWCD determined that based on Minnesota Rule 8420.0105 Subp. 2D, these areas are considered "incidental," and thus "any impacts to these wetlands constitute a no-loss per WCA Rule 8420.0415 A." The boundaries of both these exempt wetland areas are shown on Figure 5 below. The wetland application and RGU Notice of Decision is included as Appendix D.

Figure 5 Incidental Wetlands

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.

Well and Boring Records were obtained from the County Well Index. This geodatabase indicated the presence of five verified wells - four domestic and one irrigation well – in the project vicinity, as shown in Figure 6 below.

Figure 6 CWI Well Map

Information relative to each well is indicated in the following table:

Well #	Direction from Fodness Site	Static Water Depth	Ground Elevation	Water Elevation
531602	West	7	900	893
684221	West	10	900	890
105278	Southwest	N/A	916	N/A
481754	Northeast	45	916	871
149420	Northeast	30	924	894

The presence of ground water was indicated in several of the borings at 7-45 ft down from a surface elevation of roughly 900-924, yielding a groundwater elevation of approximately 893, which corresponds with the open water exposed through mining. The County Well Index data and the borings obtained by the operator are included as Appendix E. This site is not located within a MDH wellhead protection area.

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.

The wastewater generated by the site will consist of standard domestic sewage. The wastewater will be treated at St. Michael's Waste Water Treatment Facility (WWTF). The St. Michael WWTF currently has a capacity of 2.445 MGD, but only uses an average of 0.991 MGD, out of which Hanover contributes an average of 0.12 MGD. The estimated quantity of wastewater generated by the site upon full development of the 286 residential units is 80,080 GPD (.08 MGD), or 29.2 million gallons per year. The City of Hanover's contract for wastewater obligates St. Michael to provide sewer capacity for a residential equivalent population of 15,000. The 2010 US Census documents Hanover's population at 2,938. The St. Michael WWTF can accommodate the proposed development.

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.

Stormwater runoff at this site will be subject to a MPCA NPDES Construction Stormwater Permit, as well as review and approval from the City of Hanover Engineer to ensure stormwater management requirements are met. These permits and City Standards require the following controls:

- **Rate control so that the runoff rates do not exceed 0.1 CFS per acre of drainage area for the 1, 10, 100, and the 100 yr-10day 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%**

To achieve this, the vast majority of the stormwater from the project will be directed to onsite stormwater infiltration basins and a large retention pond on site via storm sewer and overland flow. Based on observed standing water and soil borings, we anticipate water to be permanently retained in the pond at a normal elevation of approximately 894.0. The water level will fluctuate up from that level based on the storm events that occur at this location, as shown in the table below, which was derived from a stormwater analysis of the development using HydroCAD.

Storm Frequency	Rainfall (inches)	Pond Level
2 yr	2.30	894.40
10 yr	4.10	895.51
100 yr	5.70	896.90
100 yr (back-to-back)	5.70	901.46
100 yr (snow-melt)	7.35	897.89

Because the retention pond is land-locked, it will not discharge off the property; instead, will infiltrate into sides of the pond with A horizon soils and/or leaves the basin through evapotranspiration. There is an emergency outlet that flows from the pond to the southeast corner of the project to an existing storm manhole around the intersection of River View Road and the Duininck Road Right-of-way that exists adjacent to the southeast corner of the Hanover Cove project. However, this pond outlet is located at elevation 906, which is 4.54 feet above the 100-yr back-to-back rainfall event modeled for this pond and is 9.10 feet above the 100-yr event. Thus, there is an extremely small chance that there would ever be any discharge from the pond through the emergency overflow. The remainder of the discharge is from the north side of the north row of lots which flow into the existing 8th Street storm sewer, as well as the south side (back yards) of the some of the lots in the southeast portion of the site.

This approach has effectively limited the runoff rate and total volume to be within the thresholds for the MPCA and City of Hanover Stormwater Permits. A summary of the pre-construction and post-construction rates is shown in Figure 7 below.

Storm Frequency (years)	Rainfall (Inches)	Pre-Development Onsite Infiltrated Flows (CFS)	Pre-Development Offsite Discharge (CFS)	Post-Development Onsite Infiltrated Flows (CFS)	Post-Development Offsite Discharge (CFS)
2 yr	2.30	0.04	0.01	21.26	0.64
10 yr	4.1	20.26	3.47	105.34	3.75
100 yr	5.7	109.66	18.27	206.66	7.76
100 yr B-B	5.7	400.78	72.70	244.28	16.22
100 yr snowfall	7.35	20.77	3.75	31.61	1.23

Figure 7 Pre- and Post-Development Runoff Rates

For volume control, since the stormwater pond is land-locked with only an emergency outlet, there is ample volume available for storage and infiltration. Based on one-inch storage/infiltration per acre of impervious surface (which for this site is 31.99 acres), 2.66 Acre-Ft is needed. Based on the pond we have proposed, 71.50 Acre-Ft is provided.

Since no water is being discharged from the pond, any TSS or Phosphorus being discharged from the site is limited to the small amount of land discharging offsite in the far north and far southeast portions of the site, which will be a reduction from the current conditions along with the reduction in discharge volume.

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.

This development will be connected to the City of Hanover's public water supply system. The City contracts their water supply through a Joint Powers agreement with St. Michael and Albertville, MN, which has adequate supply to serve the needs of this development. The plant capacity is 9.0 million gallons per day (MGD). In 2017, the total Joint Powers average water usage was 1.99 MGD with the City of Hanover contributing an average of 0.209 MGD to the total.

In order to connect the 286 residential units of the Hanover Cove development to the City's water supply system, an 8-inch PVC C-900 water main will be connected to the existing 14-inch ductile iron pipe that runs along the east side of River Road. The 8-inch water main will be 8-10 feet underground and run along the streets of the proposed development and tie into the existing 8-inch water main that stubs into the Hanover Cove development off of the 8th Street 12-inch water main at Mallard Street NE.

Based on an estimate residential usage of 280 gallons/day/household of water, it is estimated that the Hanover Cove site would use 80,080 gallons per day (GPD), or 0.080 MGD, upon full development. This proposed water usage has been anticipated by the city and planned for in their infrastructure program. By

comparing the 2017 water usage to the total capacity of the water supply system, it can be concluded that the system has enough capacity to accommodate this development.

During construction, it will be necessary to remove groundwater and surface water from the site for creation of a pond. To accommodate this removal of water, it is anticipated that a non-irrigation water appropriation permit will be obtained from the Mn/DNR, which will allow water appropriations up to a specified annual limit, which is set by the Mn/DNR area hydrologist after extensive review. This permit will also specify the pump location, manner, and the rate of pumping, as well as the discharge location, which is anticipated to be discharged through the existing storm sewer at the southeast corner of the project and flow through a natural swale to the North Branch Crow River which will be verified and approved through the permit application/review process. All conditions of this permit will be applied and strictly adhered to in order to assure that there will be no adverse impacts to water quality or quantity, neighboring residents, properties, or natural habitats as a result of the water appropriations.

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.

As a result of previous mining activities, there are two areas on the site, spanning 2.72 acres and 0.67 acres respectively, which have established wetland characteristics (but are exempt from regulation), giving some potential for limited wildlife habitat. Construction at this site will impact this existing habitat, but after construction of the on-site stormwater pond is complete, potential new habitat will be provided.

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.

No physical effects or alteration to surface water features are anticipated as a

result of this project. Furthermore, this project will not change the number or type of watercraft on any water body.

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.

To determine if there is existing contamination or potential environmental hazards on or in close proximity to the project site which have potential for environmental impacts, we accessed the MPCA's "What's in My Neighborhood" database. Upon review of a one-mile radius from the center of the proposed mining site, two feedlots were identified, six hazardous waste generator sites, six underground tank sites, two above ground tank sites, two petroleum remediation sites, and a number of construction storm water permits. This list is shown in Figure 8 below.

NAME	STREET	CITY	COUNTY	SITE ID	MPCA IDs	ACTIVITIES
Treehouse Childcare - Hanover - CSW	See location description	Hanover	Wright	104334	C00017943	Construction Stormwater
Heritage Woods of Greenfield - CSW	10345 Pioneer Trail	Greenfield	Hennepin	121065	C00023732	Construction Stormwater
CSAH 19 S.P. 098-090-007	Address Unknown	Hanover	Hennepin	143361	C00034910	Construction Stormwater
Maverick Construction	11227 River Road NE	Hanover	Wright	224201	MNS000321632	Hazardous Waste, One time generator
Lamont Avenue Improvements	Address Unknown	Hanover	Wright	142500	C00034646	Construction Stormwater
Quail Pass - CSW	See location description	Hanover	Wright	35569	C00006288	Construction Stormwater
1999 Sewer/Street/Apputenant Work	See location description	Hanover	Wright	45785	C00006030	Construction Stormwater
Hanover Co 14077	County Road S 10 & 19	Hanover	Wright	104991	TS0002842	Underground Tanks
Firehouse Auto Repair & Towing Inc	11243 River Rd NE	Hanover	Wright	15561	MNR000006213	Hazardous Waste
Rolling Oaks	SE corner 15th St. & CR 19	Hanover	Wright	62061	C00007811	Construction Stormwater
Church Street Reconstruction	Church St	Hanover	Wright	133814	C00026768	Construction Stormwater
Rhino Imported Auto Parts Inc	11103 River Rd NE	Hanover	Wright	12251	MND985770866	Hazardous Waste
City of Hanover Public Works Facility	5th Street	Hanover	Wright	214719	C00044914	Construction Stormwater
District Nursery	11629 Crow Hassan Park Dr	Rogers	Hennepin	108520	TS0054594	Aboveground Tanks
Crow River Heights East	S side of County Road 34	Hanover	Wright	49322	C00007121	Construction Stormwater
DDS Resource Recovery & Transfer LLC	11475 10th St NE	Hanover	Wright	2372	SW-392; TS0054900	Aboveground Tanks; Solid Waste, Permitted Solid Waste Facility
Spruce Tree Terrace - Hanover	11285 Lampert Ct	Hanover	Wright	85465	C00011842	Construction Stormwater
Hennepin Parks District Nursery	11629 Crow Hassan Park Rd	Rogers	Hennepin	17448	MND985765361	Hazardous Waste
Schendels Field 1st - CSW	See location description	Hanover	Wright	104569	C00016066	Construction Stormwater
LaBeaux Ave/CSAH 19 Trail Construction	Address Unknown	Hanover	Wright	137236	C00031370	Construction Stormwater
David Smith Residence	2412 Woodwinds	Minnetonka	Wright	150507	TS0123092	Underground Tanks
Crow River Heights East 3rd	See location description	Hanover	Wright	84882	C00012455; SUB0017	Construction Stormwater
Cummings Mobility Conversions & Supply	263 River Rd NE	Hanover	Wright	26216	MND982636540	Hazardous Waste
2018 Pavement Improvement Project	River Road	Hanover	Wright	224430	C00049877	Construction Stormwater
Zimmerman Property (Top Soil)	28986 109th Ave N	Hanover	Hennepin	93490	C00010565	Construction Stormwater
Pearson Bros	11071 Lamont	Hanover	Wright	148602	TS0124174	Underground Tanks
Colonial Craft Specilties	11059 Lamont Ave NE	Hanover	Wright	57705	A00006100; MNRNE3	Aboveground Tanks; Industrial Stormwater
Greenhouse Assisted Living Facility	10875 Settlers Lane	Hanover	Hennepin	213151	C00043690	Construction Stormwater
Miller Trucking & Landscape	PO Box 157	Hanover	Wright	15672	WRTC10928	Hazardous Waste
Kahnke Brothers Inc	18012 Pioneer Trl	Eden Prairie	Hennepin	20256	LS0007892; MND094	Hazardous Waste; Petroleum Remediation, Leak Site; Underground Tanks
Bobs Sales & Service	11201 River Rd NE	Hanover	Wright	114075	TS0012055	Underground Tanks
2014 Mill Pond Trail Extension	Address Unknown	Hanover	Hennepin	145994	C00037613	Construction Stormwater
Peter R Marx Farm	1711 Lander Ave NE	Saint Michael	Wright	55069	171-70310	Feedlots
Crow River Heights Park Grading	Address Unknown	Hanover	Wright	123220	C00025834	Construction Stormwater
The Bridges of Hanover	See location description	Hanover	Wright	57047	C00007670	Construction Stormwater
Hanover Elementary School	274 Labeauxe Ave	Hanover	Wright	113921	TS0012024	Underground Tanks
js stewart shop	11149 5th st ne	Hanover	Wright	214859	214859; C00045012	Construction Stormwater
Hanover Elementary	Highway 19	Hanover	Wright	197203	LS0016158	Petroleum Remediation, Leak Site
Tom Thumb Superette	329 Labeaux Ave NE	Hanover	Wright	114066	TS0012044	Underground Tanks
River Road Bike Path and App Work - CSW	See location description	Hanover	Wright	104723	C00016826	Construction Stormwater
Rod & Lucile Bechtold Farm	10589 Rosedale Ave N	Hanover	Hennepin	57404	053-60840	Feedlots
Public Works Site Grading	Address Unknown	Hanover	Wright	137761	C00031854	Construction Stormwater
River Rd NE & 8th St NE Reconstruction	See location description	Hanover	Wright	102761	C00019644	Construction Stormwater
Esterly Oaks	See location description	Hanover	Wright	39075	C00006160	Construction Stormwater
Spruce Tree Terrace	See location description	Hanover	Wright	85683	C00011828	Construction Stormwater
Crow River Heights East 2nd	See location description	Hanover	Wright	95048	C00011278	Construction Stormwater

Figure 8 MPCA "What's in my neighborhood" database

The location of these sites are shown in Figures 9 and 10 below. Upon further review of these sites in the WIMN database, none of these sites contain any site conditions that would have environmental effects caused or exacerbated by this project's construction.

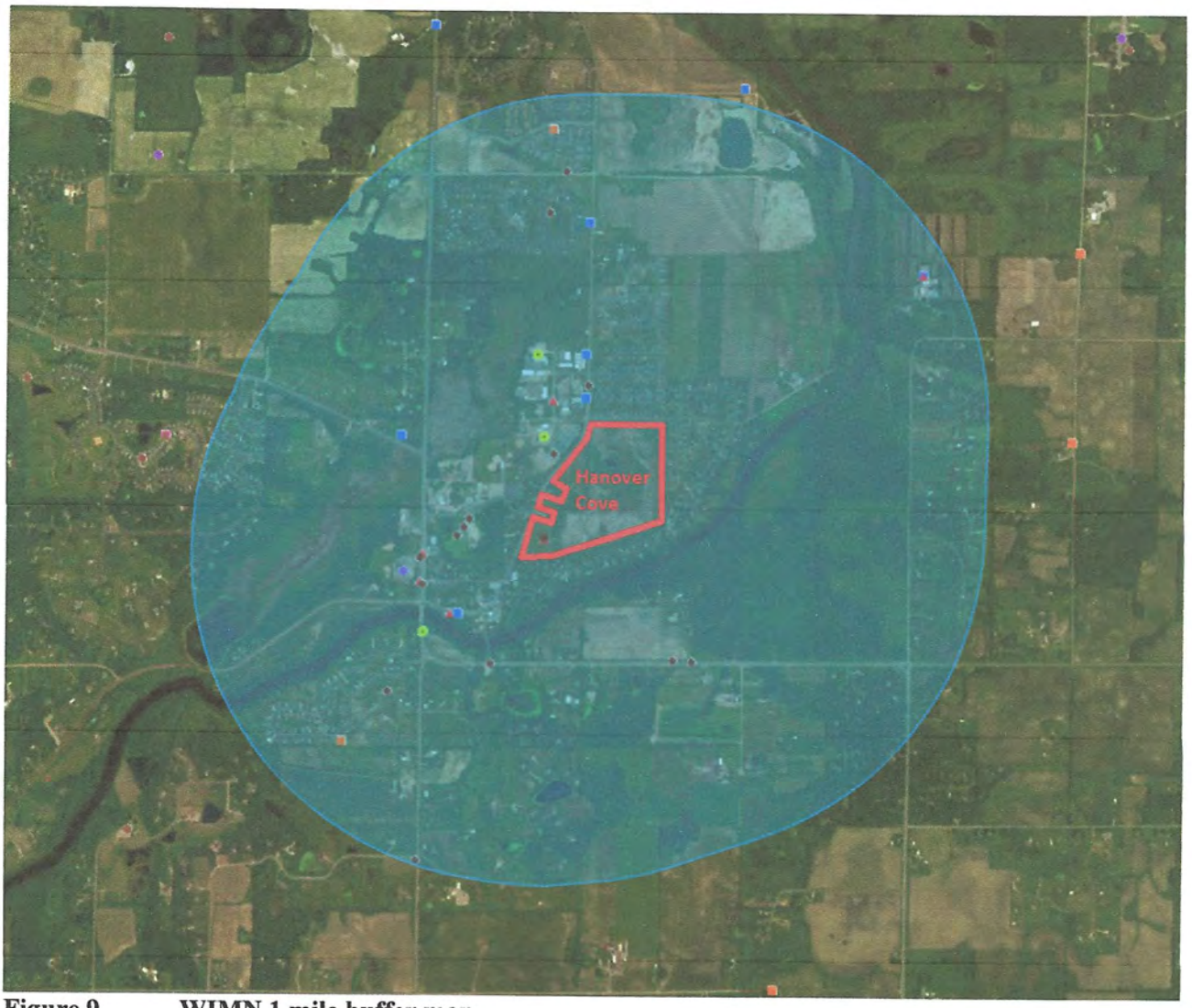


Figure 9 WIMN 1 mile buffer map

Figure 10 WIMN nearby site identifications

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.

There will be very little, if any, solid waste generated throughout construction of the infrastructure to support this development. This waste will be in the form of simple municipal solid waste, consisting of garbage from lunches, packaging, fluid bottles, etc. This waste would be disposed of in a dumpster and picked up by a local garbage hauler licensed in Wright County. Additional solid wastes will be generated during construction of individual residential units, which will be disposed of properly. Upon completion of homes, individual land owners and/or a home owners association will be responsible to dispose of municipal solid waste using a local garbage hauler licensed by the City.

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.

There are no plans to have any toxic or hazardous material on the site. At periodic times throughout the life of the infrastructure construction, there will be above ground storage tanks present that store different types of petroleum products, most likely diesel fuel. In the event of an accidental spill or release of this material, diesel could have a negative impact by polluting the soil and/or groundwater. To minimize and mitigate this risk, these tanks will meet all requirements of the MPCA, in terms of registration, labeling, secondary containment, signage, etc. In addition, procedures to follow in case of a spill will be conspicuously placed onsite, as well as education of the various operators in handling of a spill. In general, these procedures include containment, cleanup, proper disposal, and notification of the proper authorities if the spill meets certain thresholds.

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.

No hazardous waste will be generated by this 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.

Currently, the natural vegetation that has grown up and the incidental wetland created by mining below the water table in the center of the site provides some limited wildlife habitat on this site. Furthermore, the North Fork Crow River runs southwest to northeast about 400-500 feet southeast of the site, which supports some wildlife and fish.

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 _____) 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.

To determine if there is the potential for any negative effects on rare species of plants, animals, or habitat, the property and surrounding one-mile area has been reviewed by the DNR Natural Heritage Program. Based on a query of the Natural Heritage Information System (NHIS) database, the DNR report noted that the state-listed species Blanding's turtles "have been reported in the vicinity of the proposed project and may be encountered onsite." It further noted that the rusty patched bumble bee (Bombus affinis), a federally-listed endangered species, was documented in the vicinity of the proposed project.

A copy of the DNR's report is attached as Appendix F.

(Reference: Correspondence # **ERDB 20180442**)

No additional habitat or species survey work has been conducted at the site.

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.

The DNR report noted that "the project may have 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." Specifically, for this site, the low areas where wetland characteristics have developed through mining, as well as the surrounding upland, would likely provide some limited habitat for the turtle. Throughout construction, this habitat will be temporarily disturbed while the wet areas are expanded and replaced with larger ponds and infiltration areas. During the construction, extra care will be needed to ensure that there are no direct impacts to the turtle, according to the recommendations discussed in Section 13d of this report.

Relative to the Rusty Patched Bumble Bee, other than the small area of grassland along the western portion of the site, the majority of the site has been disturbed and currently has very limited potential for bumble bee habitat. The creation of 3 large infiltration basins and the proposed stormwater pond on the site will serve as areas where pollinators, wildflowers and native grasses are planted.

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

The report made several recommendations to avoid or minimize disturbance to the Blandings Turtle, which are as follows:

- **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**
- **Monitor for turtles during construction and report any sightings to the DNR**
- **Refer to the first list of recommendations in the Blanding's Turtle Fact Sheet**

Considering that all of these recommendations will be followed throughout the development of this property, adverse impacts to the Blanding's Turtle are not anticipated.

Relative to the Rusty Patched Bumble Bee, development of this property will result in a diverse landscape consisting not only of grasslands, but also of significant landscaping throughout the development. These landscapes will include wide varieties of flowering

plants that the Rusty Patched Bumble Bee can use for reproduction and feeding.

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.

The Minnesota Historical Society State Historic Preservation Office was contacted. They reviewed the project and did identify eight historic/architectural properties throughout Hanover, but found "no archeological sites…identified in a search of the Minnesota Archaeological Inventory and Historic and Architectural Inventory for the search area requested." A copy of this letter is included in Appendix G.

In the unlikely event that something of historical or archeological in nature is found, the developer will take all necessary steps to ensure compliance with the appropriate agencies.

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.

There are no significant scenic views or vistas at the project site that will be affected by construction of this development.

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.

    No stationary source emissions are expected from the end use of this development.

    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 equipment and vehicles will temporarily create exhaust emissions while constructing the site. These activities will be conducted during daytime hours and all

vehicles will be maintained to state and federal standards. The proposed project will generate an increase in carbon monoxide levels due to an increase in passenger vehicles 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.

The previous use of this site as a gravel mine would have generated significant dust during active operations. The conversion of this parcel to residential development is expected to generate some dust during construction; however, dust will be mitigated through best management practices such as the following:

- **Temporary seeding and staging plans will be submitted by the developer and reviewed by the city.**
- **Regular cleanup of sediment that is tracked onto public streets.**
- **Rock construction entrances will be used and maintained in conformance with the NPDES permit.**
- **Haul routes will be watered.**
- **Existing vegetation will remain in place to the greatest extent practicable, especially any trees that may act as wind rows.**

No odors will be associated with the development of this parcel. No sensitive receptors of dust or odors are known in the vicinity of this site.

Following completion of construction, the site is not anticipated to generate dust or odors.

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.

All phases of the project construction will generate some noise. This primarily comes from the equipment needed to effectively and efficiently construct the development, as well as the safety equipment that is mounted on the equipment, such as backup horns. Every effort possible will be made to minimize the noise generated in an otherwise generally quiet area. This will include using high quality mufflers on all equipment and maintaining some of the perimeter berms, which act as natural sound barriers on the site. Upon completion of this project, the level of noise will be negligible, just as in most any other residential development. In any case, sound levels generated from the construction of this development will not exceed the noise frequency and duration levels outlined in the Hanover Ordinances. There are no sensitive receptors of noise in the general area of the proposed development.

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.

The proposed development is occurring on a former gravel mine, without existing defined parking. The development of the land will result in 286 single family homes with generally 2-3 car garages. A traffic study was prepared by Swing Traffic Solutions, LLC, dated August 13, 2018, which estimated the number of vehicle trips generated by the 286-unit development 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). This traffic study is included in Appendix H. All residential products represented in the report are modeled as standard single-family homes corresponding to (ITE) Land Use Code 210. The Table below summarizes the trip generation estimates. Transit is not available in the area.

Trip Generation Table

Land Use	AM Peak Hour		PM Peak Hour		Daily Trips
	Enter	Exit	Enter	Exit	
Single Family Homes (286 Homes)	53 Trips	159 Trips	178 Trips	105 Trips	2,700 Trips
TOTAL	**212 Trips**		**283 Trips**		**2,700 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,

A traffic study has been completed and is included in the Appendices, along with an addendum related to conditions at the intersection of River Road and CSAH 19. The community of Hanover is a bedroom community with a 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 or 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 286 homes would not result in a change in traffic operations in terms of Level of Service at any of the intersections studied. The study and addendum showed that the intersection of CSAH 19 and River Road will operate at a Level of Service D in the year 2025.

However, the analysis did also identify that Labeaux Avenue NE or 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.

The traffic study and the addendum identify potential mitigation measures. In particular, the addendum provides more detailed information on the CSAH 19 and River Road intersection regarding the modeled impacts of additional turn lanes and protected/permitted left turn phasing. None of the modeled mitigation is currently planned or funded for construction. The traffic study also suggested that Wright County give consideration to widening Labeaux Avenue NE or CSAH 19 from the existing three lane footprint to a four-lane footprint 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 and the addendum.

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

N/A, addressed under applicable EAW Items

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:

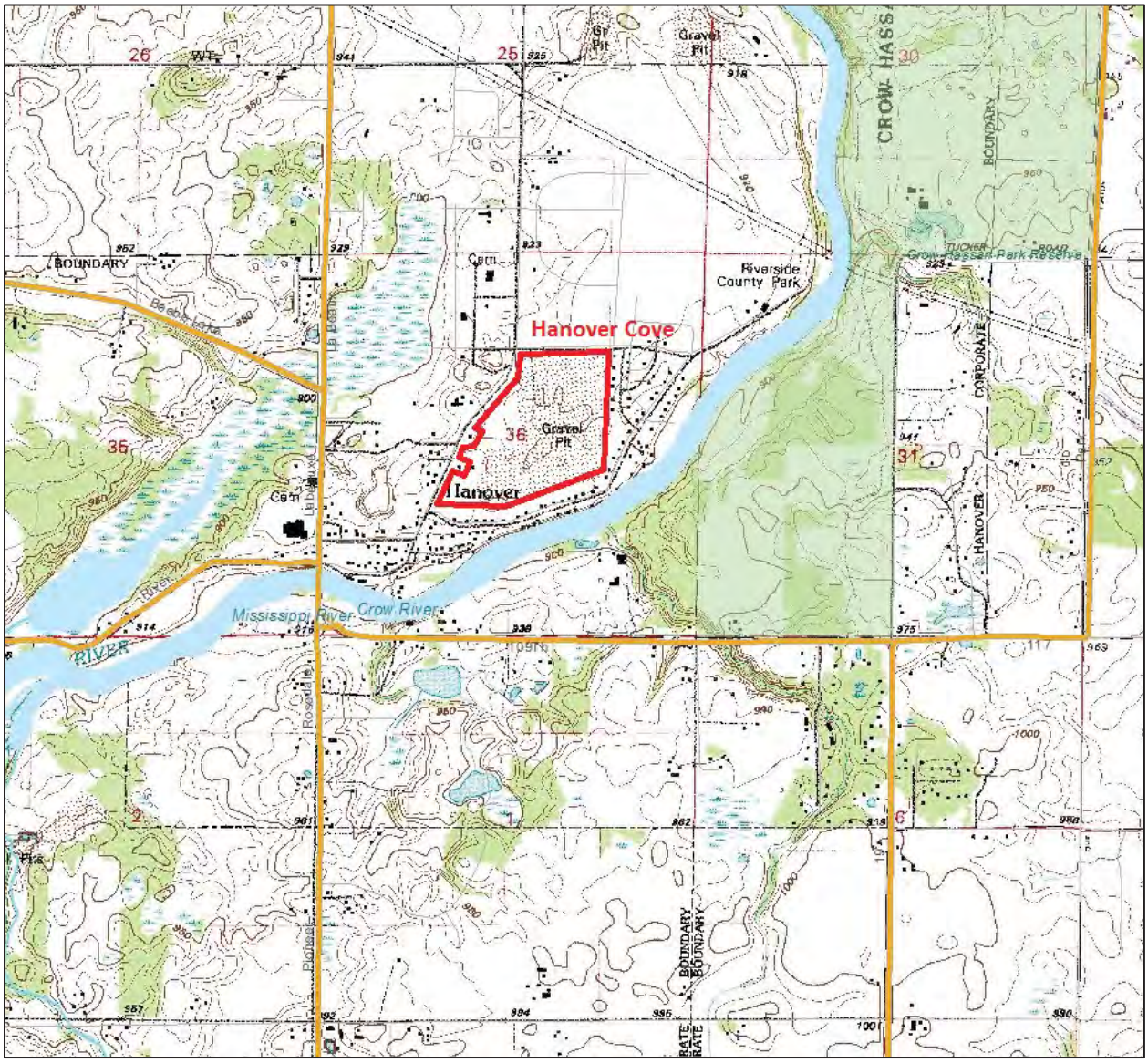
- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, 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 Wada Date 8/27/2018

Title City Planner

APPENDIX A

USGS GEOLOGICAL SURVEY


Hanover Cove
Hanover
Gravel Pit
Riverside County Park
Mississippi River
Crow River
CROW HASSAN
BOUNDARY
CORPORATE
HANOVER
Beach Lake
Crow Hassan Park Reserve
TUCKER ROAD
26
25
30
36
31
2
6

APPENDIX B

SITE PLANS

PRELIMINARY PLAT/
PRELIMINARY ENGINEERING
PLAN SUBMITTAL

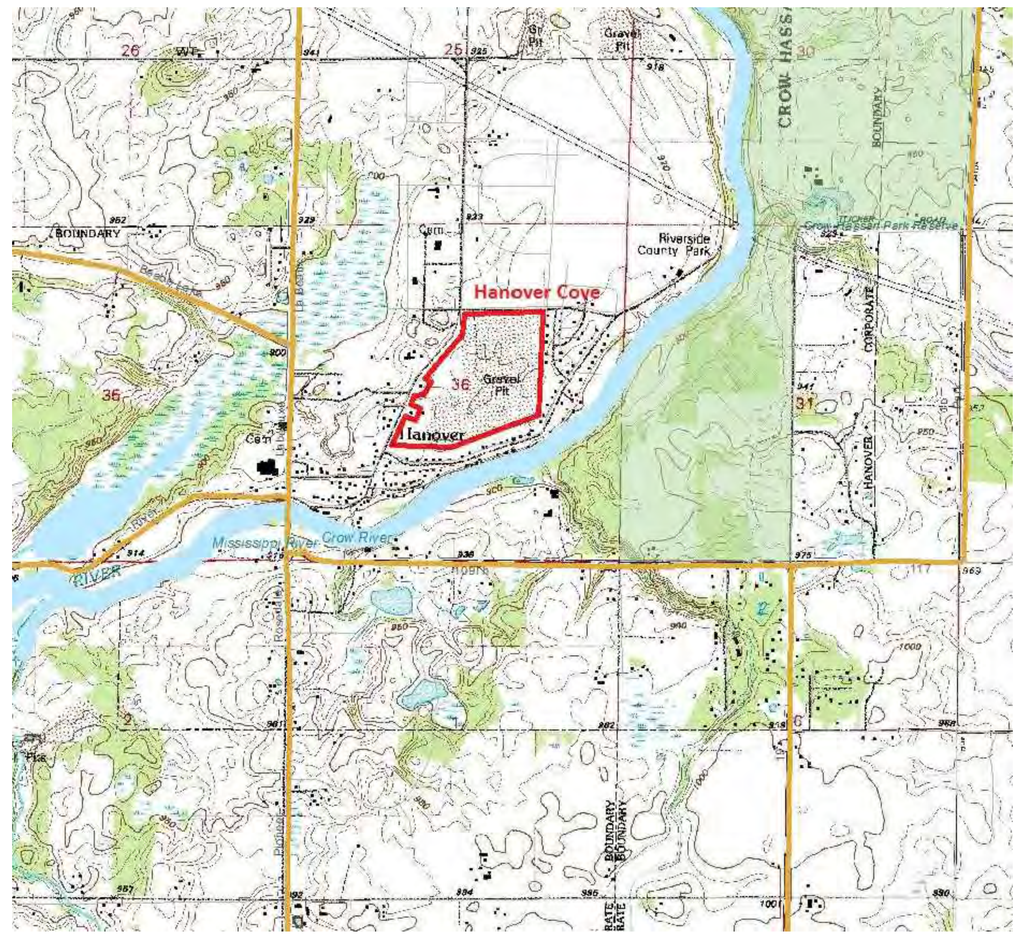
FOR

HANOVER COVE

CALL 48 HOURS BEFORE DIGGING:

GOPHER STATE ONE CALL

MN TOLL FREE 1-800-252-1166



DEVELOPER: PAXMAR, LLC
2850 CUTTERS GROVE AVE.
SUITE 207
ANOKA, MN 55303

SHEET INDEX

TITLE PAGE
ALTA SURVEY
PRELIMINARY PLAT
TYPICAL SECTION
EXISTING TOPOGRAPHY
GRADING AND DRAINAGE PLAN
UTILITY PLAN
STORMWATER POLLUTION PREVENTION PLAN
EROSION CONTROL PLAN
TREE INVENTORY

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

SIGNATURE: DATE: 8/18/2018

NAME: JASON VERSTEEG LIC. NO. 26505

DUININCK
PHONE: (320)978-6011 FAX: (320)978-4978
P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

HANOVER COVE
PRELIMINARY ENGINEERING PLAN
TITLE PAGE

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
TITLE

This is a survey of the Land Description as found on Schedule A of

Commitment No. 566416, 3rd Supplemental

issued by Stewart Title Guaranty Company
Issued by its Agent, Land Title, Inc.
dated December 15, 2017

"Parcel 1:
The Southwest Quarter of the Northeast Quarter (SW¼ NE¼), AND the Northwest Quarter of the Southeast Quarter (NW¼ SE¼) (lying North of the Crow River); AND the Northeast Quarter of the Southwest Quarter (NE¼ SW¼), all of said land being in Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), Wright County, Minnesota, excepting therefrom the following tracts:
a) Tract sold to Board of Education of Hanover by deed recorded in Book 28 of Deeds, page 524.
b) Tract sold to Henry Ernest Kirscht by deed recorded in Book 74 of Deeds, page 207.
c) Tract sold to Lakeview Motors, Inc., by deed recorded in Book 158 of deeds, page 143.
d) Tract described as beginning at the Southwest corner of said Northeast Quarter of the Southwest Quarter (NE¼ SW¼), thence North 786.8 feet to beginning tract to be conveyed; thence North 150 feet, thence angle right 90° 337.6 feet to the right of way line of State Aid Road No. 6; thence Southwesterly along said right of way line 160 feet; thence West 275 feet to beginning; all of said land being in Section Thirty-six (36), Township One hundred Twenty (120), Range Twenty-four (24).
e) Plat of Cleveland's First Addition to Hanover as recorded in Book 5 of Plats, page 50.
f) All that land lying in the Northwest corner of the Northeast Quarter of the Southwest Quarter (NE¼ SW¼) West of County Road 19 as presently situated.
g) All that land platted as Olson Addition, Dehmer's Hanover and Riverview Road Addition, Pheasant Run Second Addition.
h) All that land described in Warranty Deed recorded August 13, 1969, in Book 228 of Deeds, page 37.
i) All that land described in Warranty Deed recorded September 28, 1978 in Book 291 of Deeds, page 180.
j) All that land described in Quit Claim Deed recorded July 12, 1979, in Book 294, page 153.

AND

Parcel 2:
That part of the East Half of the Northwest Quarter (E½ NW¼) of Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), Wright County, Minnesota, lying East of County Road No. 19, EXCEPT all that part of the Northwest Quarter (NW¼) of Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), described as follows: Commencing at the center of said Section Thirty-six (36), thence South 89°15' West along the quarter line, 537.14 feet for a point of beginning, thence continuing on said last described course, 214.16 feet to the center of County Road, thence North 24°33' East along said center of road, 225 feet, thence North 89°15' East, 214.16 feet, thence South 24°33' West, 225 feet, to the point of beginning.

Abstract Property"

This is an ALTA / NSPS Land Title Survey of:

part of:

E½ of the NW¼, NE¼ of the SW¼, SW¼ of the NE¼, and NW¼ of the SE¼

Located in:

Section 36, T120N-R24W, Wright County, Minnesota

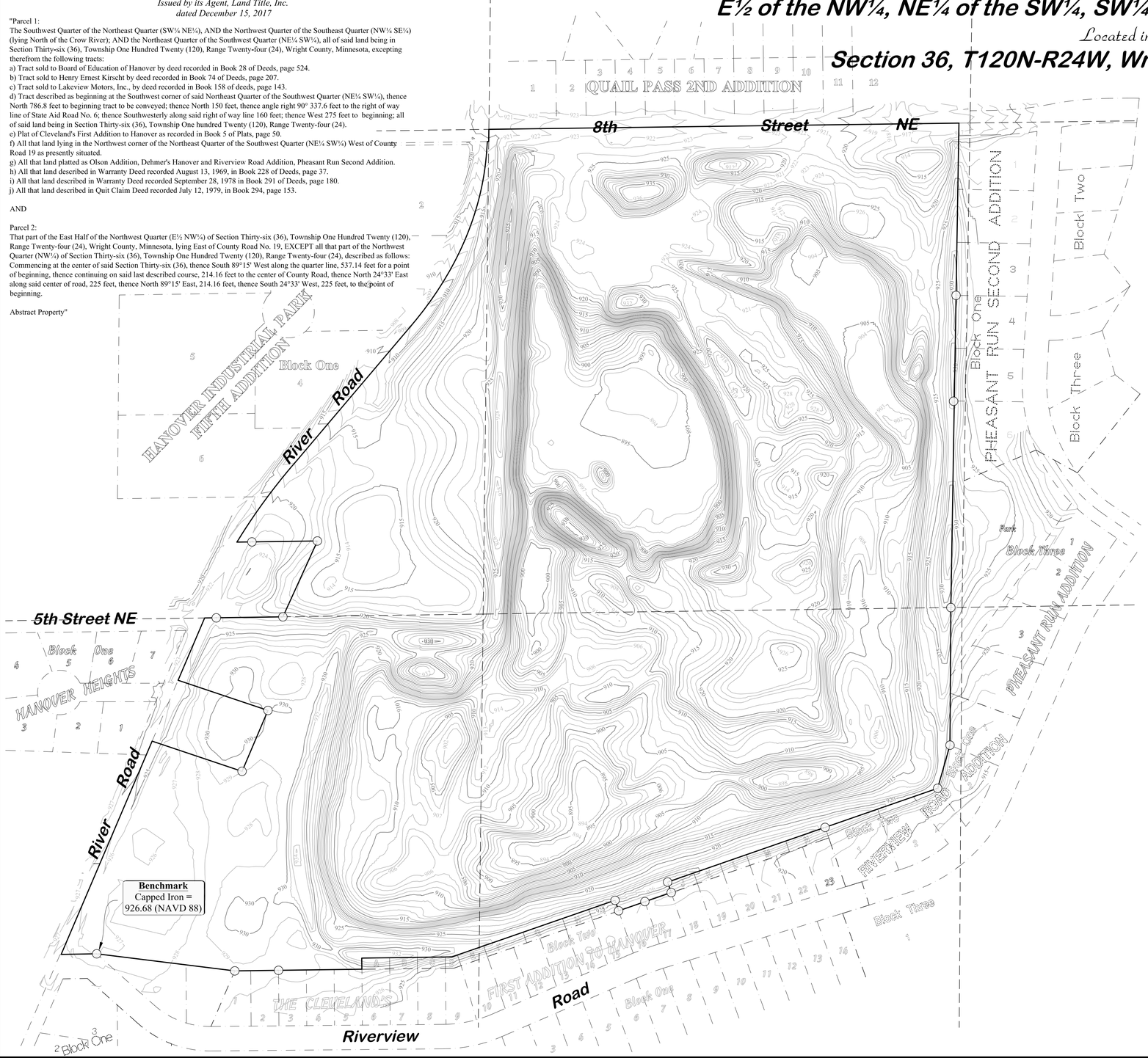


TABLE A ITEMS

Item 1:
Monuments placed or found at all major property boundary corners: As shown on this survey

Item 4:
Area of property as shown on this survey. SEE SHEETS 2 & 3

Item 5:
Vertical relief, as shown on this survey is derived from a ground survey done by Duininck Inc. on 12-14-2017, and has a contour interval of 1 foot. The datum used for this survey is the North American Vertical Datum of 1988 (NAVD 88) using MNDOT Geodetic control point BACKES, which has an NAVD 88 elevation of 922.08.

Item 7a
Exterior dimension of buildings at ground level, as shown on this survey. SEE SHEETS 2 & 3

Item 8:
Substantial features observed in the process of conducting our field work, as shown on this survey.

Item 11:
The Gopher State One Call Utility location system was notified for this survey (Ticket #173312608 on 11-27-2017, submitted by, and utilities located by Duininck Inc.). The following utility companies were notified and are required by Minnesota Statute 7560.0250 to respond.

- Comcast - MARKED 800-762-0592
- Veolia Water - MARKED 763-497-3611
- Centurylink - MARKED 800-283-4237
- Center Point Energy - MARKED 608-223-2014
- Xcel Energy - MARKED 800-848-7558
- Zayo Bandwidth - MARKED 888-267-1063

Some of the utility companies may not have responded to the locate request. There are also various private facilities that do not participate in the Gopher State One Call utility location system and may have utilities located on this property that we are not aware of. Before any excavating is done in this area, the utilities should be re-notified. The utilities shown on this survey are based on information provided by the utility companies and field observations. SEE SHEETS 2 & 3

Item 19:
Plottable offsite easements or servitudes, as shown on this survey. SEE SHEETS 2 & 3

Schedule B - Part 2 Exceptions

Items 1&2:
Are not survey issues and were not addressed as a part of this survey.

Item 3
Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the land.
AS SHOWN ON THIS SURVEY SEE SHEETS 2 & 3

Items 4-11:
Are not survey issues and were not addressed as a part of this survey.

Item 12:
Permanent Drainage, Utility & Pathway Easement filed as Document Number A954819.
AS SHOWN ON THIS SURVEY SEE SHEETS 2 & 3

Item 13:
Is not a survey issue and was not addressed as a part of this survey.

Item 14:
Subject to road(s) as shown by available maps.
AS SHOWN ON THIS SURVEY SEE SHEETS 2 & 3

Item 15:
Current Legal description appears to encroach on to the Plat of Pheasant Run Second Addition. Assuming Document No. A1358544 is the current deed referred to , this description does overlap with Pheasant Run Second Addition, however, the Schedule A land description referred to on this survey DOES NOT overlap with Pheasant Run Section Addition.

Items 16:
Current legal description appears to except out too much property in exception "i)" of Warranty Deed filed as Document Number A1358544. The current legal description (Doc. #A1358544) does except out too much property for exception i, however, the Schedule A land description fits with the found survey monuments and land use.

North

This drawing prepared by:

Bonnema Runke Stern Inc.
Professional Land Surveyors
1809 22nd St SW - Suite 104
Willmar, MN 56201
Office (320) 231-2844 Fax (320) 231-2827

Requested by: ***Duininck Inc.***
C/O Jason Ver Steeg
408 6th St
Prinsburg, MN 56281

0 150 300 450
Scale in Feet

LEGEND

- Found Iron Monument from former survey
- Bonnema Runke Stern Inc. Placed Capped Iron Monument
- Cast Iron Monument
- Course Change - No monument set
- Sanitary manhole
- Water Gate Valve
- Telephone Pedestal
- Electric Transformer
- Fire Hydrant
- Power Pole
- SAN — Sanitary Sewer
- STM — Storm Sewer
- WL — Water Line
- Road Right of way
- GAS — Gas Line
- FO — Buried Fiber Optic
- BE — Buried Electric
- BT — Buried Telephone
- OH — Overhead Power
- Occupation / Farm Tillage
- X — Fence
- (D = XX.XX) Deed Dimension
- (P = XX.XX) Platted Dimension
- Tree Row
- Existing Building

The distances shown from improvements to the property lines are shown for references purposes only and are NOT intended for determining the property line location. Property corner monuments shall always be used when establishing the property line.

To Paxmar, LLC, Duininck Inc., Stewart Title Guaranty Company, and Land Title, Inc:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 1, 4, 5, 7a, 8, 11, and 19 of Table A thereof. The fieldwork was completed on December 18, 2017.

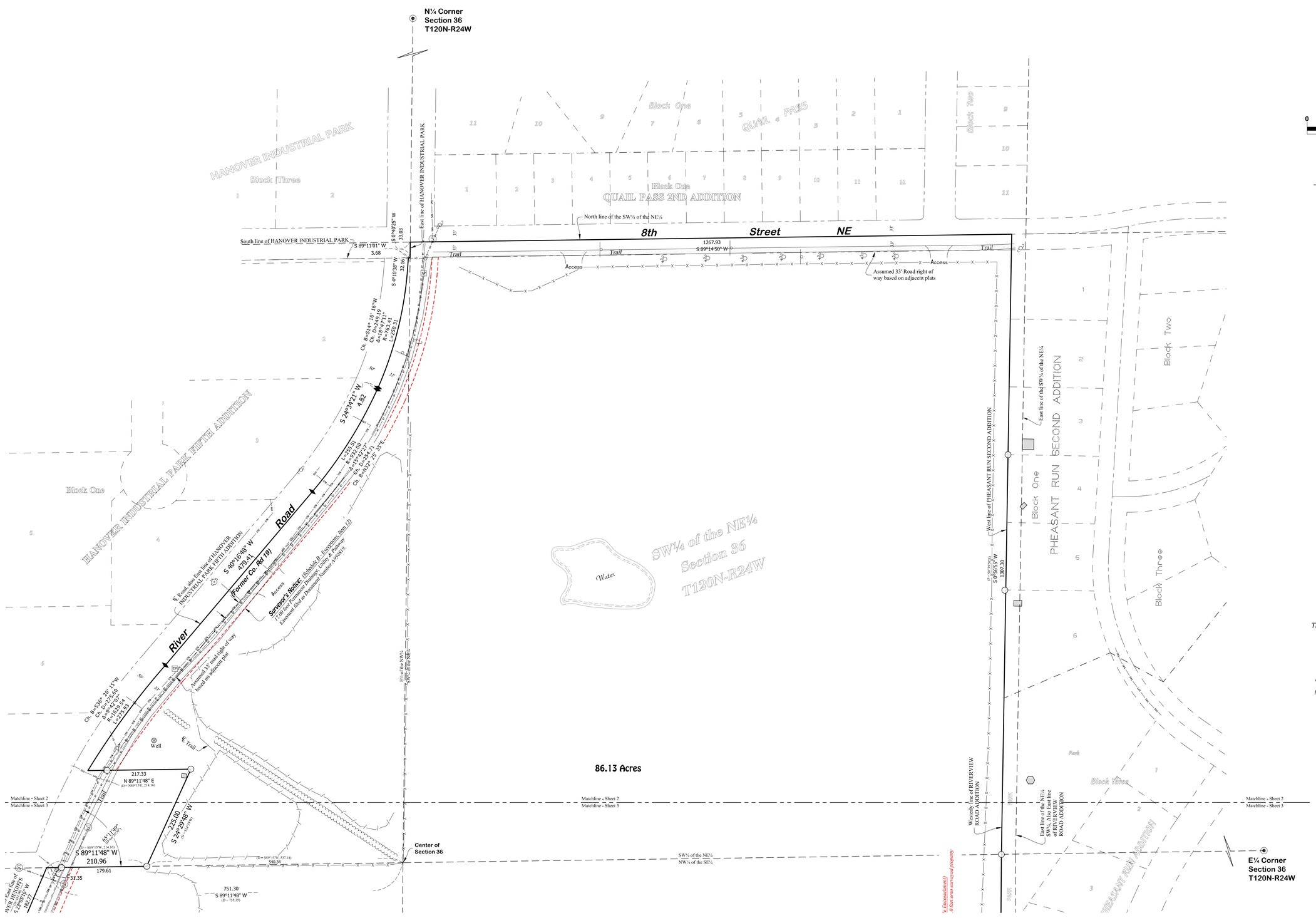
Matthew D. Runke

Date ***July 23, 2018*** License No. 46169

Survey Requested By: **Duininck Inc.**

© BONNEMA RUNKE STERN INC 2018

36-120-24



North

0 100 200 300

Scale in Feet

LEGEND

- Found Iron Monument from former survey
- Bonnema Runke Stern Inc. Placed Capped Iron Monument
- Cast Iron Monument
- Course Change - No monument set
- Sanitary manhole
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- Storm Sewer
- Water Line
- Road Right of way
- Gas Line
- Buried Fiber Optic
- Buried Electric
- Buried Telephone
- Overhead Power
- Occupation / Farm Tillage
- Fence
- (D = XX.XX) Deed Dimension
- (P = XX.XX) Plattted Dimension
- Tree Row
- Existing Building

Elevation Datum:

The Elevation Datum used for this survey is the North American Vertical Datum of 1988 (NAVD 88)

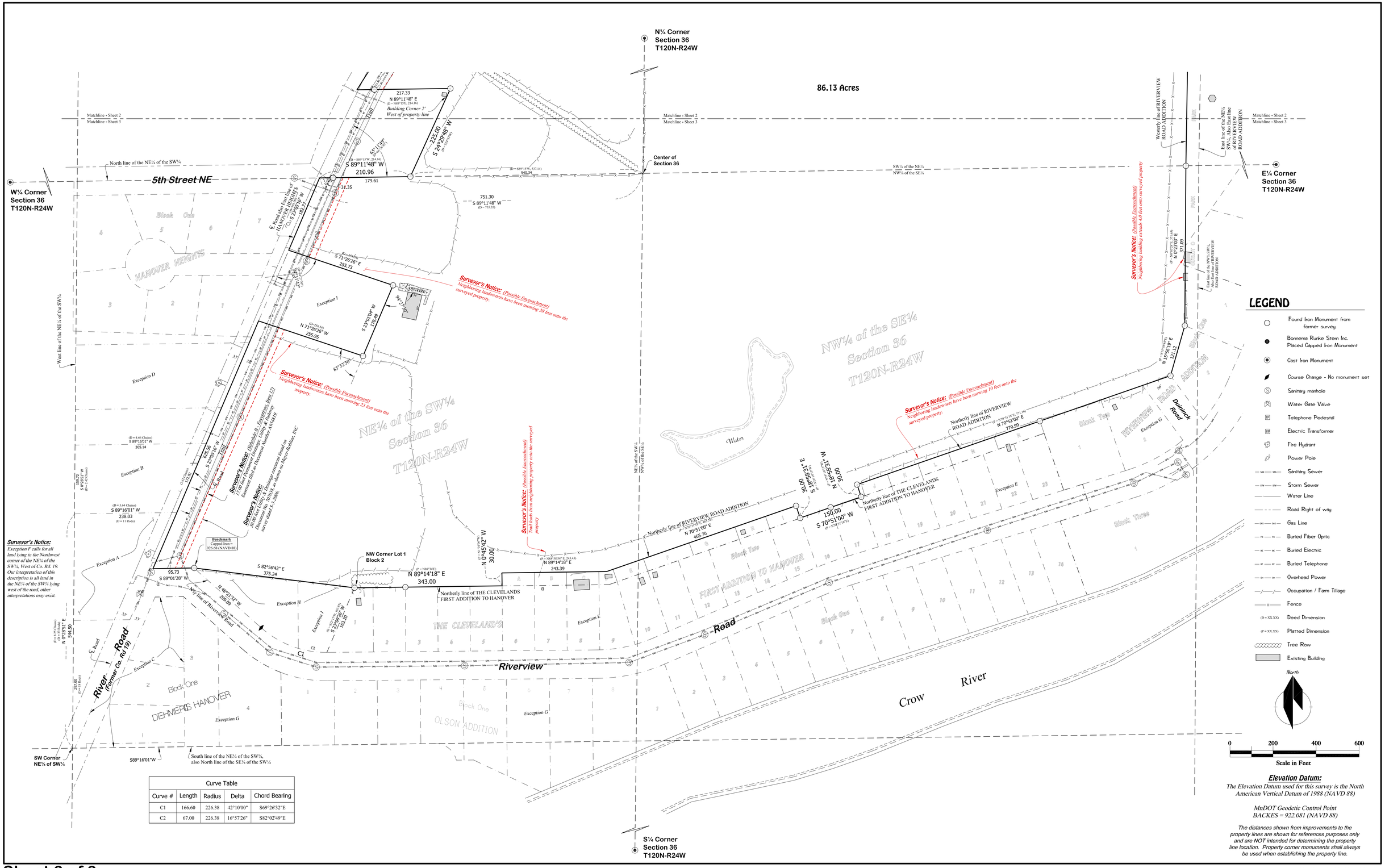
MnDOT Geodetic Control Point
BACKES = 922.081 (NAVD 88)

The distances shown from improvements to the property lines are shown for references purposes only and are NOT intended for determining the property line location. Property corner monuments shall always be used when establishing the property line.

Survey Requested By: **Duininck Inc.**

© BONNEMA RUNKE STERN INC 2018

36-120-24



Curve Table				
Curve #	Length	Radius	Delta	Chord Bearing
C1	166.60	226.38	42°10'00"	S69°26'32"E
C2	67.00	226.38	16°57'26"	S82°02'49"E

Elevation Datum:

The Elevation Datum used for this survey is the North American Vertical Datum of 1988 (NAVD 88)

MnDOT Geodetic Control Point
BACKES = 922.081 (NAVD 88)

The distances shown from improvements to the property lines are shown for references purposes only and are NOT intended for determining the property line location. Property corner monuments shall always be used when establishing the property line.

Sheet 3 of 3

Survey Requested By: **Duininck Inc.**

© BONNEMA RUNKE STERN INC 2018

36-120-24

Preliminary Plat of:

HANOVER COVE

A Planned Unit Development

Located In:
E½ of the NW¼, NE¼ of the SW¼, SW¼ of the NE¼ and the NW¼ of the SE¼, Section 36, Township 120 North, Range 24 West, Wright County, MN

Curve Table				
Curve #	Length	Radius	Delta	Chord Bearing
C1	77.75	188.00	23°41'47"	S79°02'52"E
C2	144.12	200.00	41°17'09"	S19°44'49"W
C3	110.28	200.00	31°35'37"	S14°54'03"W
C4	33.83	200.00	9°41'32"	S35°32'38"W
C5	39.22	1000.00	2°14'49"	N39°16'00"E
C6	25.02	1000.00	1°26'01"	N28°34'02"E
C7	40.02	360.00	6°22'09"	S31°02'06"W
C8	0.61	360.00	0°05'48"	S89°11'56"W
C9	35.39	1175.00	1°43'33"	N28°42'48"E
C10	25.86	185.00	8°00'32"	S31°51'18"W
C11	10.91	1060.00	0°35'23"	N40°05'43"E
C12	31.93	1060.00	1°43'33"	N28°42'48"E
C13	41.93	300.00	8°00'32"	S31°51'18"W
C14	5.31	300.00	1°00'54"	S88°44'23"W
C15	5.31	185.00	1°38'45"	S88°25'27"W
C16	38.25	325.00	6°44'34"	S87°31'28"E
C18	42.79	440.00	5°34'18"	S52°23'45"E
C19	31.60	325.00	5°34'18"	S52°23'45"E
C20	100.88	140.00	41°17'09"	S19°44'49"W
C21	21.92	140.00	8°58'14"	S3°35'22"W
C22	78.98	140.00	32°19'28"	S24°13'40"W
C23	42.83	500.00	4°54'27"	S72°37'01"E
C24	6.35	500.00	0°43'41"	N89°28'05"E
C25	42.66	100.00	24°26'42"	N83°04'21"E
C26	56.35	45.00	71°44'45"	N34°58'37"E
C27	23.74	160.00	8°30'07"	S5°08'49"E
C28	45.59	160.00	16°19'33"	S17°33'39"E
C29	23.69	160.00	8°28'58"	N75°05'29"E
C30	22.35	105.00	12°11'44"	N64°45'08"E
C31	13.94	105.00	7°36'25"	N2°54'27"E
C32	131.48	105.00	71°44'45"	N34°58'37"E
C33	29.87	225.00	7°36'25"	N2°54'27"E
C34	38.75	225.00	9°52'02"	N11°38'41"E
C35	96.16	85.00	64°49'00"	N38°26'30"E
C36	36.68	85.00	24°43'20"	N25°10'48"E
C37	38.03	85.00	25°38'03"	N50°21'30"E
C38	11.39	85.00	7°40'29"	N67°00'46"E
C39	7.54	85.00	5°05'02"	N3°29'29"E
C40	17.61	85.00	11°52'10"	N6°53'03"E
C41	41.43	200.00	11°52'10"	N6°53'03"E
C42	26.79	200.00	7°40'29"	N67°00'46"E
C43	47.89	225.00	12°11'44"	N64°45'08"E
C44	41.72	280.63	8°31'04"	N75°06'32"E
C45	54.07	280.63	11°02'22"	S4°00'52"E
C46	15.72	375.00	2°24'04"	N0°18'17"E
C47	140.80	375.00	21°30'45"	N12°15'41"E
C48	31.83	375.00	4°51'49"	N20°35'09"E
C50	33.30	375.00	5°05'15"	N4°02'56"E
C51	69.51	35.00	113°47'38"	S33°52'45"E
C52	14.31	35.00	23°25'52"	S11°18'08"W
C53	29.23	35.00	47°51'22"	S24°20'29"E
C54	25.97	35.00	42°30'24"	S69°31'22"E
C55	59.33	185.00	18°22'26"	N80°02'13"E
C56	18.38	185.00	5°41'34"	N86°22'39"E
C57	40.95	185.00	12°40'52"	N77°11'26"E
C58	66.40	300.00	12°40'52"	N77°11'26"E
C59	29.81	300.00	5°41'34"	N86°22'39"E
C60	108.52	260.00	23°54'49"	N11°03'39"E
C61	20.23	260.00	4°27'31"	N20°47'19"E
C62	52.46	260.00	11°33'41"	N12°46'44"E
C63	35.82	260.00	7°53'39"	N3°03'04"E
C64	96.21	300.00	18°22'26"	N80°02'13"E
C65	27.86	813.41	1°57'45"	N22°40'59"E
C66	27.99	982.00	1°37'58"	N39°27'50"E
C68	17.82	1579.54	0°38'47"	S40°51'55"W

Curve Table				
Curve #	Length	Radius	Delta	Chord Bearing
C69	46.10	1579.54	1°40'20"	S39°42'22"W
C70	58.56	1579.54	2°07'27"	S37°48'41"W
C71	102.57	248.00	23°41'47"	S79°02'52"E
C72	25.65	248.00	5°55'37"	S70°09'46"E
C73	38.25	248.00	8°50'17"	S77°32'43"E
C74	38.66	248.00	8°55'54"	S86°25'48"E
C75	83.47	200.00	23°54'49"	N11°03'39"E
C76	3.07	200.00	0°52'45"	N0°27'23"W
C77	50.49	200.00	14°27'52"	N7°12'56"E
C78	29.91	200.00	8°34'12"	N18°43'58"E
C79	47.58	210.00	12°58'58"	S16°31'35"W
C80	134.92	100.00	77°18'15"	S61°40'11"W
C81	53.97	40.00	77°18'15"	S61°40'11"W
C82	5.12	100.00	2°56'02"	N81°08'42"W
C83	28.23	100.00	16°10'37"	S89°17'38"W
C84	31.04	100.00	17°47'05"	S72°18'47"W
C85	31.59	100.00	18°05'50"	S54°22'20"W
C86	30.41	100.00	17°25'17"	S36°37'09"W
C87	8.55	100.00	4°53'49"	S25°27'58"W
C88	225.55	50.00	258°27'47"	N73°47'11"E
C89	60.77	50.00	69°38'29"	N20°37'28"W
C90	29.76	50.00	34°06'28"	N31°15'00"E
C91	29.04	50.00	33°16'23"	N64°56'26"E
C92	27.79	50.00	31°50'40"	S82°30'02"E
C93	26.33	50.00	30°10'29"	S51°29'27"E
C94	25.14	50.00	28°48'46"	S21°59'50"E
C95	26.71	50.00	30°36'31"	S7°42'49"W
C96	41.43	210.00	11°18'13"	S49°01'45"E
C97	34.07	210.00	9°17'41"	S59°19'44"E
C98	32.25	210.00	8°47'58"	S68°22'33"E
C99	31.35	210.00	8°33'13"	S77°03'08"E
C100	34.63	210.00	9°26'49"	S86°03'10"E
C101	115.45	360.00	18°22'26"	N80°02'13"E
C102	77.42	360.00	12°19'17"	N83°03'47"E
C103	38.03	360.00	6°03'09"	N73°52'34"E
C105	26.73	200.00	7°39'23"	S26°52'10"W
C106	11.52	260.00	2°32'21"	N69°34'49"E

Line Table		
Line #	Length	Direction
L1	26.39	N89°06'15"E
L2	26.39	S89°06'15"W
L3	95.06	N49°36'36"W
L4	35.23	N40°23'24"E
L5	14.09	N40°23'24"E
L7	7.31	N40°23'24"E
L8	11.86	N0°53'45"W
L9	11.08	N40°23'24"E
L10	15.06	S49°36'36"E
L11	15.06	S49°36'36"E
L12	48.29	N0°53'45"W
L13	27.70	S0°59'30"W
L14	64.00	S0°53'45"E
L15	61.00	S0°53'45"E
L16	50.00	S0°53'45"E
L17	18.94	S0°53'45"E
L18	2.73	N70°51'00"E
L19	0.70	N70°51'00"E
L20	33.41	S89°13'26"W
L21	18.94	N0°53'45"W
L22	2.78	N89°14'50"E
L26	11.75	S0°53'45"E
L27	23.39	S23°01'04"W
L28	39.27	S11°32'13"W
L29	10.47	S67°11'58"E
L30	23.05	N23°01'04"E
L31	4.18	N89°14'13"E
L32	1.68	N23°05'16"E
L33	13.89	N23°05'16"E
L34	16.37	S82°56'42"E
L35	14.53	S0°56'58"W

DEDICATION

KNOW ALL MEN BY THESE PRESENTS that Marah, Co. as owners and proprietors of the following described property, situated in the County of Wright, State of Minnesota, to wit:

"Parcel 1:
The Southwest Quarter of the Northeast Quarter (SW¼ NE¼), AND the Northwest Quarter of the Southeast Quarter (NW¼ SE¼) (lying North of the Crow River); AND the Northeast Quarter of the Southwest Quarter (NE¼ SW¼), all of said land being in Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), Wright County, Minnesota, excepting therefrom the following tracts:
a) Tract sold to Board of Education of Hanover by deed recorded in Book 28 of Deeds, page 524.
b) Tract sold to Henry Ernest Kirscht by deed recorded in Book 74 of Deeds, page 207.
c) Tract sold to Lakeview Motors, Inc., by deed recorded in Book 158 of deeds, page 143.
d) Tract described as beginning at the Southwest corner of said Northeast Quarter of the Southwest Quarter (NE¼ SW¼), thence North 786.8 feet to beginning tract to be conveyed; thence North 150 feet, thence angle right 90° 337.6 feet to the right of way line of State Aid Road No. 6; thence Southwesterly along said right of way line 160 feet; thence West 275 feet to beginning; all of said land being in Section Thirty-six (36), Township One hundred Twenty (120), Range Twenty-four (24).
e) Plat of Cleveland's First Addition to Hanover as recorded in Book 5 of Plats, page 50.
f) All that land lying in the Northwest corner of the Northeast Quarter of the Southwest Quarter (NE¼ SW¼) West of County Road 19 as presently situated.
g) All that land platted as Olson Addition, Dehmer's Hanover and Riverview Road Addition, Pheasant Run Second Addition.
h) All that land described in Warranty Deed recorded August 13, 1969, in Book 228 of Deeds, page 37.
i) All that land described in Warranty Deed recorded September 28, 1978 in Book 291 of Deeds, page 180.
j) All that land described in Quit Claim Deed recorded July 12, 1979, in Book 294, page 153.

AND

Parcel 2:
That part of the East Half of the Northwest Quarter (E½ NW¼) of Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), Wright County, Minnesota, lying East of County Road No. 19, EXCEPT all that part of the Northwest Quarter (NW¼) of Section Thirty-six (36), Township One Hundred Twenty (120), Range Twenty-four (24), described as follows: Commencing at the center of said Section Thirty-six (36), thence South 89°15' West along the quarter line, 537.14 feet for a point of beginning, thence continuing on said last described course, 214.16 feet to the center of County Road, thence North 24°33' East along said center of road, 225 feet, thence North 89°15' East, 214.16 feet, thence South 24°33' West, 225 feet, to the point of beginning.

Has caused the same to be surveyed and platted as HANOVER COVE, and does hereby dedicate to the public for public use the public way(s) and/or the drainage and utility easement(s) as created by this plat.

In witness whereof said Marah, Co. have hereunto set their hands this ____ day of _____ 20 __

_____
OWNER NAME

STATE OF MINNESOTA
COUNTY OF_____

This instrument was acknowledged before me this____ day of _____ 20___ by Marah, Co.

_____
Notary Signature
Notary Public, _____ County, Minnesota
My Commission Expires _____

Land Surveyor

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

Dated this ____ day of _____ 20 ____

_____
Matthew D. Runke, Licensed Land Surveyor
Minnesota License No. (46171)

STATE OF MINNESOTA
COUNTY OF _____

This instrument was acknowledged by me this ____ day of _____ 20___, by Matthew D. Runke, Licensed Land Surveyor, Minnesota License No. 46171.

_____
Notary Signature
Notary Public, _____ County, Minnesota
My Commission Expires_____

Vicinity Sketch
City of Hanover, MN

Section 36, T120N-R24W

City Planning Commission

Approved by the Planning Comission of the City of Willmar, this____ day of _____ 20_____.

Signed:_____
Chair

ATTEST: _____
Secretary

City Council

Passed and adopted this _____ day of _____ 20___.

Signed:_____
Mayor

ATTEST: _____
City Clerk

County Surveyor

Approved this _____ day of _____, 20_____, A.D.

_____
Wright County Surveyor

County Auditor/Treasurer

TAX STATEMENT
I hereby certify that all taxes for 20 ___ on the land described herein are paid; and no delinquent taxes are due and transfer entered this _____ day of _____ 20____ .

_____
Wright County Auditor / Treasurer

County Recorder

I hereby certify that this instrument was filed for record in the office of the County Recorder in and for Kandiyohi County, Minnesota on this _____ day of _____, 20___, at _____o'clock __M., as Folder No._____, and as Document No. _____.

_____
Kandiyohi County Recorder

North

This drawing prepared by:

Bonnema Runke Stern Inc.
Professional Land Surveyors
1809 22nd St SW - Suite 104
Willmar, MN 56201
Office (320) 231-2844
Fax (320) 231-2827

Requested by: **Duininck Inc.**
C/O Jason Ver Steeg
408 6th St
Prinsburg, MN 56281

Dated: **July 26, 2018**

0 100 200 300
Scale in Feet

LEGEND

- Found Iron Monument from Former Survey
- Bonnema Runke Stern Inc. placed a 5/8" Iron Rod with a 46169-46171-14895 stamped Plastic Cap
- Cast Iron Monument
- Building Setbacks
- Proposed Building Footprint
- Existing Building Footprint
- Course Change - No Monument Set
- 3895 Total Lot Area in Square Feet
- 9840 s.f. Buildable Lot Area in Square Feet
- Open Water / Low Area

The Orientation of this bearing system is assumed. The West line of PHEASANT RUN SECOND ADDITION is assumed to bear N 0°56'55" E

Total Acres to be Subdivided:
86.13 total acres are to be subdivided.

Zoning Notice:
This property is currently situated in the zoning districts of I-1, Limited Industrial; I-2, General Industrial; and R-1A, Single Family Residential. For the property's intended use, it will need to be re-zoned or given a variance.

Easement Notice:
The current 17.00 foot Permanent Drainage, Utility & Pathway Easement as found on Document No. A954819, and the current 30.00 foot utility and drainage easement found on Document No. 707638, both on file in the office of the Wright County Recorder, will be completely encompassed by the newly dedicated right of way of River Road.

Flood Zone Notice:
This property is in Zone X of the Flood Insurance Rate Map, Community Panel No. 27053C0017F, which has an effective date of November 4, 2016 and IS NOT in a Special Flood Hazard Area.

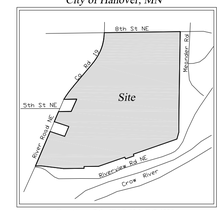
Preliminary Plat of:

HANOVER COVE

A Planned Unit Development

Located In:
E½ of the NW¼, NE¼ of the SW¼, SW¼ of the NE¼ and the NW¼ of the SE¼, Section 36, Township 120 North, Range 24 West, Wright County, MN

Vicinity Sketch
City of Hanover, MN



Section 36, T120N-R24W

North

This drawing prepared by:

Bonnema Runke Stern Inc.
Professional Land Surveyors
1809 22nd St SW - Suite 104
Willmar, MN 56201
Office (320) 231-2844
Fax (320) 231-2827

Requested by: **Duininck Inc.**
C/O Jason Ver Steeg
408 6th St
Prinsburg, MN 56281

Dated: **July 26, 2018**

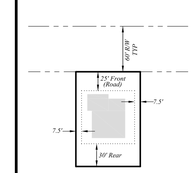
0 100 200 300
Scale in Feet

LEGEND

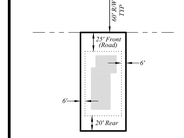
- Found Iron Monument from Former Survey
- Bonnema Runke Stern Inc. placed a 5/8" Iron Rod with a 46169-46171-14895 stamped Plastic Cap
- Cast Iron Monument
- Building Setbacks
- Proposed Building Footprint
- Existing Building Footprint
- Course Change - No Monument Set
- 3895 Total Lot Area in Square Feet
- 9840 s.f. Buildable Lot Area in Square Feet
- Open Water / Low Area

The Orientation of this bearing system is assumed. The West line of PHEASANT RUN SECOND ADDITION is assumed to bear N 0°56'55" E

Typical Single Family Home Building Setbacks



Typical Patio Home Building Setbacks



Single Family Homes

Block 1:
Lots 1-35
Block 2:
Lots 1-25 (all of Block 2)
Block 3:
Lots 1-18 (all of Block 3)
Block 4:
Lots 1-4 and 17-47
Block 5:
None
Block 6:
None
Block 7:
None
Block 8:
Lots 1-14 (all of Block 8)

Patio Homes

Block 1:
Lots 36-44
Block 2:
None
Block 3:
None
Block 4:
Lots 5-16
Block 5:
Lots 1-16 (all of Block 5)
Block 6:
Lots 1-64 (all of Block 6)
Block 7:
Lots 1-60 (all of Block 7)
Block 8:
None

Preliminary Plat of:

HANOVER COVE

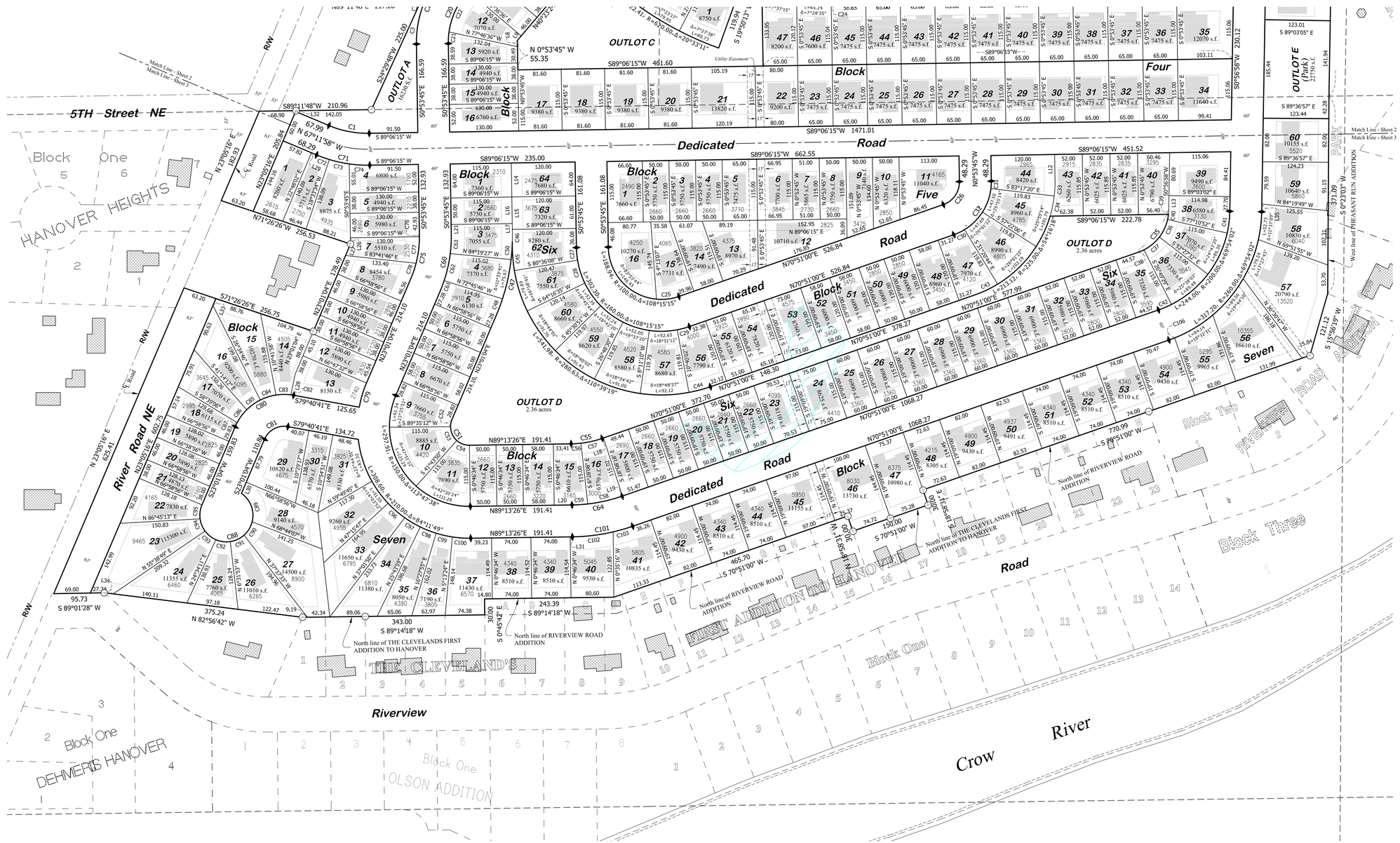
A Planned Unit Development

Located In:
E½ of the NW¼, NE¼ of the SW¼, SW¼ of the NE¼ and the NW¼ of the SE¼, Section 36, Township 120 North, Range 24 West, Wright County, MN

Vicinity Sketch
City of Hanover, MN

Section 36, T120N-R24W

North



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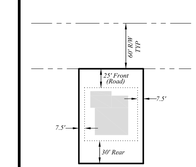
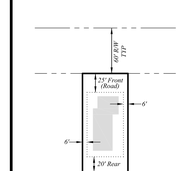


Typical Patio Home Building Setbacks



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Patio Homes

Block 1:
Lots 30-44
Block 2:
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Block 3:
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Block 4:
Lots 5-16
Block 5:
Lots 1-16 (all of Block 5)
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Preliminary Plat of:

HANOVER COVE

A Planned Unit Development

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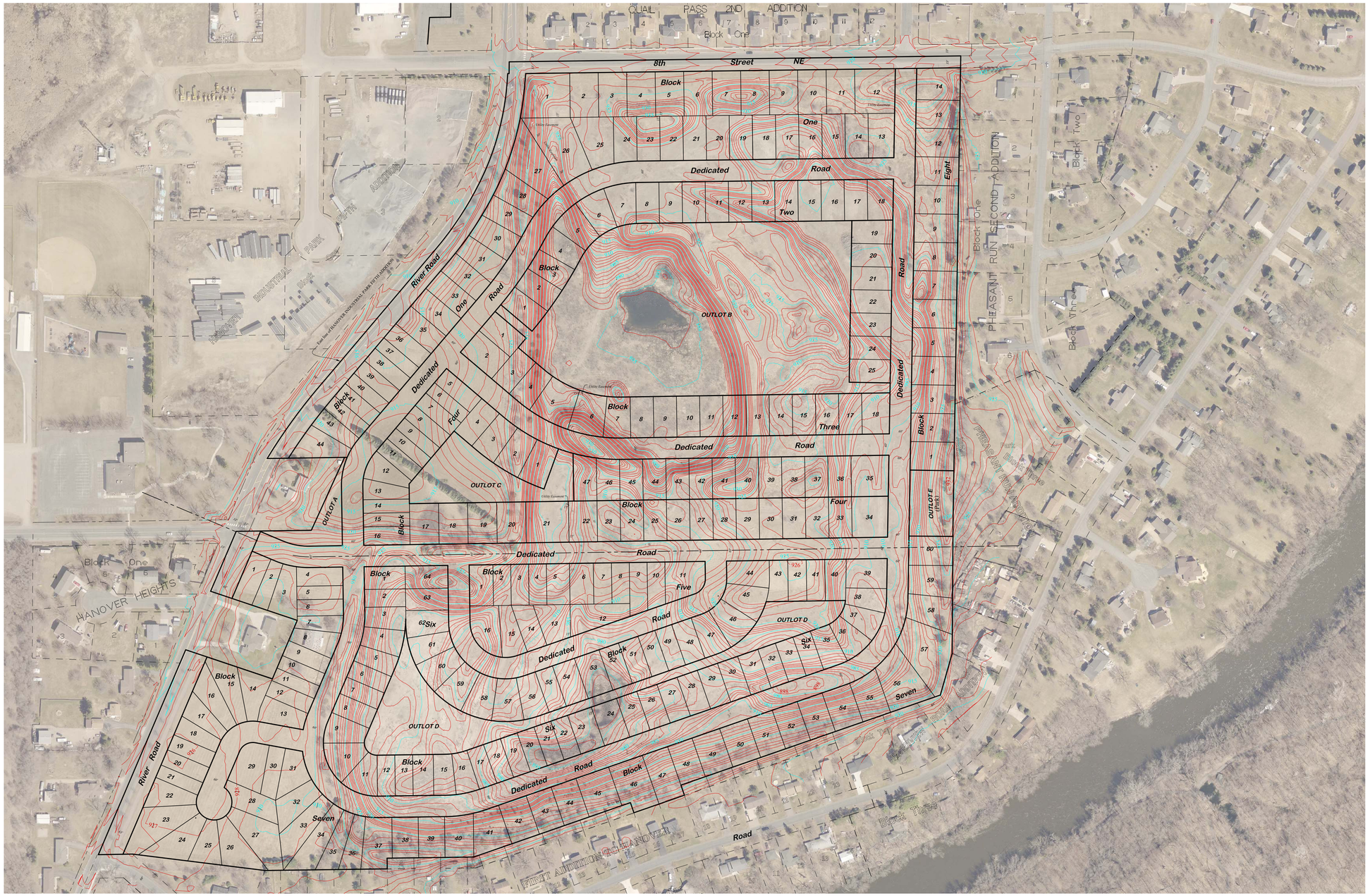

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Dated: **July 26, 2018**

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Scale in Feet

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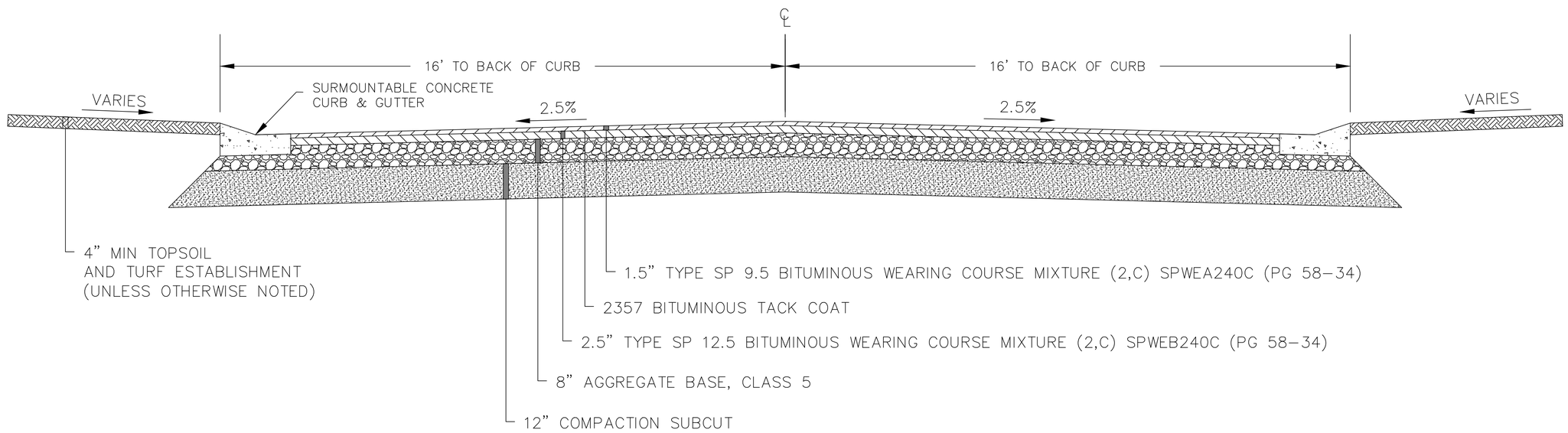

ROADWAY TYPICAL SECTION

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SIGNATURE: DATE: 7/25/2018

NAME: JASON VERSTEEG LIC. NO. 26505

DUININCK
PHONE: (320)978-6011 FAX: (320)978-4978
P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

HANOVER COVE
PRELIMINARY ENGINEERING PLAN
TYPICAL SECTION

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
JULY 25, 2018

SHEET
TYP1

SHEET TOPO1	DATE JULY 25, 2018	SCALE GRAPHIC	CHECKED BY: JVS / DRAWN BY: JVS

HANOVER COVE
PRELIMINARY ENGINEERING PLAN
EXISTING TOPOGRAPHY (NORTH)

HANOVER, MN

DUININCK
PHONE: (320)978-6011 FAX: (320)978-4978
P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

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SHEET TOPO2	DATE JULY 25, 2018	SCALE GRAPHIC	CHECKED BY: JVS / DRAWN BY: JVS

HANOVER COVE

PRELIMINARY ENGINEERING PLAN

EXISTING TOPOGRAPHY (SOUTHWEST)

HANOVER, MN

DUININCK

PHONE: (320)978-6011 FAX: (320)978-4978

P.O. BOX 208 408 SIXTH STREET

PRINSBURG, MN 56281

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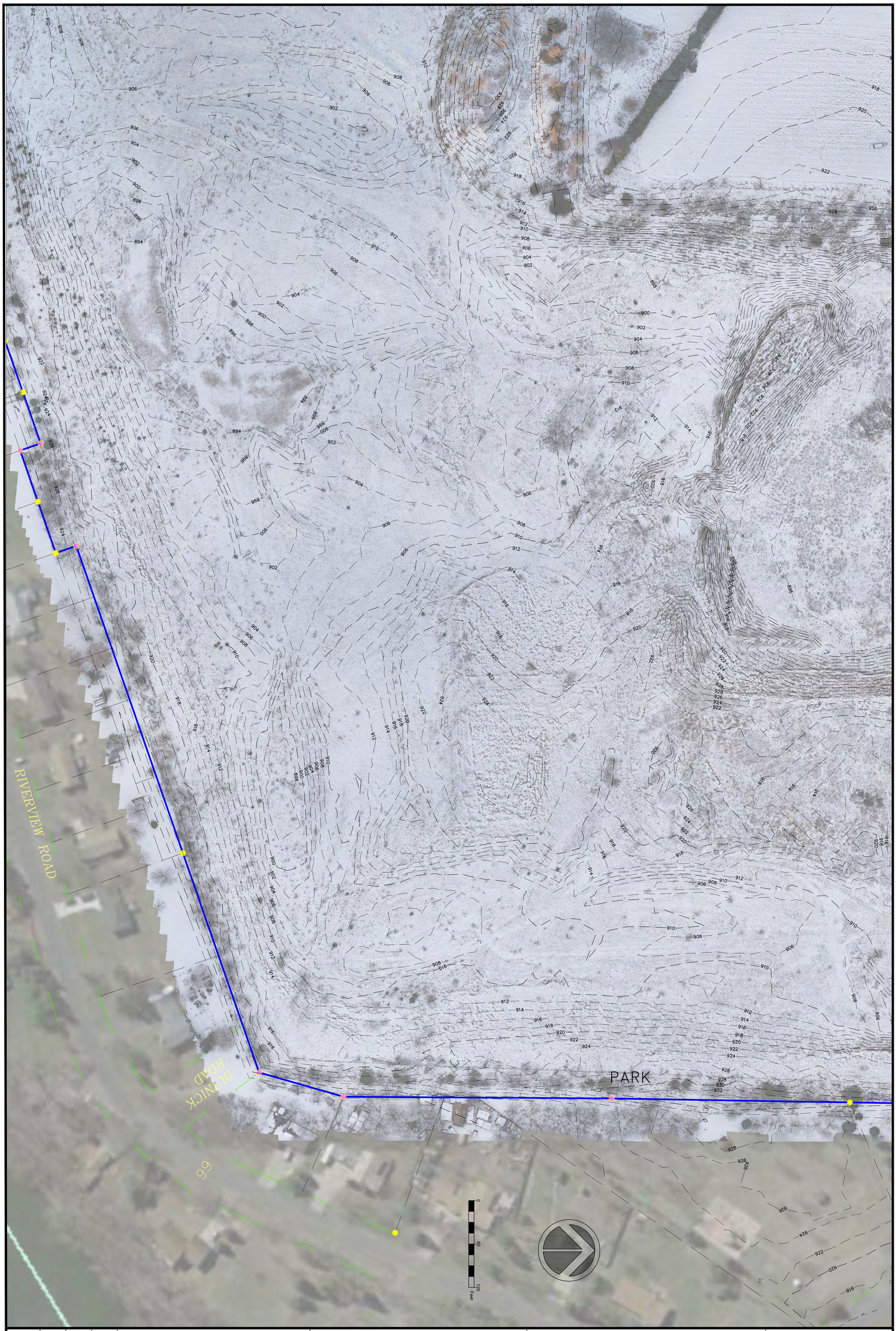

SHEET TOPO3	DATE JULY 25, 2018	SCALE GRAPHIC	CHECKED BY: JVS / DRAWN BY: JVS

HANOVER COVE

PRELIMINARY ENGINEERING PLAN

EXISTING TOPOGRAPHY (SOUTHEAST)

HANOVER, MN

DUININCK

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PRINSBURG, MN 56281

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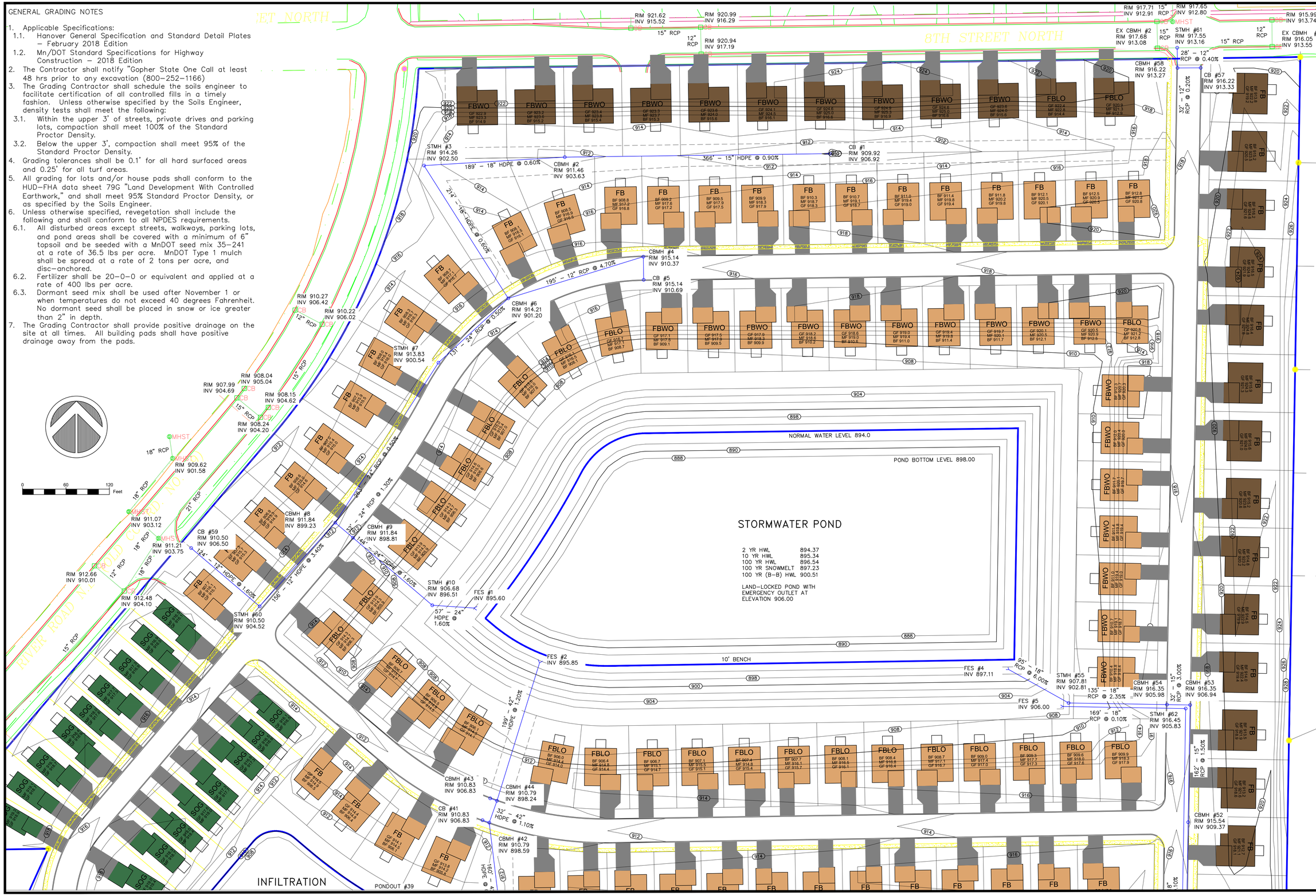
GENERAL GRADING NOTES

1. Applicable Specifications:
   1.1. Hanover General Specification and Standard Detail Plates – February 2018 Edition
   1.2. Mn/DOT Standard Specifications for Highway Construction – 2018 Edition
2. The Contractor shall notify "Gopher State One Call at least 48 hrs prior to any excavation (800–252–1166)
3. The Grading Contractor shall schedule the soils engineer to facilitate certification of all controlled fills in a timely fashion. Unless otherwise specified by the Soils Engineer, density tests shall meet the following:
   3.1. Within the upper 3' of streets, private drives and parking lots, compaction shall meet 100% of the Standard Proctor Density.
   3.2. Below the upper 3', compaction shall meet 95% of the Standard Proctor Density.
4. Grading tolerances shall be 0.1' for all hard surfaced areas and 0.25' for all turf areas.
5. All grading for lots and/or house pads shall conform to the HUD–FHA data sheet 79G "Land Development With Controlled Earthwork," and shall meet 95% Standard Proctor Density, or as specified by the Soils Engineer.
6. Unless otherwise specified, revegetation shall include the following and shall conform to all NPDES requirements.
   6.1. All disturbed areas except streets, walkways, parking lots, and pond areas shall be covered with a minimum of 6" topsoil and be seeded with a MnDOT seed mix 35–241 at a rate of 36.5 lbs per acre. MnDOT Type 1 mulch shall be spread at a rate of 2 tons per acre, and disc–anchored.
   6.2. Fertilizer shall be 20–0–0 or equivalent and applied at a rate of 400 lbs per acre.
   6.3. Dormant seed mix shall be used after November 1 or when temperatures do not exceed 40 degrees Fahrenheit. No dormant seed shall be placed in snow or ice greater than 2" in depth.
7. The Grading Contractor shall provide positive drainage on the site at all times. All building pads shall have positive drainage away from the pads.



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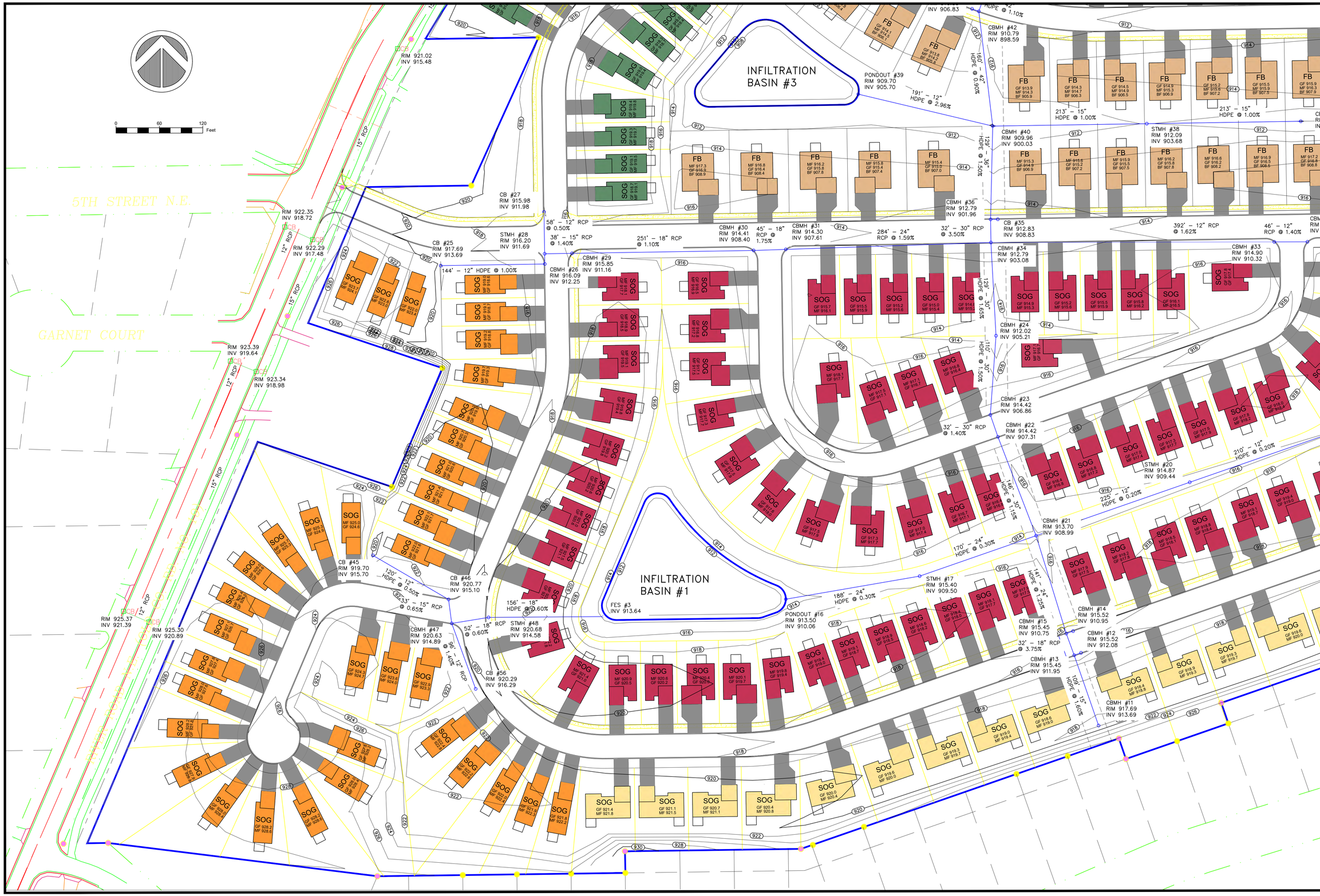
P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

HANOVER COVE
PRELIMINARY ENGINEERING PLAN
GRADING AND DRAINAGE PLAN (NORTH)
HANOVER, MN

CHECKED BY: JVS	DRAWN BY: JVS
SCALE GRAPHIC	
DATE AUGUST 18, 2018	
SHEET DRAIN1	



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HANOVER COVE

PRELIMINARY ENGINEERING PLAN

GRADING AND DRAINAGE PLAN (SOUTHWEST)

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
DRAIN2

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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
GRADING AND DRAINAGE PLAN (SOUTHEAST)

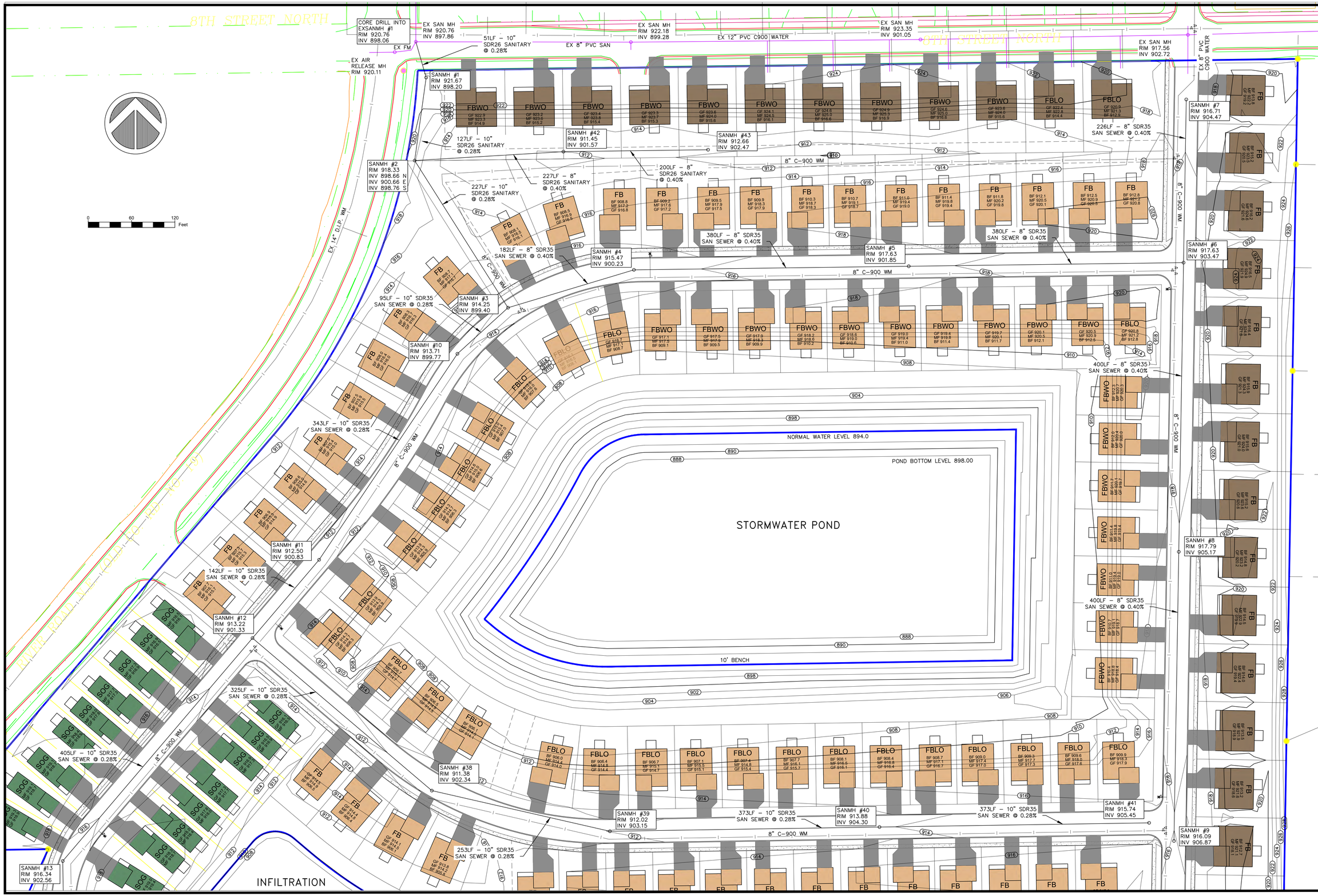
HANOVER, MN

CHECKED BY: JVS	DRAWN BY: JVS

SCALE: GRAPHIC

DATE: AUGUST 18, 2018

SHEET: DRAIN3



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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
UTILITY PLAN (NORTH)

HANOVER, MN

CHECKED BY: JVS	DRAWN BY: JVS
SCALE	GRAPHIC
DATE	AUGUST 18, 2018
SHEET	UTIL1

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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
UTILITY PLAN (SOUTHWEST)

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
UTIL2

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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
UTILITY PLAN (SOUTHEAST)

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE: GRAPHIC

DATE: AUGUST 18, 2018

SHEET: UTIL3

GENERAL PROJECT INFORMATION

PROJECT NAME: HANOVER COVE
Hanover, MN COUNTY: Wright

DESCRIPTION OF CONSTRUCTION ACTIVITY

This project includes construction of land disturbance of 1.03 acres to realign an existing township road on land owned by Al Ranta. Work includes removals, grading, gravel surfacing, and turf establishment.

KNOWLEDGEABLE PERSON / CHAIN OF RESPONSIBILITY

Owner: Paxmar, LLC Phone: 952-250-9895

SWPPP Preparer: Duininck, Inc. Contact Person: Jason Ver Steeg Phone: 320-212-9339

Contractor: _____ Contact Person: _____ Phone: _____

Person Responsible for SWPPP Inspections/Maintenance: _____ Phone: _____

Long-term O&M: Paxmar, LLC and City of Hanover

TRAINING

The individual(s) listed as the SWPPP preparer must be trained. The individual(s) overseeing implementation of, revising, and amending the SWPPP, as well as performing inspections must be trained and also must be available for an onsite inspection within 72 hours upon request by the MPCA. The individual(s) performing or supervising the installation, maintenance and repair of BMP's must be trained.

Required Documentation:

1. Names of trained personnel assigned to this project.
2. Dates of training and entity providing the training.
3. Content of training course or workshop.
4. As an alternative to 1, 2, and 3, a photocopy of a current Erosion and Stormwater Management card, issued by the University of Minnesota can be attached to the SWPPP.

SPECIAL ENVIRONMENTAL CONCERNS

An Environmental Assessment Worksheet (EAW) was prepared for this site, and any applicable findings were incorporated into this Stormwater Pollution Prevention Plan.

The Contractor should be aware of the potential to impact the Blandings Turtle and the Rusty Patch Bumblebee. If either of these species are encountered, special care must be taken to avoid any impact and the Engineer must be notified. No protected archeological features were identified in the EAW.

This site does not drain to a Calcareous Fen.

PROJECT LOCATION

County: Wright Township: 120 N Range: 22 W Section(s): 36

Latitude: 45° 09' 35" Longitude: -93° 39' 21"

PROJECT AREA CALCULATIONS

Total Project Area: 82.56 Acres

Total Disturbed Area: 82.56 Acres

Existing Impervious Area: 0.06 Acres

Post- construction Impervious Area: 31.99 Acres

New Impervious Surface Area Created: 31.93 Acres

NPDES Permit Required?: Yes (Apply at least 7 days prior to land disturbance)

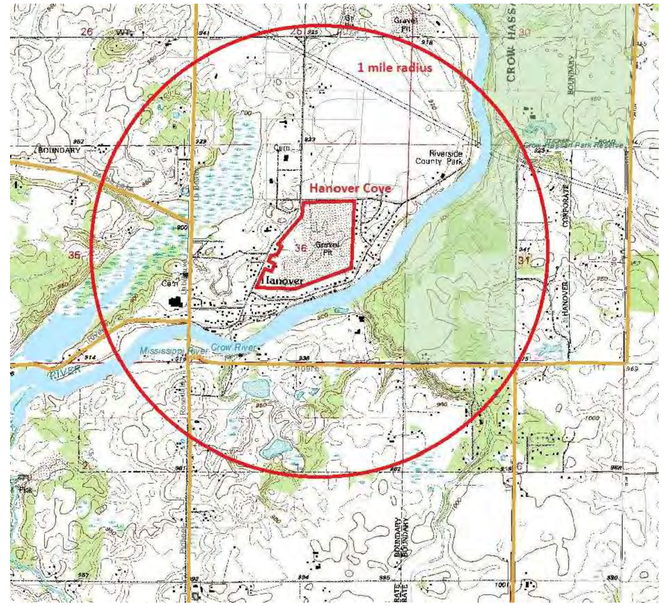
Permanent Storm Water Management Required?: No

PROJECT TIMING

Estimated Construction Start Date: October 1, 2018

Estimated Construction Completion Date: December 31, 2025

USGS QUAD MAP



RECEIVING WATERS

Receiving water (including surface water, wetlands, or stormwater ponds) within 1 mile are shown on the USGS 7.5 min quad map above and further identified in the list below, including whether the surface water is a special or impaired water. All special measures required by the NPDES permit or TMDL study to address runoff into special or impaired waters have been incorporated into the plan.

Name of Water Body	Type (ditch, pond, wetland, lake, etc.)	Appendix A Special Water	Flows to Impaired Water within 1 mi?	USEPA Appr. TMDL?
Crow River	River	No	Yes	No

PERMANENT STORMWATER MANAGEMENT SYSTEM

Type of permanent storm water management:

Wet sedimentation basin	X
Infiltration / Filtration	X
Regional Pond	____
Not required	____

All design calculations required to comply with Part III of the Permit are on file at the office of the Civil Engineer of record. In cases where compliance with temporary or permanent storm water management design requirements are infeasible, documentation of infeasibility is also on on file at the office of the Civil Engineer of record.

PLAN SHEETS

The following sheets are incorporated into the SWPPP by reference:

Grading and Drainage Plan
Erosion Control Plan

USDA SCS SOIL SURVEY MAP

SOIL TYPE SUMMARY:

Map Unit Symbol	Map Unit Name	Hyd Soil Group
1015	Udipsamments (cut and fill land)	A
1033	Pits, gravel-Udipsamments complex	A
1066B	Malardi-Hawick complex, 1 to 6 percent slopes	A

BMP QUANTITIES

Construction Entrance	2 LS
Silt Fence (Machine-Sliced)	10,364 LF
Seeding	54.0 ACRES

ORDER OF CONSTRUCTION ACTIVITIES

- Install Erosion Control Items
- Install Temporary Tracking Control
- Clearing and Grubbing
- Mass Site Grading
- Sanitary Sewer, Storm Sewer, Watermain Installation
- Aggregate Base Installation
- Curb and Gutter Installation
- Bituminous Pavement Installation
- Turf Establishment
- Individual Lot/House Construction

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SIGNATURE: _____ DATE: 8/18/2018

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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
STORMWATER POLLUTION PREVENTION PLAN
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
SWPPP1

EROSION CONTROL NOTES

- Appropriate BMPs such as construction phasing, vegetative buffer strips, horizontal slope grading, inspection and maintenance of Part IV.E. and other construction practices that minimize erosion as necessary must be planned and implemented
- The location of areas not to be disturbed must be delineated (e.g.,with flags, stakes, signs, silt fence etc.) on the project site before work begins.
- Disturbance of portions of the project that have steep slopes must be minimized. In locations that steep slopes must be disturbed, techniques such as phasing and stabilization practices designed for steep slopes (e.g., slope draining and terracing) must be used.
- All exposed soil areas (including stockpiles) must be stabilized. Stabilization must be initiated immediately to limit soil erosion whenever any construction activity has permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed no later than 14 calendar days after the construction activity in that portion of the site has temporarily or permanently ceased. For Public Waters that the Minnesota Department of Natural Resources has promulgated "work in water restrictions" during specified fish spawning time frames, all exposed soil areas that are within 200 feet of the water's edge, and drain to these waters must complete the stabilization activities within 24 hours during the restriction period. Temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) and the constructed base components of roads, parking lots and similar surfaces are exempt from this requirement but must comply with the requirements of "Sediment Control Practices, Item 3."
- Stormwater conveyance channels must be routed around unstabilized areas on the site to reduce erosion, unless infeasible.
- Erosion controls and velocity dissipation devices such as check dams, sediment traps, riprap, or grouted riprap at outlets shall be used within and along the length of any constructed stormwater conveyance channel, and at any outlet.
- The normal wetted perimeter of any temporary or permanent drainage ditch or swale that drains water from any portion of the construction site, or diverts water around the site, within 200 lineal feet from the property edge, or from the point of discharge into any surface water must be stabilized. Stabilization of the last 200 lineal feet must be completed within 24 hours after connecting to a surface water or property edge. Stabilization of the remaining portions of any temporary or permanent ditches or swales must be stabilized within 14 calendar days after connecting to a surface water or property edge and construction in that portion of the ditch has temporarily or permanently ceased. Temporary or permanent ditches or swales that are being used as a sediment containment system during construction (with properly designed rock ditch checks, bio rolls, silt dikes, etc.) do not need to be stabilized during the temporary period of its use as a sediment containment system. These areas must be stabilized within 24 hours after no longer being used as a sediment containment system. Applying mulch, hydromulch, tackifier, polyacrylamide or similar erosion prevention practices is not acceptable stabilization in any part of a temporary or permanent drainage ditch or swale.
- Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours after connection to a surface water.
- Unless infeasible due to lack of pervious or vegetated areas, discharges from BMPs must be directed to vegetated areas of the site (including any natural buffers). The Permittee(s) must use velocity dissipation devices if necessary to prevent erosion when directing stormwater to vegetated areas.

RECORD RETENTION

The SWPPP (original or copies) including, all changes to it, and inspections and maintenance records must be kept at the site during construction by the party who has/have operational control of that portion of the site. The SWPPP can be kept in either the field office or in an on-site vehicle during normal working hours. All owner(s) must keep the following records on file for three (3) years after submittal of the NOT:

1. The final SWPPP
2. Any other stormwater related permits required for the project
3. Records of all inspection and maintenance conducted during construction
4. All permanent operation and maintenance agreements that have been implemented, including all right-of-way, contracts, covenants and other binding requirements regarding perpetual maintenance
5. All required calculations for design of the temporary and permanent Stormwater Management Systems identified in the SWPPP.

SEDIMENT CONTROL PRACTICES

- Sediment control practices shall be employed as necessary to minimize sediment from entering surface waters, including curb and gutter systems and storm sewer inlets.
- Sediment control practices must be established on all down gradient perimeters and be located upgradient of any buffer zones. The perimeter sediment control practice must be in place before any upgradient land-disturbing activities begin. These practices shall remain in place until final stabilization has been established.
- Sediment control practices that have been adjusted or removed to accommodate short-term activities such as cleaning or grubbing, or passage of vehicles, shall be re-installed immediately after the short-term activity has been completed, or before the next precipitation event, whichever comes first.
- All storm drain inlets must be protected by appropriate BMPs during construction until all sources with potential for discharging to the inlet have been stabilized. Inlet protection may be removed for a particular inlet if a specific safety concern (street flooding/freezing) has been identified by the permittee or the jurisdictional authority (e.g., city/county/township/MnDOT engineer). Documentation of the need for removal must be included in the SWPPP.

SEDIMENT CONTROL PRACTICES (cont)

- Temporary soil stockpiles must have silt fence or other effective sediment controls, and cannot be placed in any natural buffers or surface waters, including stormwater conveyances such as curb and gutter systems, or conduits and ditches unless there is a bypass in place for the stormwater.
- Where vehicle traffic leaves any part of the site (or onto paved roads within the site),a vehicle tracking BMP to minimize the track out of sediment from the construction site. Examples of vehicle tracking BMPs include (but are not limited to) rock pads, mud mats, slash mulch, concrete or steel wash racks, or equivalent systems. Where such vehicle tracking BMPs are not adequate to prevent sediment from being tracked onto the street, street sweeping shall be used.
- Soil compaction shall be minimized in all areas except where the function of a specific area of the site dictates that it be compacted.
- All topsoil shall be preserved, unless infeasible.
- A 50 foot natural buffer shall be maintained, or (if a buffer is infeasible on the site) redundant sediment controls provided, when a surface water is located within 50 feet of the project's earth disturbances and stormwater flows to the surface water. Natural buffers are not required adjacent to road ditches, judicial ditches, county ditches, stormwater conveyance channels, storm drain inlets, and sediment basins.
- The use of polymers, flocculants, or other sedimentation treatment chemicals on the project site must comply with the following minimum requirements: 1) Conventional erosion and sediment controls must be used prior to chemical addition to ensure effective treatment. Chemicals may only be applied where treated stormwater is directed to a sediment control system which allows for filtration or settlement of the floc prior to discharge. 2) Chemicals must be selected that are appropriately suited to the types of soils likely to be exposed during construction, and to the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or area. 3) Chemicals must be used in accordance with accepted engineering practices, and with dosing specifications and sediment removal design specifications provided by the manufacturer or provider/supplier of the applicable chemicals.

DEWATERING AND BASIN DRAINING

- Turbid or sediment-laden waters related to dewatering or basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) must be discharged to a temporary or permanent sedimentation basin on the project site unless infeasible. The temporary or permanent sedimentation basins 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 nuisance conditions will not result from the discharge. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream properties. If water containing oil or grease must be discharged, an oil-water separator or suitable filtration device (e.g. cartridge filters, absorbents pads) must be used prior to discharging the water.
- Discharge points must be adequately protected from erosion and scour by dispersion over natural rock riprap, sand bags, plastic sheeting, or other accepted energy dissipation measures.
- All water from dewatering or basin-draining activities must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in wetlands causing significant adverse impact to the wetland.
- If filters with backwash water are being used, the backwash water must be hauled away for disposal, returned to the beginning of the treatment process, or incorporated into the site in a manner that does not cause erosion. Backwash water may be discharged to the sanitary sewer if permission is granted by the sanitary sewer authority. The filter media used in the dewatering device must be replaced and cleaned when required to retain adequate function.

POLLUTION PREVENTION MANAGEMENT MEASURES

- Building products that have the potential to leach pollutants must be under cover (e.g., plastic sheeting or temporary roofs) to prevent the discharge of pollutants or protected by a similarly effective means designed to minimize contact with stormwater.
- Pesticides, herbicides, insecticides, fertilizers, treatment chemicals, and landscape materials must be under cover (e.g., plastic sheeting or temporary roofs) to prevent the discharge of pollutants or protected by similarly effective means designed to minimize contact with stormwater.
- Hazardous materials, toxic waste, (including oil, diesel fuel, gasoline, hydraulic fluids, paint solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids) must be properly stored in sealed containers to prevent spills, leaks or other discharge. Restricted access storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste or hazardous materials must be in compliance with Minn. R. ch. 7045 including secondary containment as applicable.
- Solid waste must be stored, collected and disposed of properly in compliance with Minn. R. ch. 7035.
- 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.

POLLUTION PREVENTION MANAGEMENT MEASURES (cont)

- Fueling and Maintenance of Equipment or Vehicles; Spill Prevention and Response: Reasonable steps must be taken to prevent the discharge of spilled or leaked chemicals, including fuel, from any area where chemicals or fuel will be loaded or unloaded, including the use of drip pans or absorbents, and fueling in a contained area, unless infeasible. Adequate supplies must be available at all times to clean up discharged materials and an appropriate disposal method must be available for recovered spilled materials. Spills must be reported and cleaned up immediately as required by Minn. Stat. § 115.061, using dry clean up measures where possible.
- Vehicle and equipment washing: Washing the exterior of vehicles or equipment on the project site must be limited to a defined area of the site. Runoff from the washing area must be contained in a sediment basin or other similarly effective controls and waste from the washing activity must be properly disposed of. Soaps, detergents, or solvents must be properly used. No engine degreasing is allowed on site.
- Concrete and other washouts waste: Effective containment must be provided for all liquid and solid wastes generated by washout operations (concrete, stucco, paint, form release oils, curing compounds and other construction materials) related to the construction activity. The liquid and solid washout wastes must not contact the ground, and the containment must be designed so that it does not result in runoff from the washout operations or areas. Liquid and solid wastes must be disposed of properly and in compliance with MPCA rules. A sign must be installed adjacent to each washout facility that requires site personnel to utilize the proper facilities for disposal of concrete and other washout wastes.

TEMPORARY SEDIMENTATOIN BASINS

Where ten (10) or more acres of disturbed soil drain to a common location, a temporary sediment basin must be provided to treat the runoff before it leaves the construction site or enters surface waters. A temporary sediment basin may be converted to a permanent basin after construction is complete. The temporary basin is no longer required when permanent cover has reduced the acreage of disturbed soil to less than ten (10) acres draining to a common location. The basins must be designed and constructed according to the following requirements:

1. The basins must provide live storage for a calculated volume of runoff from a two-year, 24-hour storm from each acre drained to the basin, except that in no case shall the basin provide less than 1,800 cubic feet of live storage from each acre drained to the basin.
2. Where this calculation has not been performed, a temporary sediment basin providing 3,600 cubic feet of live storage per acre drained to the basin shall be provided for the entire drainage area of the temporary basin.
3. Temporary basin outlets must be designed to prevent short-circuiting and the discharge of floating debris. The basin must be designed with the ability to allow complete basin drawdown for maintenance activities, and must include a stabilized emergency overflow to prevent failure of pond integrity. The outlet structure must be designed to withdraw water from the surface in order to minimize the discharge of pollutants, except that the use of a surface withdrawal mechanism for discharge of the basin may be temporarily suspended during frozen conditions. Energy dissipation must be provided for the basin outlet.
4. Sediment Basins must be situated outside of surface waters and any required buffer zone required and must be designed to avoid draining water from wetlands unless the impact to the wetland.
5. The temporary basins must be constructed and made operational prior to 10 or more acres of disturbed soil draining to a common location.
6. Where a temporary sediment basin meeting the requirements of this part is infeasible, equivalent sediment controls such as smaller sediment basins, and/or sediment traps, silt fences, vegetative buffer strips, or any appropriate combination of measures are required for all down-]slope boundanes of the construction area and for side-slope boundanes as dictated by individual site conditions. In determining whether installing a sediment basin is infeasible, public safety must be considered, as well as other factors such as site soils, slope, and available area on site. This determination of infeasibility must be documented in the SWPPP

INSPECTIONS AND MAINTENANCE

- A properly trained person must routinely inspect the entire construction site at least once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours. Following an inspection that occurs within 24 hours after a rainfall event, the next inspection must be conducted within seven (7) days after the rainfall event.
- All inspections and maintenance conducted during construction must be recorded within 24 hours in writing and these records must be retained with the SWPPP. Records of each inspection and maintenance activity shall include: a.) Date and time of inspections b.) Name of person(s) conducting inspections c.) Findings of inspections, including the specific location where corrective actions are needed d.) Corrective actions taken (including dates, times, and party completing maintenance activities) e.) Date and amount of all rainfall events greater than 1/2 inch (0.5 inches) in 24 hours. Rainfall amounts must be obtained by a properly maintained rain gauge installed onsite, a weather station that is within 1 mile of your location or a weather reporting system that provides site specific rainfall data from radar summaries. f.) If any discharge is observed to be occurring during the inspection, a record of all points of the property from which there is a discharge must be made, and the discharge should be described (i.e., color, odor, floating, settled, or suspended solids, foam, oil sheen, and other obvious indicators of pollutants) and photographed. g.) Any amendments to the SWPPP proposed as a result of the inspection must be documented within seven (7) calendar days.

INSPECTIONS AND MAINTENANCE (cont)

Inspection Frequency Adjustment: Where parts of the project site have permanent cover, but work remains on other parts of the site, the Permittee(s) may reduce inspections of the areas with permanent cover to once per month. Where construction sites have permanent cover on all exposed soil areas and no construction activity is occurring anywhere on the site, the site must be inspected during non-frozen ground conditions at least once per month for a period of twelve (12) months. Following the twelfth month of permanent cover and no construction activity, inspections may be terminated until construction activity is once again initiated unless the Permittee(s) is/are notified in writing by the MPCA that erosion issues have been detected at the site and inspections need to resume. Where work has been suspended due to frozen ground conditions, the inspections may be suspended. The required inspections and maintenance schedule must begin within 24 hours after runoff occurs at the site or 24 hours prior to resuming construction, whichever comes first.

The temporary and permanent water quality management BMPs must be inspected, as well as all erosion prevention and sediment control BMPs, until responsibility for inspections and maintenance has been transferred by submitting notice to the MPCA, or the project has undergone Final Stabilization, and an NOT has been submitted to the MPCA.

As part of each and every routine and post-rainfall event inspection, all erosion prevention and sediment control BMPs and Pollution Prevention Management Measures must be inspected to ensure integrity and effectiveness. All nonfunctional BMPs must be repaired, replaced, or
supplemented with functional BMPs by the end of the next business day after discovery, or as
soon as field conditions allow access, unless another time frame is specified below:

a. All perimeter control devices must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches one-half (1/2) of the height of the device. These repairs must be made by the end of the next business day after discovery, or thereafter as soon as field conditions allow access.

b. Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches one-half (1/2) the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow access

c. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of erosion and sediment deposition during each inspection. All deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, must be removed and restabilized. The removal and stabilization must take place within seven (7) days of discovery unless precluded by legal, regulatory, or physical access constraints. All reasonable efforts must be used to obtain access. If precluded, removal and stabilization must take place within seven (7) calendar days of obtaining access. All applicable local, regional, state and federal authorities must be contacted and any applicable permits received, prior to conducting any work in surface waters.

d. Construction site vehicle exit locations must be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment must be removed from all paved surfaces both on and off site within 24 hours of discovery.

e. Streets and other areas adjacent to the project must be inspected for evidence of off-site accumulations of sediment. If sediment is present, it must be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).

- All infiltration areas must be inspected to ensure that no sediment from ongoing construction activity is reaching the infiltration area. All infiltration areas must be inspected to ensure that equipment is not being driven across the infiltration area.

FINAL STABILIZATION

Final Stabilization of the site must be assured. Final Stabilization is not complete until all of the following requirements are complete:

1. All soil disturbing activities at the site have been completed and all soils are stabilized by a uniform perennial vegetative cover with a density of 70 percent of its expected final growth density over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions.
2. The permanent stormwater management system is constructed according to the plans and is operating as designed. Temporary or permanent sedimentation basins that are to be used as permanent water quality management basins have been cleaned of any accumulated sediment. All sediment has been removed from conveyance systems and ditches are stabilized with permanent cover.
3. All temporary synthetic and structural erosion prevention and sediment control BMPs (such as silt fence) have been removed. BMPs designed to decompose on site (such as some compost logs) may be left in place.
4. For residential construction only, individual lots are considered finally stabilized if the structure(s) are finished and temporary erosion protection and down-gradient perimeter control has been completed and the residence has been sold to the homeowner. Additionally, the MPCA's "Homeowner Fact Sheet" must be delivered to the homeowner to inform the homeowner of the need for, and benefits of, permanent cover.
5. For construction projects on agricultural land (e.g., pipelines across crop, field pasture or range land) the disturbed land has been returned to its pre-construction agricultural use.

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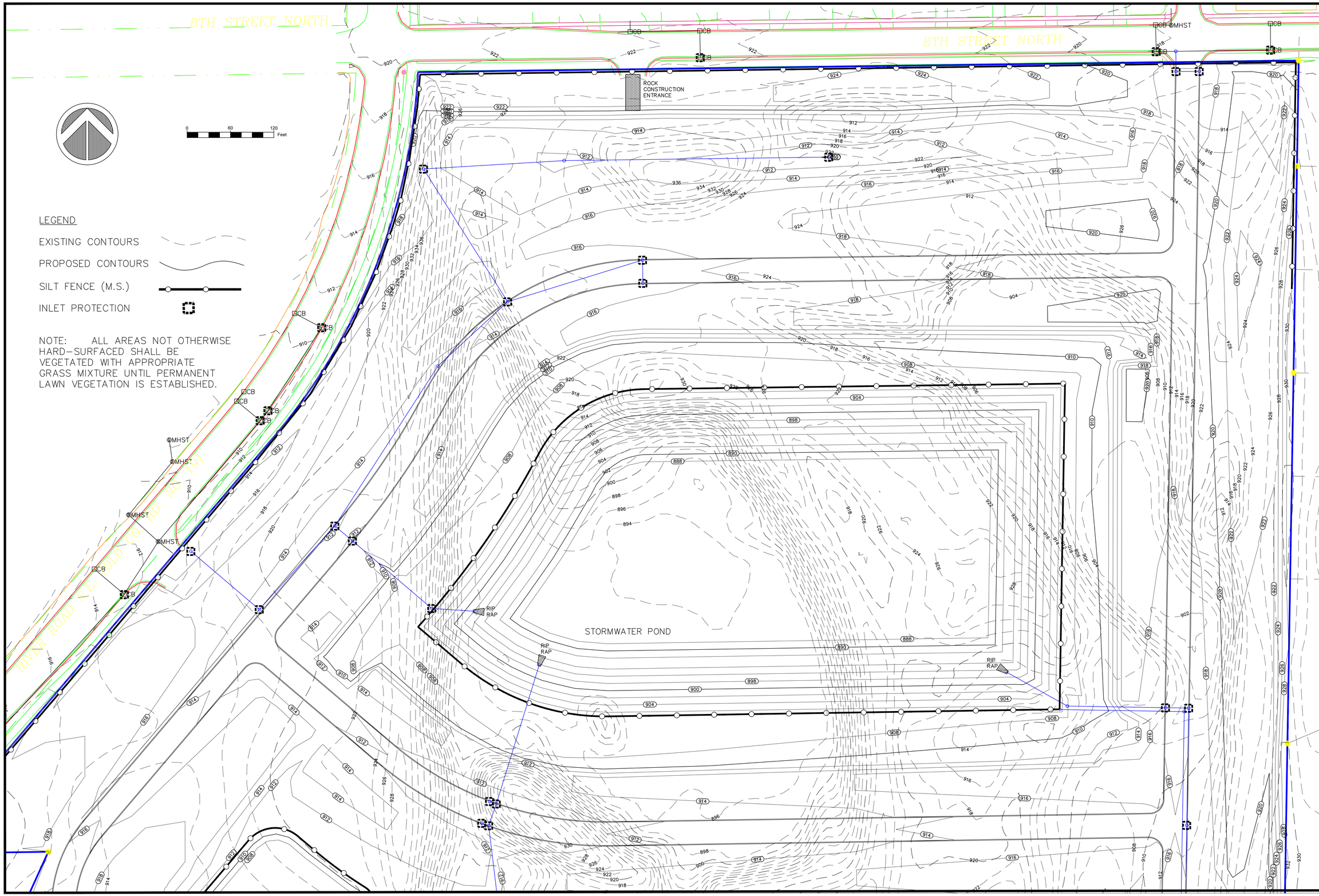
HANOVER COVE
PRELIMINARY ENGINEERING PLAN
STORMWATER POLLUTION PREVENTION PLAN
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
JULY 25, 2018

SHEET
SWPPP2



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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
EROSION CONTROL PLAN (NORTH)

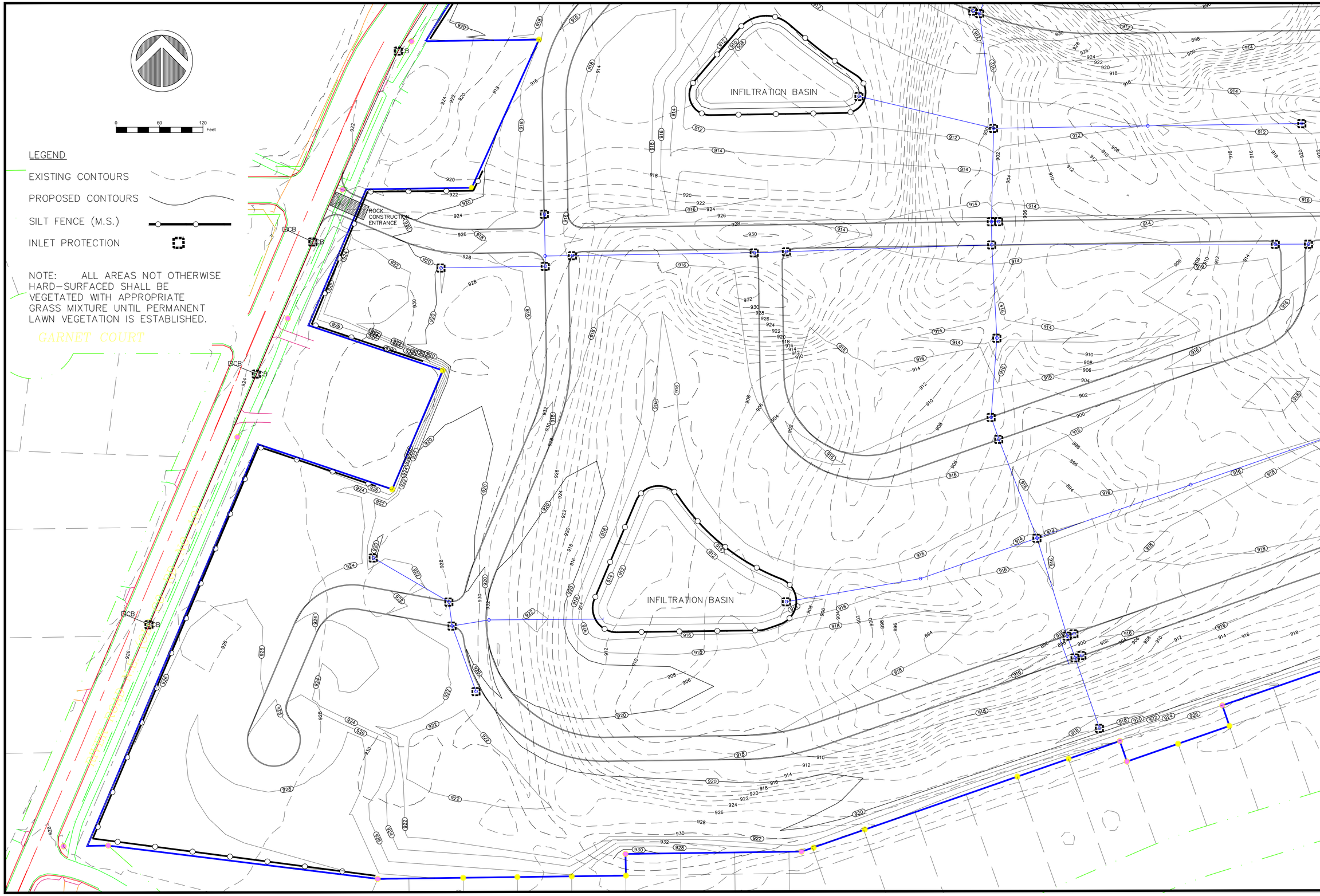
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE: GRAPHIC

DATE: AUGUST 18, 2018

SHEET: EC1



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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
EROSION CONTROL PLAN (SOUTHWEST)

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
EC2

INFILTRATION BASIN

INFILTRATION BASIN

TION / BASIN

PARK

DUININCK ROAD

RIVERVIEW ROAD

CB TOP BEEHIVE

0 60 120 Feet

LEGEND

EXISTING CONTOURS

PROPOSED CONTOURS

SILT FENCE (M.S.)

INLET PROTECTION

NOTE: ALL AREAS NOT OTHERWISE HARD-SURFACED SHALL BE VEGETATED WITH APPROPRIATE GRASS MIXTURE UNTIL PERMANENT LAWN VEGETATION IS ESTABLISHED.

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HANOVER COVE

PRELIMINARY ENGINEERING PLAN

EROSION CONTROL PLAN (SOUTHEAST)

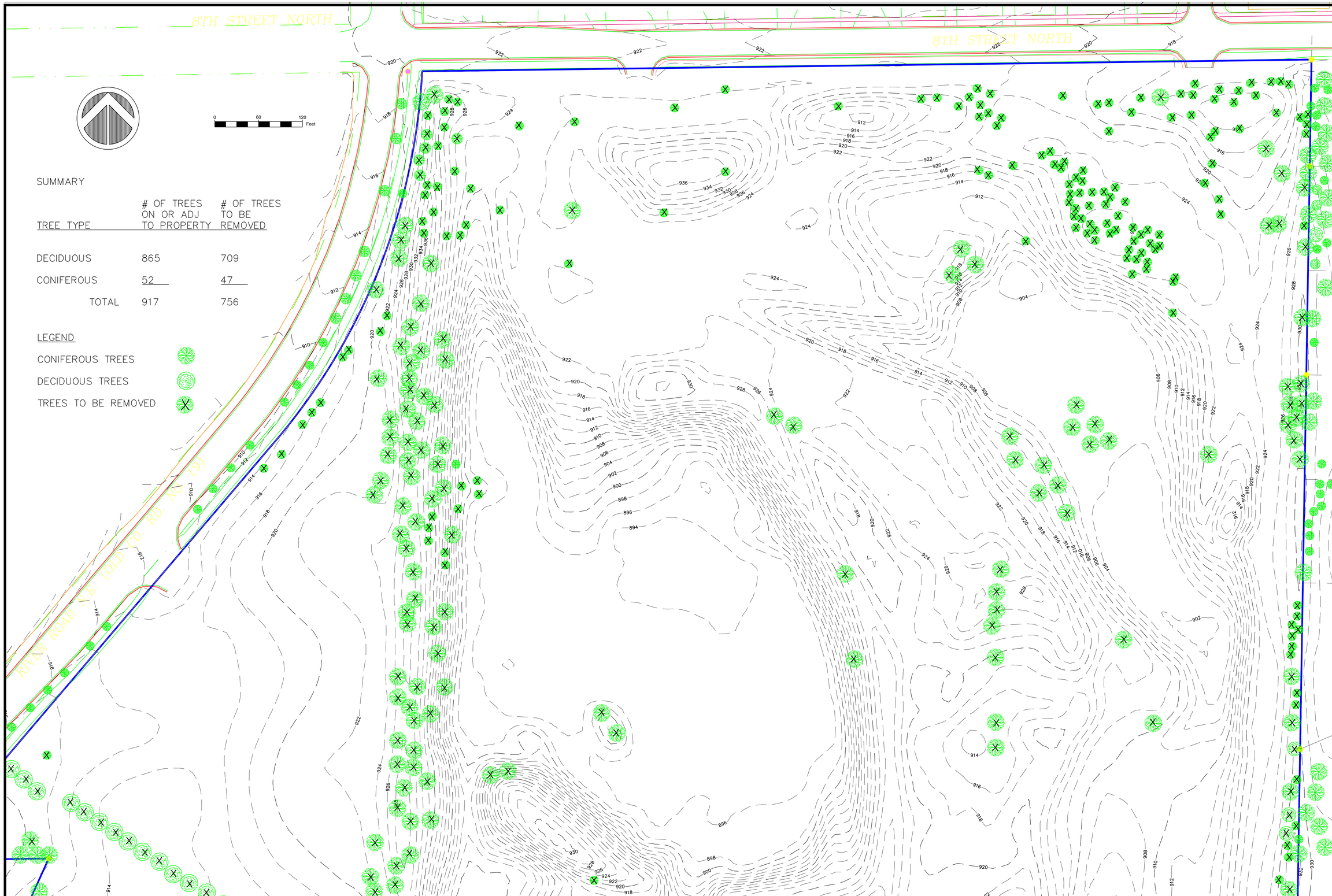
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
EC3



SUMMARY

TREE TYPE	# OF TREES ON OR ADJ TO PROPERTY	# OF TREES TO BE REMOVED
DECIDUOUS	865	709
CONIFEROUS	52	47
TOTAL	917	756

LEGEND

CONIFEROUS TREES

DECIDUOUS TREES

TREES TO BE REMOVED

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HANOVER COVE
PRELIMINARY ENGINEERING PLAN
TREE INVENTORY (NORTH)

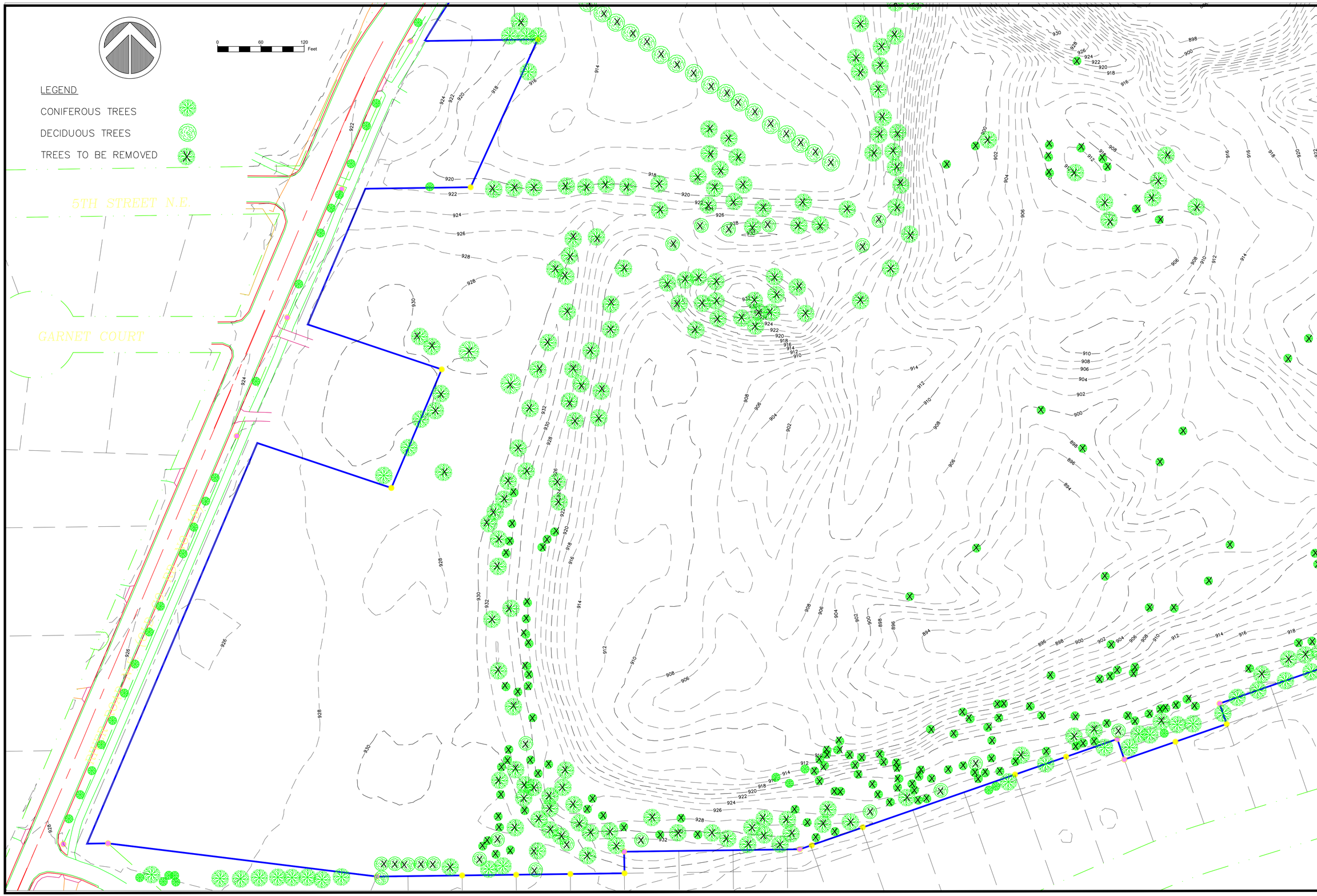
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
TREE1



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SIGNATURE: DATE: 8/18/2018

NAME: JASON VERSTEEG LIC. NO. 26505

DUININCK
PHONE: (320)978-6011 FAX: (320)978-4978
P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

HANOVER COVE
PRELIMINARY ENGINEERING PLAN
TREE INVENTORY (SOUTHWEST)

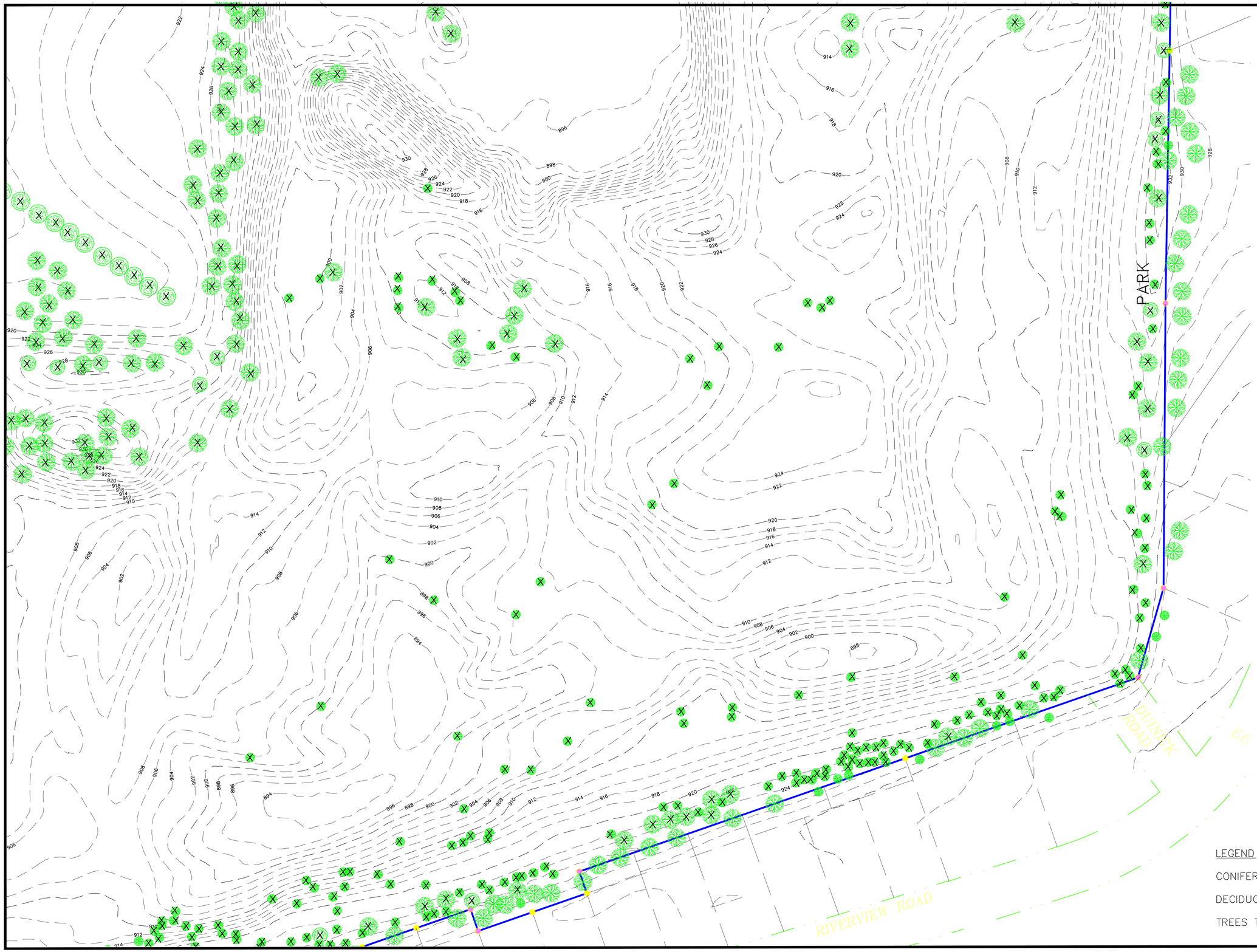
HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
TREE2



LEGEND

CONIFEROUS TREES

DECIDUOUS TREES

TREES TO BE REMOVED

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SIGNATURE: DATE: 8/18/2018

NAME: JASON VERSTEEG LIC. NO. 26505

DUININCK

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P.O. BOX 208 408 SIXTH STREET
PRINSBURG, MN 56281

HANOVER COVE

PRELIMINARY ENGINEERING PLAN

TREE INVENTORY (SOUTHEAST)

HANOVER, MN

CHECKED BY:	DRAWN BY:
JVS	JVS

SCALE
GRAPHIC

DATE
AUGUST 18, 2018

SHEET
TREE3

APPENDIX C

SOILS INFORMATION

PRELIMINARY GEOTECHNICAL REPORT

HANOVER COVE

HANOVER, MN

JULY 13, 2018

Prepared for:
Duininck, Inc.
PO Box 208
408 Sixth Street
Prinsburg, Minnesota 56281

WSB PROJECT NO. 012227-000

PRELIMINARY GEOTECHNICAL REPORT

HANOVER COVE

FOR

DUININCK, INC.

CERTIFICATION

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

Mark W. Osborn, PE

Date: July 13, 2018 Lic. No. 41362

540 Gateway Boulevard | Suite 100 | Burnsville, MN 55337 | (952) 737-4660

July 13, 2018

Duininck, Inc.
PO Box 208
408 Sixth Street
Prinsburg, Minnesota 56281

Re: Preliminary Geotechnical Report
Hanover Cove
Hanover, Minnesota
WSB Project No.: 012227-000

We have conducted a geotechnical subsurface exploration program for the above referenced project. This report contains our soil boring logs, an evaluation of the conditions encountered in the borings and our preliminary recommendations for foundations, roadway subgrades, and other geotechnical related design and construction considerations.

If you have any questions concerning this report or our recommendations, or for construction material testing for this project, please call us at (952) 737-4660.

Sincerely,

WSB & Associates, Inc.

Mark Osborn, PE
Geotechnical Project Engineer

Darin Hyatt, PE
Senior Geotechnical Engineer

Attachment:
Geotechnical Report

MWO/tw

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CERTIFICATION SHEET
LETTER OF TRANSMITTAL
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Soil Boring Exhibit
Logs of Test Borings
Symbols and Terminology on Test Boring Log
Notice to Report Users Boring Log Information
Unified Soil Classification System (USCS)

1. INTRODUCTION

1.1 Project Location

The site is located in Hanover, Minnesota, north of the Crow River. The site is bounded by River Road NE, River View Road and 8th Street North. The approximate soil boring locations can be found on the Soil Boring Exhibit in ***Appendix A***.

1.2 Project Description

It is proposed to construct a new residential development. A map of the preliminary roadway configurations was provided to us, dated May 30, 2018. We understand the residential homes at this site will consist of 1 to 2 story wood framed structures with slab on grade, walkout, lookout, or full basement design.

Significant grading is expected to occur at this location, and could exceed 10 feet in cut or fill depths. We understand the residential roads planned within the development will be publicly owned with public utilities including watermain, sanitary sewer, and storm sewer. Stormwater retention and infiltration ponds are planned at the site as well.

Structural loads for the townhomes were not provided, but we estimate that they could be in the range of three to five (3-5) kips per lineal foot along the bearing walls of the building, with column loads on the order of seventy-five (75) kips.

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

We anticipate that additional drilling may be required at this site when the final site plans are prepared.

1.3 Purpose and Project Scope of Services

Mr. Jason Ver Steeg with Duininck Inc (Duininck) authorized this work. In order to assist the design team in preparing plans and specifications, we have developed recommendations for preliminary design of foundations, slabs and pavements. As such, we have completed a subsurface exploration program and prepared a preliminary geotechnical report for the referenced site. This stated purpose was a significant factor in determining the scope and level of service provided. Should the purpose of the report change the report immediately ceases to be valid and use of it without WSB's prior review and written authorization shall be at the user's sole risk.

Our authorized scope of work has been limited to:

1. Mobilization / Demobilization of an All-Terrain Track Mounted Drill Rig.
2. Clearing underground utilities utilizing the Gopher State One Call.
3. Drilling 17 standard penetration borings to approximately 20 foot depths.
4. Sealing the borings per Minnesota Department of Health procedures.
5. Perform soil classification and analysis.
6. Review of readily available project information and geologic data.
7. Providing this preliminary geotechnical report containing:
    a. Summary of our findings.
    b. Discussion of subsurface soil and groundwater conditions and how they may affect the proposed foundations, slabs, utilities, pavements, and ponds
    c. Estimated Range of Allowable Bearing Capacity of the soils.
    d. Estimated Range of R-value of the soils.
    e. A discussion of soils for use as structural fill and site fill.

2. PROCEDURES

2.1 Boring Layout and Soil Sampling Procedures

Duininck requested we complete 17 soil borings in the residential development. Duininck recommended the boring depths and selected the desired locations. Our survey crew staked and elevated the borings with GPS technology. The approximate boring locations are shown on the Soil Boring Exhibit in ***Appendix A*** which is an aerial photo.

We drilled the borings on June 6 and 7, 2018 with a truck-mounted CME-55 drill rig operated by a two-person crew. The drill crew advanced the borings using continuous hollow stem augers. Drilling methods, crew chief, depths, sampling interval, casing usage, groundwater observations, test data, and other drilling information are indicated on the boring logs.

Generally, the drill crew sampled the soil in advance of the auger tip at two and one-half foot (2½') intervals of a depth to fifteen feet (15') and then at five foot (5') intervals thereafter. The soil samples were obtained using a split-barrel sampler which was driven into the ground during standard penetration tests in accordance with ASTM D 1586, Standard Method of Penetration Test and Split-Barrel Sampling of Soils.

The materials encountered were described on field logs and representative samples were containerized, and transported to our laboratory for further examination and testing.

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

2.2 Groundwater Measurements and Borehole Abandonment

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

2.3 Boring Log Procedures and Qualifications

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

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

3. EXPLORATION RESULTS

3.1 Site and Geology

The borings were generally completed within a sand and gravel pit. Boring elevations ranged from about 895.06 to 927.53 feet.

The Wright County Geologic Atlas indicates the surficial geology of the area is mostly glacial outwash. This outwash is sand and gravel in most places, with some fine-grained sand and silt beds.

3.2 Subsurface Soil and Groundwater Conditions

The boring profile generally consisted of fills and glacial outwash soils. However, glacial till deposits were mixed with glacial outwash at a few of the borings.

Fills

We encountered fill at Borings PB-1, PB-2, PB-5, PB-6, PB-7, PB-9, PB-10, PB-11, PB-12, PB-13, PB-16, and PB-17. These fills consisted mostly of sands with clays or silts, and organic clays. Fills were encountered to depths of up to about 9 feet below grade.

Outwash

The outwash deposits encountered consisted of sands, sands with silt, sands with clay, clayey sand, and silty sands. These soils had varying amounts of gravel. These soils were mostly brown in color and moist to wet to waterbearing.

Till

We encountered glacial till at Boring PB-10 at a depth of about 10 ½ to 12 feet below grade, and at Boring PB-16 at a depth of about 2 to 6 ½ feet below grade. These tills consisted of lean clays and lean clays with sand which were brown to gray in color and generally wet.

3.3 Strength Characteristics

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

Table 1 presents a summary of the penetration resistances in the soils for the borings completed and remarks regarding the material strengths of the soils.

Table 1: Penetration Resistances

Soil Type	Classification	Penetration Resistances	Remarks
Fill	Varies	3 to 19 BPF	Variable compaction
Glacial Outwash	SP, SM, SC SP-SC, SP-SM	2 to 54 BPF Average 17 BPF	Very loose to very dense Generally medium dense
Glacial Till	CL	2 to 17 BPF	Very soft to hard

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

3.4 Groundwater Conditions

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

Table 2 below is a summary of the estimated water levels at our borings.

Table 2: Groundwater Measurements

Boring No.	Ground Surface Elevation	Depth to Groundwater after Drilling	Estimated Groundwater Elevation
PB-1	924.38	n/a	<905
PB-2	923.46	11	912 ½
PB-3	905.48	14	891 ½
PB-4	923.79	n/a	Below 904
PB-5	895.06	6	889 ½
PB-6	895.94	n/a	Below 876
PB-7	908.75	6	903
PB-8	915.84	8	908
PB-9	920.19	n/a	Below 900 ½
PB-10	905.24	14	891 ½
PB-11	904.74	6	899
PB-12	914.58	n/a	Below 895
PB-13	915.1	n/a	Below 895 ½
PB-14	927.53	n/a	Below 908
PB-15	915.91	n/a	Below 896
PB-16	925.41	n/a	Below 906
PB-17	908.41	15 ½	893

n/a – indicates ground water was not encountered. Elevations are rounded to the highest ½ foot.

Groundwater was encountered at various boring locations as can be seen in Table 2 above. Groundwater elevations in the borings ranged from about 891 ½ to 912 ½ feet, with the majority of the readings under 900 feet. The bore holes were only left open a short period of time, and groundwater levels may not have stabilized. The groundwater elevation observed in Boring PB-2 is much higher than that observed in other borings. It is possible that the water level in that boring is perched or trapped within the silty sand soils as the soils were noted to be moist as opposed to wet or waterbearing. It should be noted that Mr. Ver Steeg indicated that during mining operations groundwater was observed near an elevation of 894 feet.

The Crow River is located less than 1000 feet southeast of the site. According to data from the Minnesota Department of Natural Resources on their MnTOPO website, the elevation at the edge of the Crow River is around 880 feet.

It is our opinion that a stable groundwater table will be located at an elevation of below 900 feet, however wet soils could be encountered at shallower elevations.

4. PRELIMINARY ANALYSIS AND RECOMMENDATIONS

4.1 Discussion

Fills

No information was provided to us regarding density tests or placement observations for the existing fills at the boring locations. Generally, fills that are not documented are recommended for removal and replacement with an engineered fill. The fills encountered contained deleterious materials including organics and roots. In our opinion these fills were not placed as structural fills to support roadways, utilities, or foundations.

Glacial Tills

Borings PB-10 and PB-16 encountered glacial tills consisting of lean clays and lean clays with sand. These soils are generally suitable for support of light loads where they are firm and moist. Where these soils are wet, they cannot directly support the pavement, utility, or foundation loads. A partial excavation and replacement would provide a more suitable subgrade in these areas.

Glacial Outwash

The glacial outwash deposits consisted of sands with varying amounts of clay, silt, and gravel. Generally, these soils are suitable for support of pavements, utilities, and foundations.

General

The borings noted groundwater at varying depths. Based on a review of the site topography on MnTOPO and our boring logs, it is our opinion that a stable groundwater table is likely below an elevation of 900 feet. Piezometers would be required to determine the actual long-term groundwater elevations at this site.

4.2 Preliminary Foundation Recommendations

The glacial soils would likely be able to support foundation loads ranging from 2,000 to 3,000 pounds per square foot (psf). Several factors including site grading and building loads will need to be considered for final design recommendations.

4.3 Preliminary Pavement Recommendations

The glacial soils consisted of lean clays, silty sands, clayey sands, and sand with silt or clay and would have R-values ranging from about 10 to 70.

A final pavement design will need to consider the site grading and traffic loading at this site.

4.4 Preliminary Infiltration Ponds

Estimated infiltration rates of the soils encountered in the boring logs are provided in Table 3 below. These values were determined from the Minnesota Stormwater Manual based on soil classification, and are based on online data that was updated on May 24, 2018.

Table 3: Estimated Design Infiltration Rates

Soil Classification	Hydrologic Soils Group	Estimated Infiltration Rate (inches/hour)
Fills	Not suitable for infiltration	n/a
CL, SC, SP-SC	D	0.06
SP-SM, SM	B	0.45
SP	A	0.8

Final pond design will need to consider pond location and site grading. We are able to provide double ring infiltrometer testing at the proposed pond locations for inclusion with a final geotechnical report.

4.5 Preliminary Backfill and Fill Selection and Compaction

In general, the non-organic soils onsite can likely be reused as fill materials. Some moisture conditioning may be required.

Our final geotechnical report will consider the final site grading plan in our discussions of recommendations for the backfill materials.

4.6 Consolidation of Deep Fills

Clay and silt fills are known to internally self-consolidate even after proper placement. Generally, this only presents issues when the clay/silt thickness exceeds 10 feet. Once final design grades are known, a review should be made of any areas where fill placement will exceed 10 feet.

Construction delays, increased compaction requirements, or surcharging may be required in these areas.

5. STANDARD OF CARE

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

APPENDIX A

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

Document Path: K:\012227-000\GIS\Maps\Hanover Cove Borings.mxd Date Saved: 7/13/2018 2:07:30 PM

Soil Boring Exhibit

Hanover Cove
Hanover, Minnesota
WSB Project #012227-000

N

0 550 Feet
1 inch = 550 feet

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 924.38 ft

BORING NUMBER PB-1

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Sand with Silt and Gravel, a few Roots, brown, moist	SP-SM	Fill								
1	923	SILTY SAND, fine grained, grayish brown, moist, medium dense	SM	Glacial Outwash	-		1	HSA				
2	922											
3	921				13		2	SB				
4	920											
5	919											
6	918				20		3	SB				
7	917											
8	916				24		4	SB				
9	915	SAND WITH A LITTLE GRAVEL, fine to medium grained, light brown, moist	SP									
10	914											
11	913				12		5	SB				
12	912	SAND, fine grained, light brown, moist, medium dense	SP									
13	911				13		6	SB				
14	910											
15	909											
16	908				17		7	SB				
17	907											
18	906											
19	905											
20	904				12		8	SB				
21	903	End of Boring 21.0 ft.										
22	902											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	4:00 pm	21	19.5	1	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 923.46 ft

BORING NUMBER PB-2

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Organic Clay, black, wet	OL	Fill								
1	922				-		1	HSA				
2	921	FILL, Lean Clay with a little Sand, a few Roots and Organics, dark brown to black, wet	CL									
3	920				3		2	SB				
4	919											
5	918											
					12		3	SB				
6	917	SAND, fine to medium grained, brown, moist, loose	SP	Glacial Outwash								
7	916											
8	915				8		4	SB				
9	914	SILTY SAND, fine to medium grained, brown, moist, loose	SM									
10	913											
					9	▽	5	SB				
11	912											
12	911											
13	910				8		6	SB				
14	909											
15	908											
					9		7	SB				
16	907											
17	906											
18	905	SAND WITH SILT AND GRAVEL, fine to coarse grained, brown, moist, medium dense	SP-SM									
19	904											
20	903				21		8	SB				
21	902	End of Boring 21.0 ft.										
22	901											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	2:59 pm	21	19.5		11.0	912.46	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 905.48 ft

BORING NUMBER PB-3

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		SAND, a few Roots, fine grained, brown, moist	SP	Topsoil								
1	904	SAND WITH GRAVEL, fine to coarse grained, brown, moist, medium dense	SP	Glacial Outwash	-		1	HSA				
2	903											
3	902				13		2	SB				
4	901											
5	900											
6	899				15		3	SB				
7	898	SAND WITH A LITTLE GRAVEL, fine to medium grained, brown, moist, medium dense	SP									
8	897				20		4	SB				
9	896											
10	895	SAND WITH GRAVEL, fine to coarse grained, brown, moist to wet to waterbearing, medium dense	SP		13		5	SB				
11	894											
12	893											
13	892				13		6	SB				
14	891	SILTY SAND, fine grained, gray, waterbearing, loose	SM			▽						
15	890				9		7	SB				
16	889											
17	888											
18	887											
19	886											
20	885	SAND WITH GRAVEL, fine to coarse grained, brown, waterbearing, very loose	SP		4		8	SB				
21	884	End of Boring 21.0 ft.										
22	883											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	1:50 pm	21	19.5	6.2	14.0	891.48	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 923.79 ft

BORING NUMBER PB-4

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		SILTY SAND WITH ORGANIC FINES, dark brown, moist	SM	Topsoil								
1	923				-		1	HSA				
		SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist, medium dense	SM	Glacial Outwash								
2	922											
3	921				17		2	SB				
4	920	SAND WITH GRAVEL, fine to coarse grained, light brown, moist, medium dense	SP									
5	919											
6	918				14		3	SB				
7	917	SAND WITH A LITTLE GRAVEL, fine grained, light brown, moist, loose	SP									
8	916				7		4	SB				
9	915											
10	914											
11	913				7		5	SB				
12	912											
13	911				5		6	SB				
14	910											
15	909											
16	908				7		7	SB				
17	907											
18	906	SAND WITH GRAVEL, fine to coarse grained, brown, moist, medium dense	SP									
19	905											
20	904				15		8	SB				
21	903	End of Boring 21.0 ft.										
22	902											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	3:50 pm	21	19.5	12	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 895.06 ft

BORING NUMBER PB-5

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
1	894	FILL, Sand with Clay and Gravel, a few Roots, dark brown, moist	SC	Fill	-		1	HSA				
2	893	SAND WITH SILT AND GRAVEL, fine grained, grayish brown, wet	SM	Glacial Outwash								
3	892				24		2	SB				
4	891											
5	890											
6	889				18	▽	3	SB				
7	888											
8	887				4		4	SB				
9	886											
10	885											
11	884				3		5	SB				
12	883	SAND WITH GRAVEL AND A LITTLE SILT, fine to coarse grained, brown, wet to waterbearing, loose to very loose	SP-SM									
13	882				6		6	SB				
14	881											
15	880											
16	879				11		7	SB				
17	878											
18	877											
19	876	SAND WITH CLAY AND A LITTLE GRAVEL, coarse to medium grained, gray, waterbearing, loose	SC									
20	875				8		8	SB				
21	874	End of Boring 21.0 ft.										
22	873											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	5:25 pm	21	19.5	7	6.0	889.06	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 895.94 ft

BORING NUMBER PB-6

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Sand with Clay and Gravel, a few Roots, brown, moist	SC	Fill								
1	895				-		1	HSA				
2	894	FILL, Sand with a little Gravel, brown, moist	SP									
3	893				10		2	SB				
4	892											
5	891											
6	890				7		3	SB				
7	889	FILL, Sand with Silt, a few Roots, dark brown and light gray, strong odor, wet	SM									
8	888				5		4	SB				
9	887	SILTY SAND, fine grained, brown, wet, loose	SM	Glacial Outwash								
10	886											
11	885				9		5	SB				
12	884											
13	883				9		6	SB				
14	882											
15	881											
		- 3" lense of gray Lean Clay			18		7	SB				
16	880	GRAVELLY SAND, coarse to medium grained, brown, wet, medium dense	SP									
17	879											
18	878											
19	877											
20	876				21		8	SB				
21	875	End of Boring 21.0 ft.										
22	874											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	5:00 pm	21	19.5		None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 908.75 ft

BORING NUMBER PB-7

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
1	908	FILL, Sand with Silt and Gravel, a few Roots, brown, moist	SP-SM	Fill	-		1	HSA				
2	907	SAND, fine grained, brown, moist, loose	SP	Glacial Outwash								
3	906				9		2	SB				
4	905	SAND WITH GRAVEL AND A LITTLE CLAY, fine to medium grained, brown to dark brown, moist, medium dense	SP-SC									
5	904											
6	903				12	▽	3	SB				
7	902											
8	901				10		4	SB				
9	900											
10	899	SAND WITH CLAY AND A LITTLE GRAVEL, fine to medium grained, brown, moist, medium dense	SC		21		5	SB				
11	898											
12	897											
13	896	SAND WITH CLAY, fine grained, brown, moist, medium dense	SC		12		6	SB				
14	895											
15	894				17		7	SB				
16	893											
17	892											
18	891	SILTY SAND, fine grained, brown, wet, medium dense	SM									
19	890											
20	889				23		8	SB				
21	888	End of Boring 21.0 ft.										
22	887											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	11:55 am	21	19.5		6.1	902.65	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 915.84 ft

BORING NUMBER PB-8

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		SILTY SAND WITH GRAVEL, fine grained, brown, moist	SM	Glacial Outwash								
1	915	SAND WITH SILT AND GRAVEL, fine to medium grained, brown, moist, dense	SP-SM		-		1	HSA				
2	914											
3	913				31		2	SB				
4	912	SAND WITH GRAVEL AND A LITTLE SILT, fine to coarse grained,brown, moist	SP-SM									
5	911											
					22		3	SB				
6	910											
7	909											
8	908				20	▽	4	SB				
9	907											
10	906											
					19		5	SB				
11	905											
12	904											
13	903				16		6	SB				
14	902											
15	901											
					14		7	SB				
16	900	SAND WTIH SILT AND GRAVEL, fine to medium grained, brown, moist, medium dense to dense	SP-SM									
17	899											
18	898											
19	897											
20	896				39		8	SB				
21	895	End of Boring 21.0 ft.										
22	894											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	12:50 pm	21	19.5		8.0	907.84	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 920.19 ft

BORING NUMBER PB-9

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
1	919	FILL, mixture of Sand with Silt and Gravel and Clayey Sands, a few Roots, brown, moist	SP-SM	Fill	-		1	HSA				
2	918											
3	917	SAND WITH A LITTLE GRAVEL, fine to medium grained, brownish gray, moist, medium dense	SP	Glacial Outwash	20		2	SB				
4	916											
5	915				21		3	SB				
6	914											
7	913	SAND WITH A LITTLE CLAY AND GRAVEL, fine to coarse grained, brown, moist, medium dense	SP-SC									
8	912				11		4	SB				
9	911	SAND WITH A LITTLE GRAVEL, fine to medium grained, brown, moist, medium dense	SP									
10	910											
11	909				15		5	SB				
12	908											
13	907				10		6	SB				
14	906											
15	905											
16	904				19		7	SB				
17	903											
18	902											
19	901	SAND, fine grained, light brown, moist, dense	SP									
20	900				31		8	SB				
21	899	End of Boring 21.0 ft.										
22	898											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	11:10 am	21	19.5		None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 905.24 ft

BORING NUMBER PB-10

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Sand with Silt and Gravel, a few Roots, brown and reddish brown and gray, moist	SP-SC	Fill								
1	904				-		1	HSA				
2	903											
3	902				4		2	SB				
4	901	SAND WITH CLAY AND A LITTLE GRAVEL, fine to medium grained, grayish brown, moist, very loose to loose	SP-SC	Glacial Outwash								
5	900											
					4		3	SB				
6	899											
7	898											
8	897				5		4	SB				
9	896											
10	895											
		LEAN CLAY WITH SAND, gray, wet, soft	CL	Glacial Till	17		5	SB				
11	894											
12	893	SILTY SAND, fine grained, brown, wet to waterbearing, loose	SM	Glacial Outwash								
13	892				6		6	SB				
14	891					▽						
15	890											
					13		7	SB				
16	889											
17	888											
18	887	CLAYEY SAND, fine grained, light brown, wet, medium dense	SC									
19	886											
20	885				25		8	SB				
21	884	End of Boring 21.0 ft.										
22	883											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	10:20 am	21	19.5	3.3	14.0	891.24	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 904.74 ft

BORING NUMBER PB-11

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
1	904	FILL, Sand with Gravel, a few Roots, brown, moist	SP	Fill	-		1	HSA				
2	903	SAND, fine grained, brown, moist, medium dense to loose	SP	Glacial Outwash								
3	902				11		2	SB				
4	901											
5	900											
6	899				9	▽	3	SB				
7	898											
8	897	SAND WITH GRAVEL AND A LITTLE SILT, fine to medium grained, dark brown to gray, moist, medium dense	SP-SM		14		4	SB				
9	896											
10	895											
11	894				16		5	SB				
12	893											
13	892				13		6	SB				
14	891											
15	890	SAND WITH A LITTLE CLAY, coarse to medium grained, brown, moist, medium dense	SP-SC		17		7	SB				
16	889											
17	888											
18	887											
19	886	GRAVEL WITH A LITTLE SAND, wet, loose	GP									
20	885				8		8	SB				
21	884	End of Boring 21.0 ft.										
22	883											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	9:26 am	21	19.5		5.7	899.04	3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 914.58 ft

BORING NUMBER PB-12

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Sand with Silt and a little Gravel, a few Roots, brown, moist	SM	Fill								
1	914				-		1	HSA				
2	913											
3	912				19		2	SB				
4	911	SAND WITH GRAVEL AND A LITTLE SILT, light brown, moist	SP-SM	Glacial Outwash								
5	910											
					8		3	SB				
6	909	SAND, fine grained, brown, moist, loose	SP									
7	908											
8	907				10		4	SB				
9	906	- pieces of Limestone from 9 to 11 feet										
10	905											
					17		5	SB				
11	904											
12	903											
13	902				9		6	SB				
14	901	SAND WITH GRAVEL, fine to coarse grained, brown, moist, medium dense to very dense	SP									
15	900											
					14		7	SB				
16	899											
17	898											
18	897											
19	896											
20	895				57		8	SB				
21	894	End of Boring 21.0 ft.										
22	893											

WATER LEVEL MEASUREMENTS

START: 6/07/2018 END: 6/07/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/07/2018	8:40 am	21	19.5		None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 915.1 ft

BORING NUMBER PB-13

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Organic Clay, black, moist	OL	Fill								
1	914				-		1	HSA				
2	913	SAND WITH CLAY AND SILT, brown, moist, very loose to loose to very loose	SC	Glacial Outwash								
3	912				3		2	SB				
4	911											
5	910											
					7		3	SB				
6	909											
7	908											
8	907				2		4	SB				
9	906											
10	905	SAND WITH CLAY AND GRAVEL, coarse to medium grained, brown, moist	SC									
					8		5	SB				
11	904											
12	903											
13	902				4		6	SB				
14	901											
15	900											
					3		7	SB				
16	899											
17	898											
18	897											
19	896											
20	895	SAND WITH SILT AND GRAVEL, fine to medium grained, brown, moist, wet	SM		3		8	SB				
21	894	End of Boring 21.0 ft.										
22	893											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	2:12 pm	21	19.5	11	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 927.53 ft

BORING NUMBER PB-14

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		SILTY SAND WITH GRAVEL, a few Roots and Organics, dark brown, moist	SM	Topsoil								
1	927	SILTY SAND WITH GRAVEL, fine grained, brown, moist	SM	Glacial Outwash	-		1	HSA				
2	926											
3	925				15		2	SB				
4	924											
5	923	GRAVEL	GP									
					33		3	SB				
6	922											
7	921											
8	920				42		4	SB				
9	919											
10	918	SAND WITH GRAVEL, coarse to medium grained, brown, moist, medium dense	SP									
					19		5	SB				
11	917											
12	916											
13	915				22		6	SB				
14	914											
15	913											
					22		7	SB				
16	912											
17	911	SAND WITH A LITTLE GRAVEL, fine to medium grained, brown, moist, medium dense	SP									
18	910											
19	909											
20	908				19		8	SB				
21	907	End of Boring 21.0 ft.										
22	906											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	1:24 pm	21	19.5	8	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 915.91 ft

BORING NUMBER PB-15

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		SAND WITH A LITTLE CLAY, a few roots, brown, moist	SP-SC	Topsoil								
1	915				-		1	HSA				
2	914	SILTY SAND, brown, moist, very loose	SM	Glacial Outwash								
3	913				2		2	SB				
4	912	SAND WITH GRAVEL, pieces of Limestone, light brown, moist, very loose to medium dense to dense to medium dense	SP									
5	911				4		3	SB				
6	910											
7	909											
8	908				24		4	SB				
9	907											
10	906											
11	905				32		5	SB				
12	904											
13	903				13		6	SB				
14	902											
15	901											
16	900				14		7	SB				
17	899											
18	898											
19	897	SAND WITH A LITTLE CLAY, brown, moist, medium dense	SP-SC									
20	896				20		8	SB				
21	895	End of Boring 21.0 ft.										
22	894											

LABORATORY TESTS

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018		21	19.5	8.5	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 925.41 ft

BORING NUMBER PB-16

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
		FILL, Organic Clay, black, wet	OL	Fill								
1	924				-		1	HSA				
2	923	LEAN CLAY, brown, wet, very soft	CL	Glacial Till								
3	922				2		2	SB				
4	921											
5	920											
6	919				4		3	SB				
7	918	SAND WITH GRAVEL AND A LITTLE CLAY, medium to coarse grained, brown, moist, loose to medium dense	SP-SC	Glacial Outwash								
8	917				7		4	SB				
9	916											
10	915											
11	914				8		5	SB				
12	913											
13	912				10		6	SB				
14	911											
15	910											
16	909				11		7	SB				
17	908											
18	907	SAND, medium to coarse grained, brown, moist, loose	SP									
19	906											
20	905				10		8	SB				
21	904	End of Boring 21.0 ft.										
22	903											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	12:30 pm	21	19.5	9	None		3 1/4" HSA 0' - 19.5'

Crew Chief: R. Kurth
Logged By: MWO
Notes:

LOG OF TEST BORING

PROJECT NAME: Hanover Cove
CLIENT/WSB #: 012227-000

PROJECT LOCATION: Hanover, MN
SURFACE ELEVATION: 908.41 ft

BORING NUMBER PB-17

DEPTH (ft)	ELEV. (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	N	WL	SAMPLE No.	SAMPLE TYPE	MC (%)	DD (pcf)	LL (%)	PL (%)
1	907	FILL, mixture of Organic Clay with Sand and Lean Clay with Sand, a few Roots, black and brown, moist	OL	Fill	-		1	HSA				
2	906											
3	905				10		2	SB				
4	904	FILL, a mixture of Clayey Sand and Lean Clay with Sand, a few pieces of Limestone, brown and gray, moist	SC									
5	903											
6	902				8		3	SB				
7	901	SAND WITH GRAVEL AND A LITTLE SILT, fine to medium graiend, brown, moist, medium dense	SP-SM	Glacial Outwash								
8	900				20		4	SB				
9	899											
10	898											
11	897				25		5	SB				
12	896					▽						
13	895	SAND WITH A LITTTLE SILT AND GRAVEL, fine grained, brown, wet to waterbearing, loose to very loose	SP-SM		6		6	SB				
14	894											
15	893											
16	892				4	▼	7	SB				
17	891											
18	890											
19	889											
20	888				1		8	SB				
21	887	End of Boring 21.0 ft.										
22	886											

WATER LEVEL MEASUREMENTS

START: 6/06/2018 END: 6/06/2018

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD
6/06/2018	10:53 am	14	12		12.0	896.41	3 1/4" HSA 0' - 19.5'
6/06/2018	11:09 am	21	19.5		15.6	892.81	

Crew Chief: R. Kurth
Logged By: MWO

Notes: Boring moved 33 feet horizontally and 1 foot vertically

SYMBOLS AND TERMINOLOGY ON TEST BORING LOG

SYMBOLS

Drilling and Sampling

Symbol	Description
HSA	3-1/4" LD. Hollow stem auger
_ FA	4", 6" or 10" diameter flight auger
_HA	2", 4", or 6" hand auger
_DC	2-1/2", 4", 5", or 6" steel drive casing
_RC	Size A, B or N rotary casing
PD	Pipe drill or cleanout tube
CS	Continuous split barrel sampling
DM	Drilling mud
JW	Jetting water
SB	2" O.D. split barrel sampling
_L	2-1/2" or 3-1/2" O.D. SB liner sampler
_T	2" or 3" thin walled tube sample
3TP	3" thin walled tube using pitcher sampler
_TO	2" or 3" thin walled tube using Osterberg sampler
W	Wash sample
B	Bag sample
P	Test pit sample
_Q	BQ, NQ, or PQ wire line system
_X	AX, BX, or NX double tube barrel
N	Standard penetration test, blows per foot
CR	Core recovery, percent
WL	Water level
▼	Water level
NMR	No measurement recorded, primarily due to presence of drilling or coring fluid.

Laboratory Testing

Symbol	Description
W	Water content, % (ASTM** D2216)
D	Dry density, pcf
LL	Liquid limit (ASTM D4318)
PL	Plastic limit (ASTM D4318)
	-Inserts in last column (Qu or RQD)-
Qu	Unconfined compressive strength, psf (ASTM D2166)
Pq	Penetrometer reading, tsf (ASTM D1558)
Ts	Torvane reading, tsf
G	Specific gravity (ASTM D854)
SL	Shrinkage limits (ASTM D427)
OC	Organic content-combustion method (ASTM D2974)
SP	Swell pressure, tsf (ASTM D4546)
PS	Percent swell under pressure (ASTM D4546)
FS	Free swell, % (ASTM D4546)
SS	Shrink swell, % (ASTM D4546)
pH	Hydrogen ion content-Meter Method (ASTM D4972)
SC	Sulfate content, parts/million or mg/l
CC	Chloride content, parts/million or mg/l
C*	One dimensional consolidation (ASTM D2435)
Qc*	Triaxial compression (ASSTM D2850 and D4767)
D.S.*	Direct Shear (ASTM D3080)
K*	Coefficient of permeability, cm/sec (ASTM D2434)
P*	Pinhole test (ASTM D4647)
DH*	Double hydrometer (ASTM D4221)
MA*	Particle size analysis (ASTM D422)
R	Laboratory electrical resistivity, ohm-cm (ASTM G57)
E*	Pressuremeter deformation modulus, tsf (ASTM D4719)
PM*	Pressuremeter test (ASTM D4719)
VS*	Field vane shear (ASTM D2573)
IR*	Infiltrometer test (ASTM D3385)
RQD	Rock quality designation, percent

*Results shown on attached data sheet or graph

**ASTM designates American Society for Testing and Materials

TERMINOLOGY

Particle Sizes

Type	Size Range
Boulders	> 12"
Cobbles	3" – 12"
Coarse gravel	3/4" – 3"
Fine gravel	#4 sieve – 3/4"
Coarse sand	#4 - #10 sieve
Medium sand	#10-#40 sieve
Fine sand	#40-#200 sieve
Silt	100% passing #200 sieve and > 0.005mm
Clay	100% passing #200 sieve and < 0.005mm

Soil layering and Moisture

Term	Visual Observation
Lamination	Up to 1/4" thick stratum
Varved	Altering laminations of any combination of clay, silt, fine sand, or colors
Lenses	Small pockets of different soils in a soil mass
Stratified	Altering layers of varying materials or colors
Layer	1/4" to 12" thick stratum
Dry	Powdery, no noticeable water
Moist	Damp, below saturation
Waterbearing	Pervious soil below water
Wet	Saturated, above liquid limit

Gravel Content

Coarse-Grained Soils

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

Fine-Grained Soils

% Gravel	Description
< 5	Trace of gravel
5-15	A little gravel
16-30	With gravel
31-49	Gravelly

Standard Penetration Resistance

Cohesionless Soils

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

Cohesive Soils

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

NOTICE TO REPORT USERS BORING LOG INFORMATION

Subsurface Profiles

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

Water Level

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

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

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

Sampled Depth: The lowest depth of soil sampling at the time a water level measurement is taken.

Casing Depth: The depth to the bottom of the casing or hollow-stem auger at the time of water level measurement.

Cave-In Depth: The depth at which the measuring tape stops in the bore hole.

Water Level: The point in the bore hole at which free-standing water is encountered by a measuring tape dropped from the surface inside the casing.

Drilling Fluid Level: Similar to the water level, except the liquid in the bore hole is a drilling fluid.

Obstruction Depths

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

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

WSB & Associates, Inc.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

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

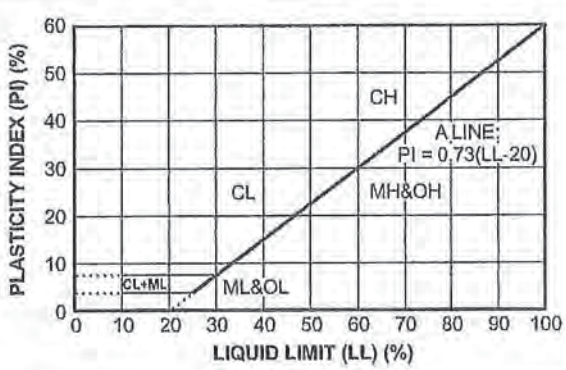
LABORATORY CLASSIFICATION CRITERIA

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

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

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

PLASTICITY CHART



APPENDIX D

WETLAND REPORT / NO-LOSS DETERMINATION

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit (LGU)	Address
Wright SWCD	**311 Brighton Ave S, Suite C** **Buffalo, MN 55313**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Jason VerSteeg	**Duininck Bros. Mine – WCA No-Loss PID 108500361300**	**10-3-17**	

☒ Attach site locator map.

Type of Decision:

☐ Wetland Boundary or Type ☒ No-Loss ☐ Exemption ☐ Sequencing
☐ Replacement Plan ☐ Banking Plan

Technical Evaluation Panel Findings and Recommendation (if any):

☐ Approve ☐ Approve with conditions ☐ Deny

Summary (or attach): No TEP comments as there was no Notice of Application or comment period.

2. LOCAL GOVERNMENT UNIT DECISION

Date of Decision: **10-18-17**

☒ Approved ☐ Approved with conditions (include below) ☐ Denied

LGU Findings and Conclusions (attach additional sheets as necessary):

Greg Goeser submitted a WCA No-Loss application on behalf of the applicant, Jason VerSteeg (Duininck Bros. Inc.) on 10-3-17. The project area is located in T120N, R24W, Sec. 36 (City of Hanover – PID 108500361300). The applicant provided information to show that two wetland areas qualify as incidental per WCA Rule 8420.0105 Subp. 2. D. Historic aerial photos and pre-post mining grading plans were provided to demonstrate this (attached). The LGU concurs that the information provided by the applicant demonstrates that the wetlands identified are incidental per WCA Rule 8420.0105 Subp. 2. D. and thus any impacts to these wetlands constitute a no-loss per WCA Rule 8420.0415 A.

For Replacement Plans using credits from the State Wetland Bank:

Bank Account #	Bank Service Area	County	Credits Approved for Withdrawal (sq. ft. or nearest .01 acre)

Replacement Plan Approval Conditions. In addition to any conditions specified by the LGU, the approval of a Wetland Replacement Plan is conditional upon the following:

☐ **Financial Assurance:** For project-specific replacement that is not in-advance, a financial assurance specified by the LGU must be submitted to the LGU in accordance with MN Rule 8420.0522, Subp. 9 (List amount and type in LGU Findings).

☐ **Deed Recording:** For project-specific replacement, evidence must be provided to the LGU that the BWSR "Declaration of Restrictions and Covenants" and "Consent to Replacement Wetland" forms have been filed with the county recorder's office in which the replacement wetland is located.

☐ **Credit Withdrawal:** For replacement consisting of wetland bank credits, confirmation that BWSR has withdrawn the credits from the state wetland bank as specified in the approved replacement plan.

Wetlands may not be impacted until all applicable conditions have been met!

LGU Authorized Signature:

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 5 provides notice that a decision was made by the LGU under the Wetland Conservation Act as specified above. If additional details on the decision exist, they have been provided to the landowner and are available from the LGU upon request.		
Name **Andrew Grean**	Title **Wetland Specialist**	
Signature	Date **10-18-17**	Phone Number and E-mail **763.682.1933** **andrew.grean@mn.nacdnet.net**

THIS DECISION ONLY APPLIES TO THE MINNESOTA WETLAND CONSERVATION ACT. Additional approvals or permits from local, state, and federal agencies may be required. Check with all appropriate authorities before commencing work in or near wetlands.

Applicants proceed at their own risk if work authorized by this decision is started before the time period for appeal (30 days) has expired. If this decision is reversed or revised under appeal, the applicant may be responsible for restoring or replacing all wetland impacts.

This decision is valid for three years from the date of decision unless a longer period is advised by the TEP and specified in this notice of decision.

3. APPEAL OF THIS DECISION

Pursuant to MN Rule 8420.0905, any appeal of this decision can only be commenced by mailing a petition for appeal, including applicable fee, within thirty (30) calendar days of the date of the mailing of this Notice to the following as indicated:

Check one:

☒ Appeal of an LGU staff decision. Send petition and $**0** fee (if applicable) to: **Wright SWCD** **311 Brighton Ave S, Suite C** **Buffalo, MN 55313**	☐ Appeal of LGU governing body decision. Send petition and $500 filing fee to: Executive Director Minnesota Board of Water and Soil Resources 520 Lafayette Road North St. Paul, MN 55155

4. LIST OF ADDRESSEES

☒ SWCD TEP member: **Andrew Grean, Wright SWCD, andrew.grean@mn.nacdnet.met**

☒ BWSR TEP member: **Cade Steffenson, BWSR, cade.steffenson@state.mn.us**
☒ LGU TEP member (if different than LGU Contact): **Jeremy Carlson, Wright County Highway Dept., jeremy.carlson@co.wright.mn.us**
☒ DNR TEP member: **Jason Neuman, DNR, jason.neuman@state.mn.us**
☐ DNR Regional Office (if different than DNR TEP member)
☐ WD or WMO (if applicable):
☒ Applicant (notice only) and Landowner (if different)

Jason VerSteeg (applicant), jasonv@duininck.com
Greg Goeser (agent), gjgoeser@outlook.com

☒ Members of the public who requested notice (notice only):

Frank Svoboda, franks@gpsinnovations.com
Cody Okeson, USFWS, cody_okeson@fws.gov

☒ Corps of Engineers Project Manager (notice only):

LeeAnn Glomski, ACOE, LeeAnn.M.Glmoski@usace.army.mil

☐ BWSR Wetland Bank Coordinator (wetland bank plan applications only)

5. MAILING INFORMATION

- For a list of BWSR TEP representatives: www.bwsr.state.mn.us/aboutbwsr/workareas/WCA_areas.pdf
- For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf
- Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

For a map of DNR Administrative Regions, see: http://files.dnr.state.mn.us/aboutdnr/dnr_regions.pdf

- For a list of Corps of Project Managers: www.mvp.usace.army.mil/regulatory/default.asp?pageid=687 or send to:

US Army Corps of Engineers
St. Paul District, ATTN: OP-R
180 Fifth St. East, Suite 700
St. Paul, MN 55101-1678

- For Wetland Bank Plan applications, also send a copy of the application to:

Minnesota Board of Water and Soil Resources
Wetland Bank Coordinator
520 Lafayette Road North
St. Paul, MN 55155

6. ATTACHMENTS

In addition to the site locator map, list any other attachments:
☒ **WCA No-Loss Supporting Information**

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: Duininck Bros., Inc. (c/o Jason Versteeg)
Mailing Address: P.O. Box 208, Prinsburg, MN 56281
Phone: 320-212-9339
E-mail Address: jasonv@duininck.com

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

Agent Name: Greg Goeser
Mailing Address: 1201 Grace Ave. SW, Willmar, MN 56201
Phone: 775-340-3030
E-mail Address: gjgoeser@outlook.com

PART TWO: Site Location Information

County: Wright **City/Township: Hanover**
Parcel ID and/or Address: 108500361300
Legal Description (Section, Township, Range): 36, 120, 24
Lat/Long (decimal degrees):
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): 78 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.

Refer to Attached Report

Project Name and/or Number: Hanover Gravel Pit

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]
W1	Wetland	To be determined	P	3.70	N/A	5 & 6	Wright, 18, 7
W2	Wetland	"	P	0.52	N/A	3 & 4	Wright, 18, 7

[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:

N/A

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: _____ Date: 10/10/2017

I hereby authorize Greg Goeser 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.

Project Name and/or Number: Hanover Gravel Pit

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:

~~**MN Administrative Rules 8420.0420, Exemption Standards, Subp. 5, Restored Wetlands, B**~~ 8420.0145, No-Loss, WCA Incidental Wetland

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:

Refer to Attached Report

Hanover Gravel Pit Wetlands

Beacon™ Wright County, MN

Legend

Roads
- CSAHCL
- CTYCL
- MUNICL
- PRIVATECL
- TWPCL

Highways
- Interstate
- State Hwy
- US Hwy

City/Township Limits
- c
- t
- Parcels

Parcel ID	108500361300	**Alternate ID**	n/a	**Owner Address**	n/a
Sec/Twp/Rng	36-120-024	**Class**	206 - RES 1-3 UNITS		
Property Address	11575 8TH ST NE HANOVER	**Acreage**	78		

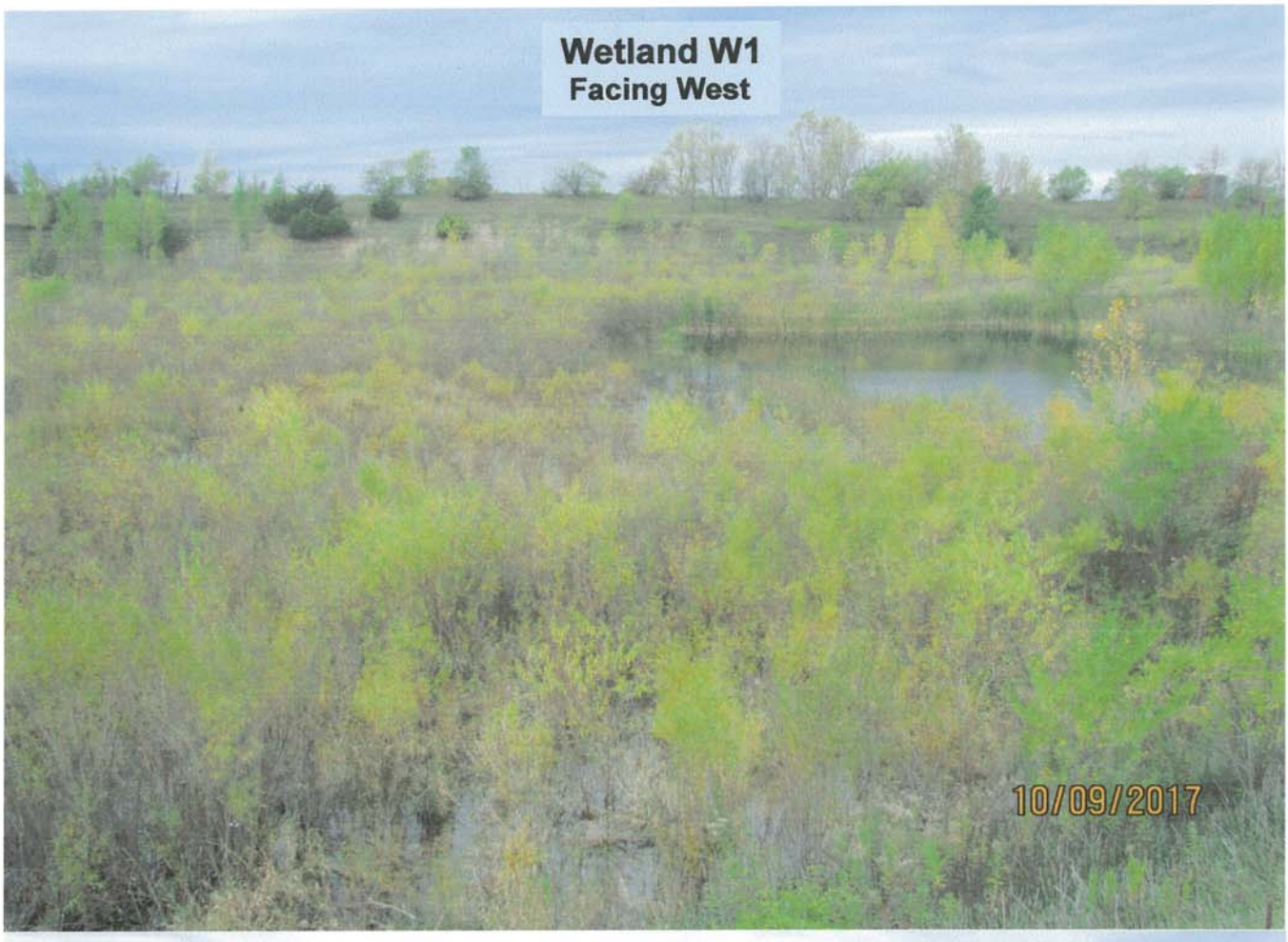
District 0801 CITY OF HANOVER 877

Brief Tax Description Sect-36 Twp-120 Range-024 UNPLATTED LAND HANOVER 78.00 AC SW1/4OF NE1/4NE1/4OF SW1/4EX SCH&1A TO KIRSCHT&NW1/4OF SE1/4IN TH CO EX PRT TO LAKEVIEW MOTORS INC&TO MAHLER EX PLT EX TR DES IN BK188PG32EX18535B EX TR DES IN BK 228-37EX TR DES IN18535D UNREC EX TH PRT PLTD AS RIVERVIEW ROAD ADD EX TR DES IN BK 317-855EX N33FT OF SW1/4OF NE1/4

(Note: Not to be used on legal documents)

Date created: 10/10/2017
Last Data Uploaded: 10/10/2017 6:14:55 AM

Developed by
The Schneider Corporation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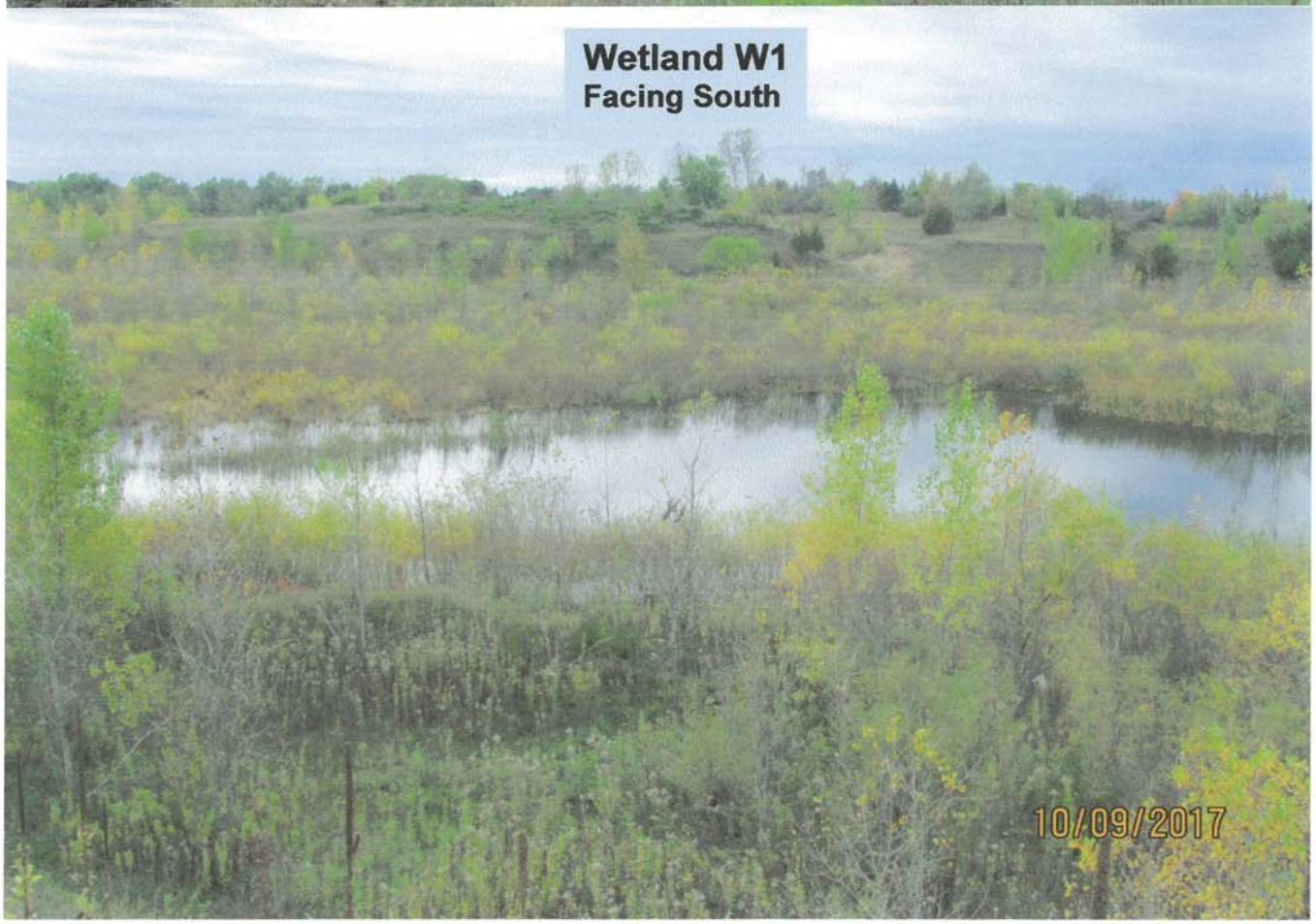
Facing West
10/09/2017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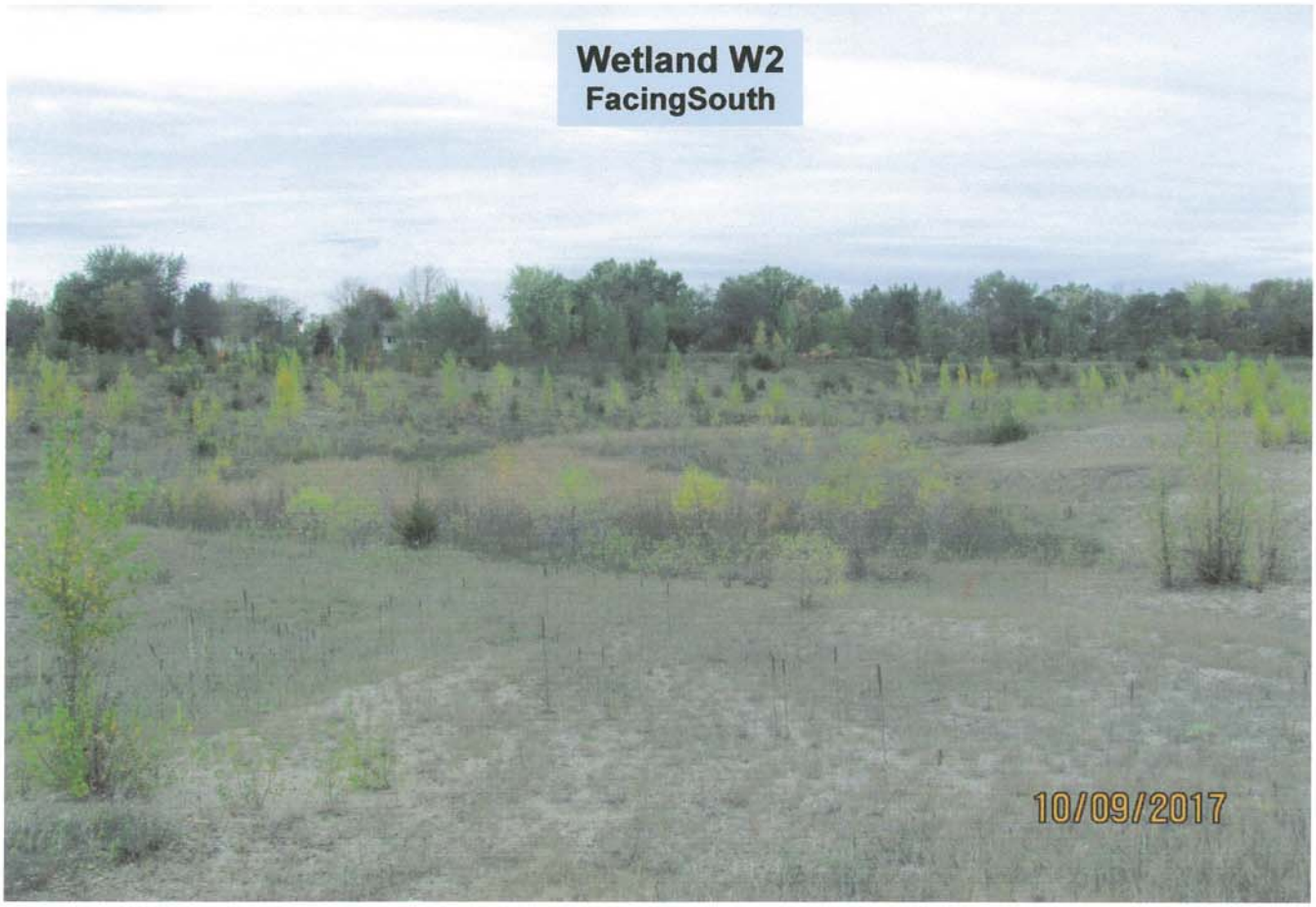
Facing South
10/09/2017

Wetland W2
Facing East

Wetland W2
FacingSouth



Pre-Mining Wetland Determination
And Exemption Request
Hanover Gravel Pit
Section 36, T120N, R24W
Wright County, MN

Purpose

Duininck Bros. Inc. intends to sell and/or convert the *Hanover Gravel Pit* as/into a housing development *(Location Map)*. The purpose of this investigation is to determine if the site ponds are pre-mining, jurisdictional wetlands.

Site History

Historical data for the Hanover Gravel Pit site spans over 100 years. A *1909 Topographic Map* was found in USGS records. The oldest image reviewed, is a *1953 Aerial Photograph*, found on the MnDNR: Landview website. Other images and maps are provided, which document site conditions prior, during, and after mining.

According to Duininck Bros., the site was surveyed in 1980 *(DUININCK BROS & GILCHRIST map)*, and mining occurred from 1985 to 2000 *(1991 Aerial Photograph)*. Prior to mining, the site appears to have been farmed and/or pastured *(1953 & 1963 Aerial Photographs)*. After 2000, there may have been limited/minor site activity *(2008 Aerial Photograph)*.

Site/Contact Information

Parcel Numbers: 108500361300 & 108500362400 (*Hanover Gravel Pit* map)
Contact: Duininck Bros. Inc.
Jason VerSteeg
P.O. Box 208
Prinsburg, MN 56281
(320) 212-9339

Topography

The *1909 Topographic Map* shows the site elevation ranging from approximately 910 to 930 feet. The contour interval is 20 or 25 feet and no site depressions are identified. The site benchmark is at 926 feet.

The *1958 Topographic Map* shows the site elevation ranging from approximately 905 to 925 feet. The contour interval is 20 feet and there appears to be a slight depression in the center of the property. The site benchmark is at 922 feet.

The 1980 *DUININCK BROS & GILCHRIST* survey shows the site elevation ranging from approximately 910 to 930 feet. The contour interval is 4 feet and there appears to be two depressions (910 feet) in the east central and central portion of the property.

The *1981 Topographic Map* shows the site elevation ranging from approximately 915 to 925 feet. The contour interval is 10 feet and there appears to be a slight depression in the east central portion of the property.

According to the *LIDAR Map* the site elevation ranging from approximately 893 to 931 feet. The contour interval is 2 feet and there are excavated ponds in the northwest quarter and south central portions of the property.

Soils

According to the NRCS *Soil Map*, site soils consist of Malardi-Hawick (1066B) 1-6% slopes, and Pits, gravel-Udipsamments (1030) complexes. Malardi-Hawick soils are excessively-drained with sand and gravel subsoil. Although the upper soil strata have been excavated throughout the pit, it can be assumed that the original soils were probably Malardi-Hawick (1066C), 6-12% slopes.

Hydrology

Since the gravel pit is an excavation with elevated borders, there is no surface water runoff from, or onto, neighboring properties *(LIDAR Map)*. Based on site pond elevations, groundwater occurs at 894 feet, which is the approximate elevation of the Crow River (to the east) and the elevation of the wetlands west of the property.

Shoreland Protection Zone

The site ponds are not within 300 feet of the Crow River or within 1000 feet of a lake *(Location Map)*.

National Wetlands Inventory (NWI)

The site ponds are identified as Freshwater Pond on the *National Wetlands Inventory: Wetlands* map.

Summary

Aerial photographs from 1953 and 1963, illustrate that, at that time, the site was farmed, and there is no indication of wetlands in the current pond areas.

The *1909, 1958, 1980, and 1981 Topographic Maps* show that site elevations were much higher than in the present condition *(LIDAR Map)*.

The NRCS *Soil Map* identifies, and mining indicates, that site soils are/were rapidly-drained Malardi-Hawick complex.

Pit hydrology is controlled/contained by boundary walls and has no apparent interaction with surrounding properties *(LIDAR Map)*.

The site ponds are not within the Shoreland Protection Zone *(Location Map)*.

Site ponds are identified on the *National Wetlands Inventory: Wetlands* map, which was drawn post-mining.

Conclusions

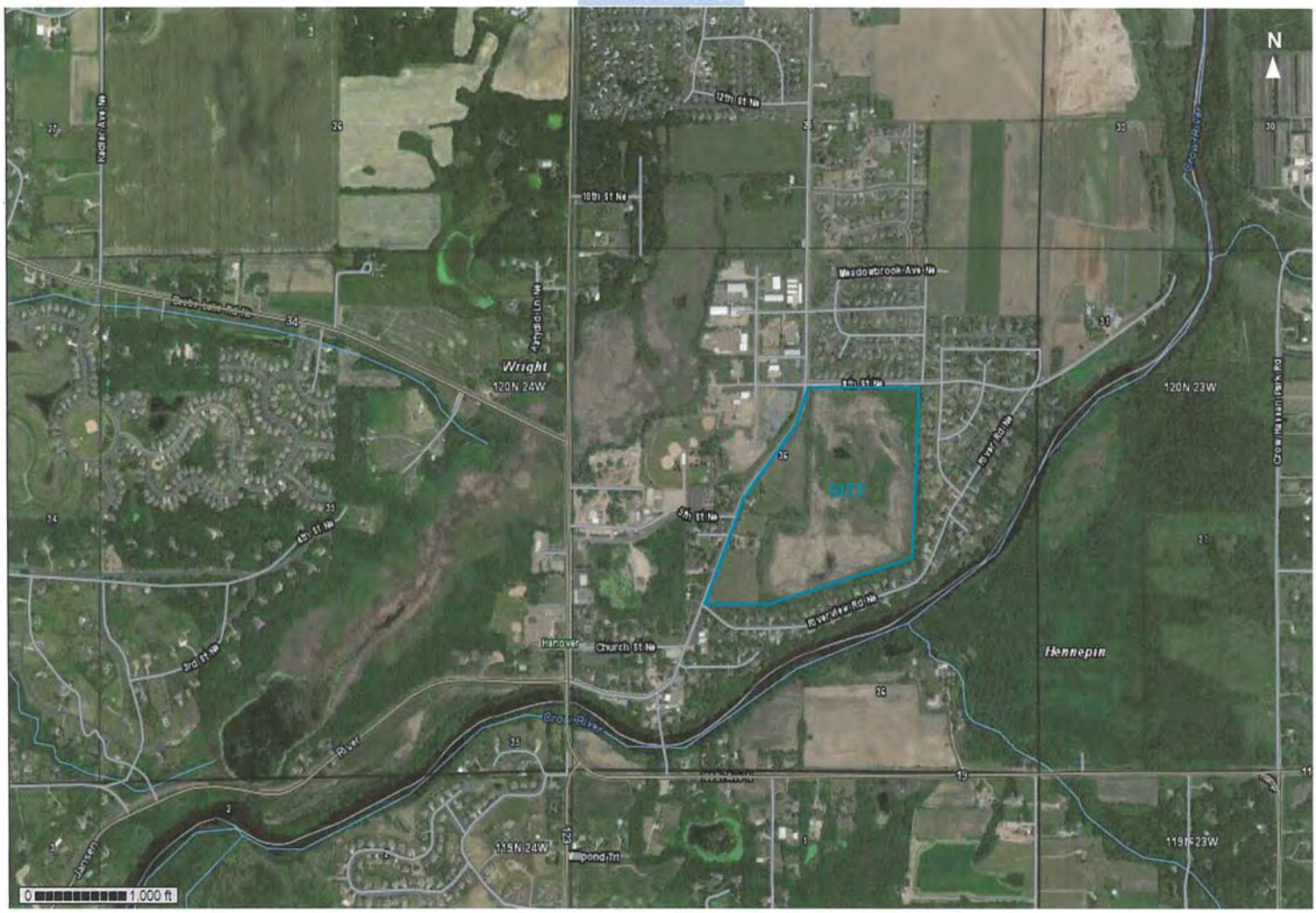
Currently, the site contains three excavated ponds/wet areas that were not present prior to mining. The ponds are not natural and were incidentally-created by mining below the groundwater normal high water mark. Based on the provided information, Duininck Bros. requests that the site ponds be considered for exemption from regulatory action.

Signatures

I hereby declare that this site investigation was performed using due diligence and a sufficient number of data sources.

Greg J. Goeser: Wetland Delineator

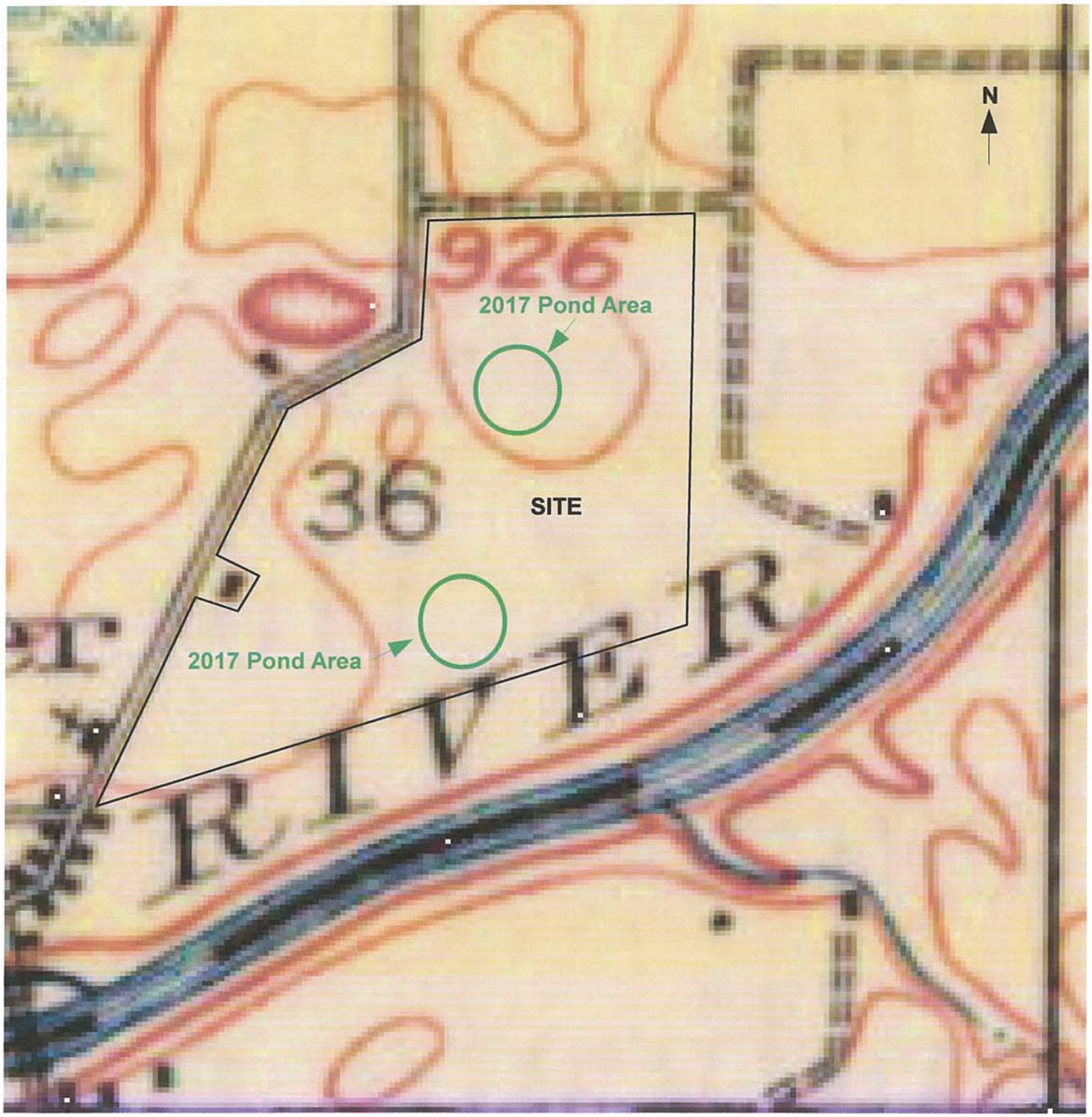
Location Map



N

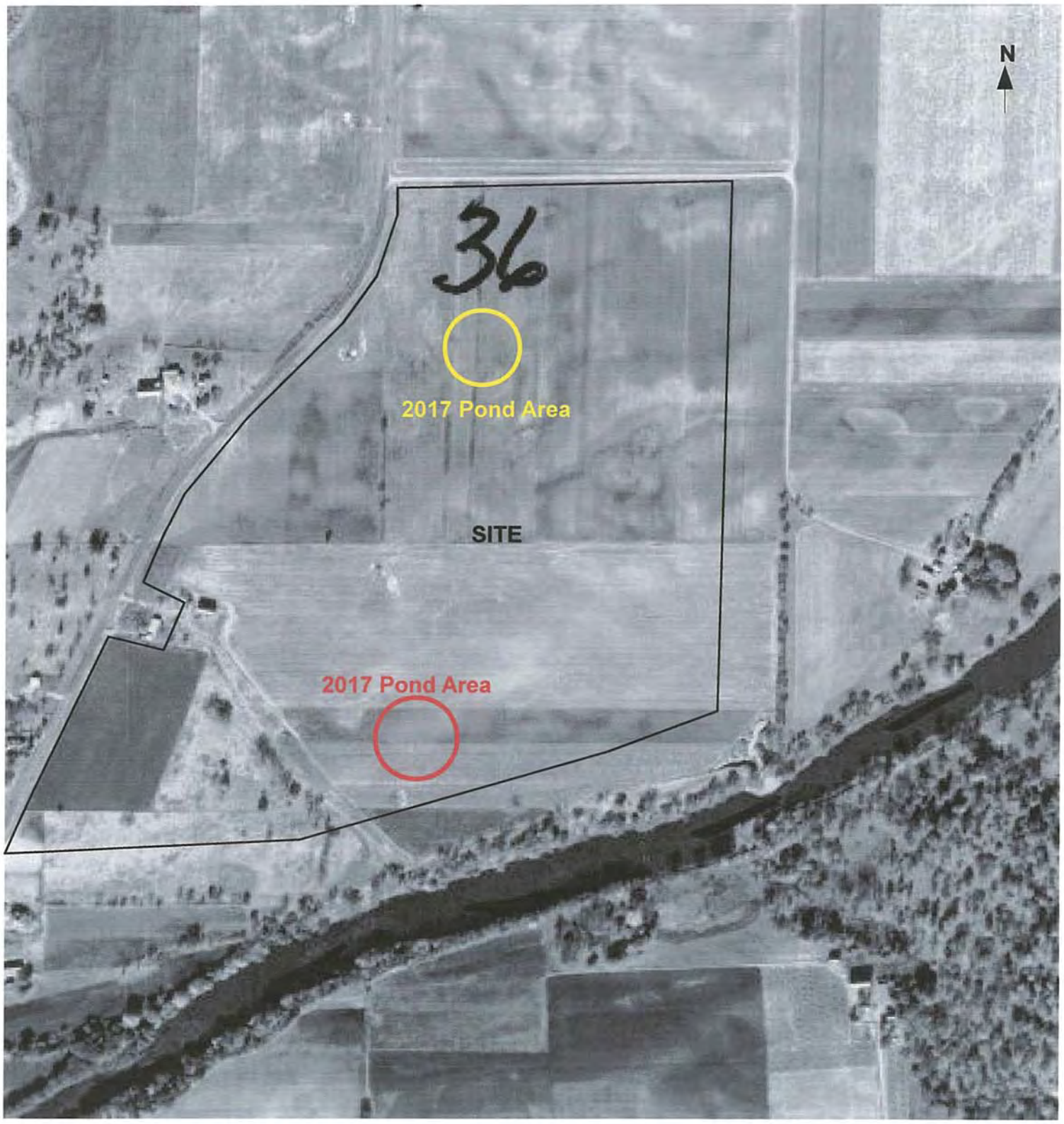
108024001010
LAMONT AV
108023
8TH ST NE
108500362403
108046001050
108500362301
108046001060
108500362400
108500362102
5TH ST NE
GARNET CT
108500361300
Hanover Gravel Pit
MEANDER RD
MEADOWLARK LN
RIVERVIEW RD NE
OVERLOOK CIR
108018001160
Hennepin
CHURCH ST NE
CROW RIVER DR NE
MILL POND

1909 Topographic Map



DUNNINCK BROS. & GILCHRIST
HANOVER GRAVEL OPERATION
APPLICATION FOR ZONING AMENDMENT
& PERMIT APPROVAL
1980
prepared by BARTON ASCHMAN ASSOCIATES, INC.
SCALE:
CONTOUR INTERVAL=1ft.
KEY

1953 Aerial Photograph

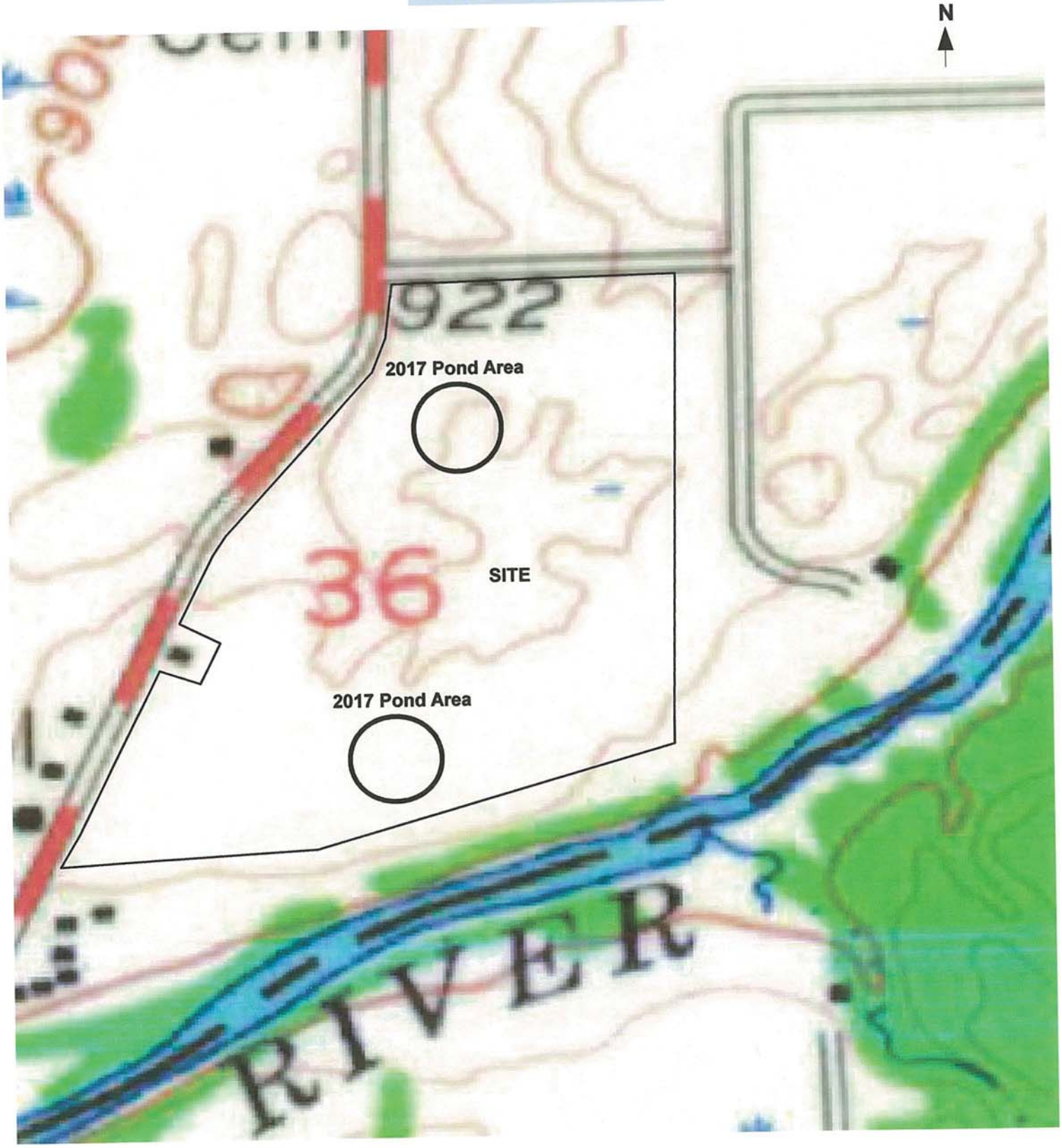


1963 Aerial Photograph

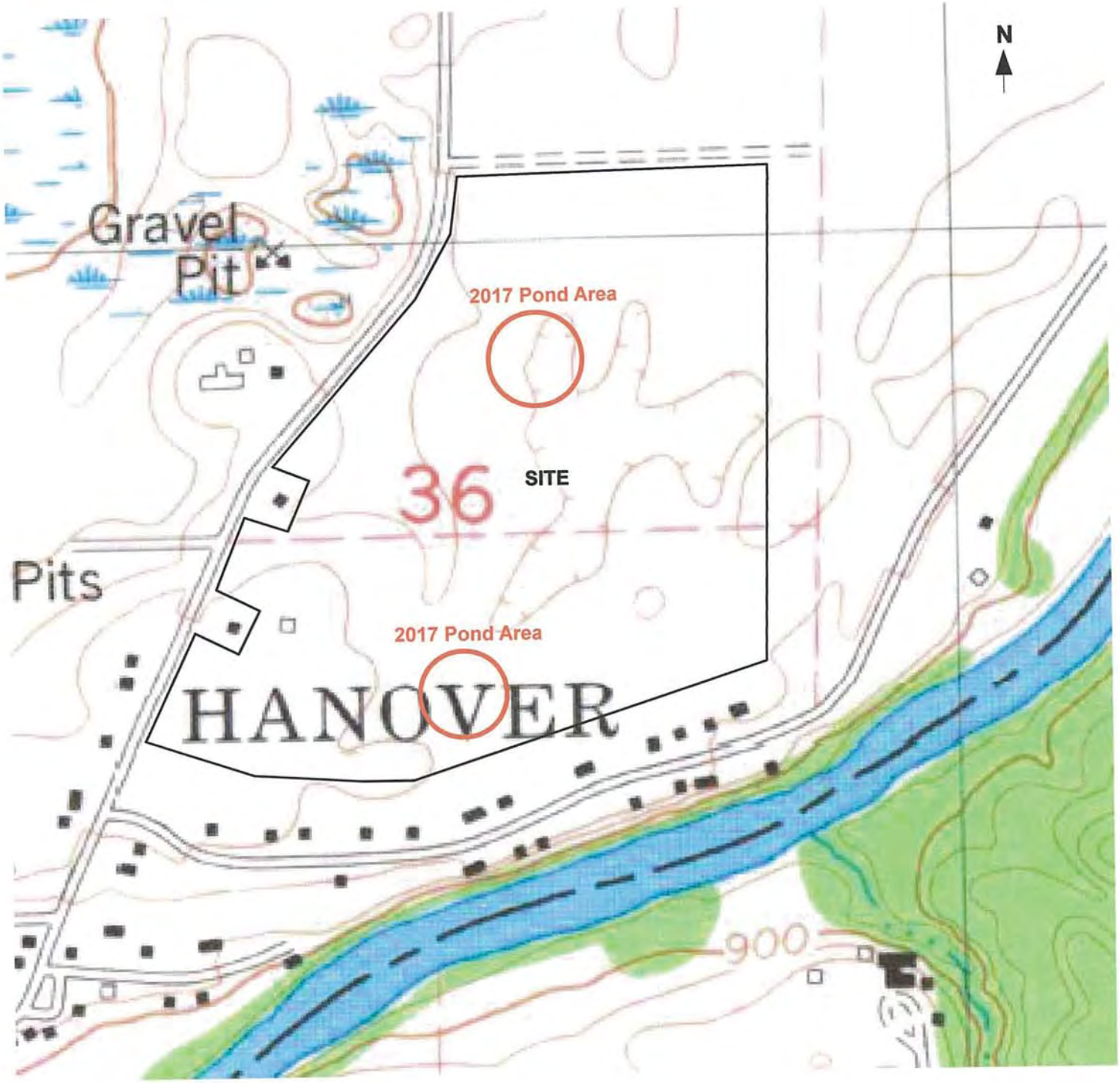
1991 Aerial
Legen
Lamont Ave NE
Mallard St NE
9th St NE
8th St NE
River Meadows Rd NE
Meander Rd
Meadowlark Ln
Excavated Pond
SITE
146
Garnett Ct
5th St NE
River Rd NE
No Ponds
Google Earth
Image U.S. Geological Survey
1000 ft
N

2008 Aerial Photograph

1958 Topogrphic Map



1981 Topographic Map



LIDAR Map

8th St NE
River Rd NE
Meanderd NE
Meadowlark Ln
Riverview Rd NE
Garnet Ct
ver Athletic Assoc Complex
Excavated Pond
SITE
Excavated Ponds
N
900
910
920
930
880

Map Scale: 1:7,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hennepin County, Minnesota
Survey Area Data: Version 12, Sep 19, 2016

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

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 17, 2013—Aug 2, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hennepin County, Minnesota (MN053)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
L2B	Malardi-Hawick complex, 1 to 6 percent slopes	5.3	2.3%
L2E	Malardi-Hawick complex, 18 to 35 percent slopes	0.1	0.1%
L4B	Crowfork loamy sand, 1 to 6 percent slopes	1.2	0.5%
L22E	Lester loam, 10 to 22 percent slopes	3.1	1.3%
L29A	Hanlon fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.8	0.4%
L37B	Angus loam, 2 to 6 percent slopes	0.1	0.1%
W	Water	2.1	0.9%
Subtotals for Soil Survey Area		**12.9**	**5.5%**
Totals for Area of Interest		**234.6**	**100.0%**

Wright County, Minnesota (MN171)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
603	Hanlon fine sandy loam, 0 to 2 percent slopes, occasionally flooded	4.3	1.8%
1015	Udipsamments (cut and fill land)	31.3	13.3%
1030	Pits, gravel-Udipsamments complex	64.6	27.5%
1066B	Malardi-Hawick complex, 1 to 6 percent slopes	99.5	42.4%
1066C	Malardi-Hawick complex, 6 to 12 percent slopes	11.2	4.8%
1066E	Malardi-Hawick complex, 18 to 35 percent slopes	3.7	1.6%
1203	Muskego, Blue Earth, and Houghton soils, ponded, 0 to 1 percent slopes	2.5	1.0%
W	Water	4.7	2.0%
Subtotals for Soil Survey Area		**221.7**	**94.5%**
Totals for Area of Interest		**234.6**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

Wetlands

September 15, 2017

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

APPENDIX E

COUNTY WELL INDEX DATA

Minnesota Unique Well Number

684221

County Wright
Quad St Michael
Quad ID 121B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/21/2003
Update Date 08/18/2014
Received Date 12/26/2002

Well Name	Township	Range	Dir	Section	Subsection
HANOVER	120	24	W	36	BCDCDA

Elevation 900 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11230 5TH ST NE HANOVER MN 55341

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	2	BLACK	MEDIUM
SAND & ROCK	2	65	BROWN	SOFT
CLAY	65	75	GRAY	MEDIUM
SANDY CLAY	75	78	BROWN	MEDIUM
SAND	78	98	BROWN	SOFT
SHALE	98	100		SOFT

Remarks

Well Depth 100 ft. **Depth Completed** 98 ft. **Date Well Completed** 11/07/2002

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 78 ft.	lbs./ft.	8 in. To 30 ft.
		6.2 in. To 98 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make**

Diameter	Slot/Gauze	Length	Set
4 in.	15	20 ft.	78 ft. 98 ft.

Static Water Level
10 ft. land surface Measure 11/07/2002

Pumping Level (below land surface)
70 ft. 3 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite	4 Sacks	0 ft.	30 ft.

Nearest Known Source of Contamination
50 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/25/2002
Manufacturer's name RED JACKET
Model Number HP 2 Volt 220
Length of drop pipe 63 ft Capacity 28 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Quat. buried
Last Strat Tunnel City Group Depth to Bedrock 98 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - NAD83, Zone 15, Meters X 447951 Y 5000930
Unique Number Verification Tag on well Input Date 01/27/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Bergerson-Caswell	27058	FELTMANN, T.

Minnesota Unique Well Number

531602

County Wright
Quad St Michael
Quad ID 121B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/08/1994
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HANOVER	120	24	W	36	BCDBAA

Elevation 900 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11230 5TH ST NE HANOVER MN 55341

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	26	BROWN	
SANDY/CLAY	26	39	BROWN	
SAND AND GRAVEL	39	90		

Remarks

Well Depth 90 ft. **Depth Completed** 90 ft. **Date Well Completed** 11/22/1993

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use irrigation **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
6 in. To ft.	lbs./ft.	12 in. To 30 ft.
		8 in. To 90 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
6 in.	14	10 ft.	ft. ft.

Static Water Level

7 ft. land surface Measure 11/15/1993

Pumping Level (below land surface)

ft. hrs. Pumping at 150 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		0 ft.	30 ft.

Nearest Known Source of Contamination

300 feet East Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/22/1993

Manufacturer's name GRUNFOS

Model Number HP 5 Volt

Length of drop pipe 40 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - NAD83, Zone 15, Meters X 447933 Y 5001084

Unique Number Verification Information from Input Date 01/27/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, R.

Minnesota Unique Well Number

481754

County Wright
Quad St Michael
Quad ID 121B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/17/1993
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
RUTER, MARTIN	120	24	W	36	AADDDD

Elevation 916 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 11959 RIVERVIEW RD NE HANOVER MN 55341

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	32		
CLAY W/GRAVEL	32	68	BROWN	
SAND & GRAVEL	68	80		
SHALE & SANDROCK	80	130		

Remarks

Well Depth 130 ft. **Depth Completed** 130 ft. **Date Well Completed** 07/20/1992

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 89 ft.	lbs./ft.	6.5 in. To 89 ft.
		4 in. To 130 ft.

Open Hole From 89 ft. To 130 ft.

Screen? ☐ **Type** **Make**

Static Water Level

45 ft. land surface Measure 07/20/1992

Pumping Level (below land surface)

ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

75 feet North Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/24/1992

Manufacturer's name TAIT

Model Number HP 0.5 Volt

Length of drop pipe 60 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 80 ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged)

System UTM - NAD83, Zone 15, Meters X 449232 Y 5001318

Unique Number Verification Tax Records Input Date 01/27/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, R.

Minnesota Unique Well Number

149420

County Wright
Quad St Michael
Quad ID 121B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/17/1988
Update Date 09/15/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
RUTER, MARTIN	120	23	W	31	BBCAAD

Elevation 924 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 12119 8TH ST NE HANOVER MN 55341

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	30	BROWN	
CLAY	30	80	BROWN	
SHALE & ROCK	80	111	WHT/BLU	

Remarks

Well Depth 111 ft. **Depth Completed** 111 ft. **Date Well Completed** 03/27/1978

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 96 ft.	lbs./ft.	4 in. To 111 ft.

Open Hole From 96 ft. To 111 ft.

Screen? ☐ **Type** **Make**

Static Water Level

30 ft. land surface Measure 03/27/1978

Pumping Level (below land surface)

40 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 03/29/1978

Manufacturer's name AERMOTOR

Model Number HP 0.5 Volt

Length of drop pipe 54 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Lawrence-Tunnel City Aquifer St.Lawrence-

Last Strat St.Lawrence-Tunnel City Depth to Bedrock 80 ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged)

System UTM - NAD83, Zone 15, Meters X 449441 Y 5001463

Unique Number Verification Tax Records Input Date 01/27/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, B.

Minnesota Unique Well Number

105278

County Wright
Quad St Michael
Quad ID 121B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/17/1988
Update Date 11/08/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KONKE, KEN	120	24	W	36	CADCCC

Elevation 916 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 11311 RIVERVIEW RD NE HANOVER MN 55341

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	75		
CLAY	75	110		
SOFT SAND	110	155		
ROCK	155	200		
SANDROCK	200	200		

Remarks

OLSON ADDITION - BLOCK 1 LOT 2

Well Depth 200 ft. **Depth Completed** 200 ft. **Date Well Completed** 06/15/1977

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**

4 in. To 155 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make**

Diameter Slot/Gauze Length Set

2 in. ft. ft. ft.

Static Water Level

Pumping Level (below land surface)

60 ft. hrs. Pumping at 25 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 06/15/1977

Manufacturer's name TAIT

Model Number HP 0.5 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Jordan Sandstone Aquifer St.Lawrence-

Last Strat Tunnel City Group Depth to Bedrock 110 ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged)

System UTM - NAD83, Zone 15, Meters X 448247 Y 5000517

Unique Number Verification Tax Records Input Date 01/27/2010

Angled Drill Hole

Well Contractor

Torgerson Well Co. 27056 TORGERSON, W.

Licensee Business Lic. or Reg. No. Name of Driller

APPENDIX F

DNR NATURAL HERITAGE LETTER

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

May 29, 2018
Correspondence # ERDB 20180442

Mr. Jason Ver Steeg
Duininck, Inc.
PO Box 208
Prinsburg, MN 56281

RE: Natural Heritage Review of the proposed Hanover Cove,
T120N R24W Section 36; Wright County

Dear Mr. Ver Steeg,

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:

State-listed Species

- Blanding's turtles (*Emydoidea blandingii*), a state-listed threatened species, have been reported from 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 may have 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 further assistance regarding the Blanding's turtle, 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.

Federally Protected Species

- The rusty patched bumble bee (*Bombus affinis*), a federally-listed endangered species, was documented in the vicinity of the proposed project. The rusty patched bumble bee typically occurs in grasslands and urban gardens with flowering plants from April through October. This species nests underground in abandoned rodent cavities or in clumps of grasses. Please reference the guidance at the USFWS rusty patched bumble bee website to determine if the project has the potential to impact this protected species.

Environmental Review and Permitting

- 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

Samantha Bump
Natural Heritage Review Specialist
Samantha.Bump@state.mn.us

Enc. Blanding's Turtle Fact Sheet & Flyer
Wildlife Friendly Erosion Control
Rusty Patched Bumble Bee Fact Sheet

Links: Rare Species Guide
http://www.dnr.state.mn.us/rsg/index.html
USFWS Rusty Patched Bumble Bee
https://www.fws.gov/midwest/endangered/insects/rpbb/guidance.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

Environmental Review Fact Sheet Series

Endangered, Threatened, and Special Concern Species of Minnesota

Blanding's Turtle

(*Emydoidea blandingii*)

Minnesota Status:	Threatened	State Rank[1]:	S2
Federal Status:	none	Global Rank[1]:	G4

HABITAT USE

Blanding's turtles need both wetland and upland habitats to complete their life cycle. The types of wetlands used include ponds, marshes, shrub swamps, bogs, and ditches and streams with slow-moving water. In Minnesota, Blanding's turtles are primarily marsh and pond inhabitants. Calm, shallow water bodies (Type 1-3 wetlands) with mud bottoms and abundant aquatic vegetation (e.g., cattails, water lilies) are preferred, and extensive marshes bordering rivers provide excellent habitat. Small temporary wetlands (those that dry up in the late summer or fall) are frequently used in spring and summer -- these fishless pools are amphibian and invertebrate breeding habitat, which provides an important food source for Blanding's turtles. Also, the warmer water of these shallower areas probably aids in the development of eggs within the female turtle. Nesting occurs in open (grassy or brushy) sandy uplands, often some distance from water bodies. Frequently, nesting occurs in traditional nesting grounds on undeveloped land. Blanding's turtles have also been known to nest successfully on residential property (especially in low density housing situations), and to utilize disturbed areas such as farm fields, gardens, under power lines, and road shoulders (especially of dirt roads). Although Blanding's turtles may travel through woodlots during their seasonal movements, shady areas (including forests and lawns with shade trees) are not used for nesting. Wetlands with deeper water are needed in times of drought, and during the winter. Blanding's turtles overwinter in the muddy bottoms of deeper marshes and ponds, or other water bodies where they are protected from freezing.

LIFE HISTORY

Individuals emerge from overwintering and begin basking in late March or early April on warm, sunny days. The increase in body temperature which occurs during basking is necessary for egg development within the female turtle. Nesting in Minnesota typically occurs during June, and females are most active in late afternoon and at dusk. Nesting can occur as much as a mile from wetlands. The nest is dug by the female in an open sandy area and 6-15 eggs are laid. The female turtle returns to the marsh within 24 hours of laying eggs. After a development period of approximately two months, hatchlings leave the nest from mid-August through early-October. Nesting females and hatchlings are often at risk of being killed while crossing roads between wetlands and nesting areas. In addition to movements associated with nesting, all ages and both sexes move between wetlands from April through November. These movements peak in June and July and again in September and October as turtles move to and from overwintering sites. In late autumn (typically November), Blanding′s turtles bury themselves in the substrate (the mud at the bottom) of deeper wetlands to overwinter.

IMPACTS / THREATS / CAUSES OF DECLINE

- loss of wetland habitat through drainage or flooding (converting wetlands into ponds or lakes)
- loss of upland habitat through development or conversion to agriculture
- human disturbance, including collection for the pet trade* and road kills during seasonal movements
- increase in predator populations (skunks, raccoons, etc.) which prey on nests and young

*It is illegal to possess this threatened species.

RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS

These recommendations apply to typical construction projects and general land use within Blanding's turtle habitat, and are provided to help local governments, developers, contractors, and homeowners minimize or avoid detrimental impacts to Blanding's turtle populations. **List 1** describes minimum measures which we recommend to prevent harm to Blanding's turtles during construction or other work within Blanding's turtle habitat. **List 2** contains recommendations which offer even greater protection for Blanding's turtles populations; this list should be used *in addition to the first list* in areas which are known to be of state-wide importance to Blanding's turtles (contact the DNR's Natural Heritage and Nongame Research Program if you wish to determine if your project or home is in one of these areas), or in any other area where greater protection for Blanding's turtles is desired.

List 1. Recommendations for all areas inhabited by Blanding's turtles.	**List 2. *Additional* recommendations for areas known to be of state-wide importance to Blanding's turtles.**
GENERAL	
A flyer with an illustration of a Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.	Turtle crossing signs can be installed adjacent to road-crossing areas used by Blanding's turtles to increase public awareness and reduce road kills.
Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed.	Workers in the area should be aware that Blanding's turtles nest in June, generally after 4pm, and should be advised to minimize disturbance if turtles are seen.
If a Blanding's turtle nests in your yard, do not disturb the nest.	If you would like to provide more protection for a Blanding's turtle nest on your property, see "Protecting Blanding's Turtle Nests" on page 3 of this fact sheet.
Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.	Construction in potential nesting areas should be limited to the period between September 15 and June 1 (this is the time when activity of adults and hatchlings in upland areas is at a minimum).
WETLANDS	
Small, vegetated temporary wetlands (Types 2 & 3) should not be dredged, deepened, filled, or converted to storm water retention basins (these wetlands provide important habitat during spring and summer).	Shallow portions of wetlands should not be disturbed during prime basking time (mid morning to mid- afternoon in May and June). A wide buffer should be left along the shore to minimize human activity near wetlands (basking Blanding's turtles are more easily disturbed than other turtle species).
Wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.	Wetlands should be protected from road, lawn, and other chemical run-off by a vegetated buffer strip at least 50' wide. This area should be left unmowed and in a natural condition.
ROADS	
Roads should be kept to minimum standards on widths and lanes (this reduces road kills by slowing traffic and reducing the distance turtles need to cross).	Tunnels should be considered in areas with concentrations of turtle crossings (more than 10 turtles per year per 100 meters of road), and in areas of lower density if the level of road use would make a safe crossing impossible for turtles. Contact your DNR Regional Nongame Specialist for further information on wildlife tunnels.
Roads should be ditched, not curbed or below grade. If curbs must be used, 4 inch high curbs at a 3:1 slope are preferred (Blanding's turtles have great difficulty climbing traditional curbs; curbs and below grade roads trap turtles on the road and can cause road kills).	Roads should be ditched, not curbed or below grade.

ROADS cont.	
Culverts between wetland areas, or between wetland areas and nesting areas, should be 36 inches or greater in diameter, and elliptical or flat-bottomed.	Road placement should avoid separating wetlands from adjacent upland nesting sites, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details).
Wetland crossings should be bridged, or include raised roadways with culverts which are 36 in or greater in diameter and flat-bottomed or elliptical (raised roadways discourage turtles from leaving the wetland to bask on roads).	Road placement should avoid bisecting wetlands, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details). This is especially important for roads with more than 2 lanes.
Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.	Roads crossing streams should be bridged.
UTILITIES	
Utility access and maintenance roads should be kept to a minimum (this reduces road-kill potential).	
Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.	
LANDSCAPING AND VEGETATION MANAGEMENT	
Terrain should be left with as much natural contour as possible.	As much natural landscape as possible should be preserved (installation of sod or wood chips, paving, and planting of trees within nesting habitat can make that habitat unusable to nesting Blanding's turtles).
Graded areas should be revegetated with native grasses and forbs (some non-natives form dense patches through which it is difficult for turtles to travel).	Open space should include some areas at higher elevations for nesting. These areas should be retained in native vegetation, and should be connected to wetlands by a wide corridor of native vegetation.
Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).	Ditches and utility access roads should not be mowed or managed through use of chemicals. If vegetation management is required, it should be done mechanically, as infrequently as possible, and fall through spring (mowing can kill turtles present during mowing, and makes it easier for predators to locate turtles crossing roads).

Protecting Blanding's Turtle Nests: Most predation on turtle nests occurs within 48 hours after the eggs are laid. After this time, the scent is gone from the nest and it is more difficult for predators to locate the nest. Nests more than a week old probably do not need additional protection, unless they are in a particularly vulnerable spot, such as a yard where pets may disturb the nest. Turtle nests can be protected from predators and other disturbance by covering them with a piece of wire fencing (such as chicken wire), secured to the ground with stakes or rocks. The piece of fencing should measure at least 2 ft. x 2 ft., and should be of medium sized mesh (openings should be about 2 in. x 2 in.). It is ***very important*** that the fencing be **removed <u>before August 1st</u>** so the young turtles can escape from the nest when they hatch!

REFERENCES

[1]Association for Biodiversity Information. "Heritage Status: Global, National, and Subnational Conservation Status Ranks." NatureServe. Version 1.3 (9 April 2001). http://www.natureserve.org/ranking.htm (15 April 2001).

Coffin, B., and L. Pfannmuller. 1988. Minnesota's Endangered Flora and Fauna. University of Minnesota Press, Minneapolis, 473 pp.

REFERENCES (cont.)

Moriarty, J. J., and M. Linck. 1994. Suggested guidelines for projects occurring in Blanding's turtle habitat. Unpublished report to the Minnesota DNR. 8 pp.

Oldfield, B., and J. J. Moriarty. 1994. Amphibians and Reptiles Native to Minnesota. University of Minnesota Press, Minneapolis, 237 pp.

Sajwaj, T. D., and J. W. Lang. 2000. Thermal ecology of Blanding′s turtle in central Minnesota. Chelonian Conservation and Biology 3(4):626-636.

Rusty Patched Bumble Bee
Bombus affinis

The U.S. Fish and Wildlife Service listed the rusty patched bumble bee as endangered under the Endangered Species Act. Endangered species are animals and plants that are in danger of becoming extinct. Identifying, protecting and recovering endangered species is a primary objective of the U.S. Fish and Wildlife Service's endangered species program.

What is a rusty patched bumble bee?

Appearance: Rusty patched bumble bees live in colonies that include a single queen and female workers. The colony produces males and new queens in late summer. Queens are the largest bees in the colony, and workers are the smallest. All rusty patched bumble bees have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the back.

Habitat: Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast, but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil).

Illustrations of a rusty patched bumble bee queen (left), worker (center), and male (right) by Elaine Evans, The Xerces Society.

Photo courtesy of Christy Stewart

Reproduction: Rusty patched bumble bee colonies have an annual cycle. In spring, solitary queens emerge and find nest sites, collect nectar and pollen from flowers and begin laying eggs, which are fertilized by sperm stored since mating the previous fall. Workers hatch from these first eggs and colonies grow as workers collect food, defend the colony, and care for young. Queens remain within the nests and continue laying eggs. In late summer, new queens and males also hatch from eggs. Males disperse to mate with new queens from other colonies. In fall, founding queens, workers and males die. Only new queens go into diapause (a form of hibernation) over winter - and the cycle begins again in spring.

Feeding Habits: Bumble bees gather pollen and nectar from a variety of flowering plants. The rusty patched emerges early in spring and is one of the last species to go into hibernation.

Why conserve rusty patched bumble bees?

As pollinators, rusty patched bumble bees contribute to our food security and the healthy functioning of our ecosystems. Bumble bees are keystone species in most ecosystems, necessary not only for native wildflower reproduction, but also for creating seeds and fruits that feed wildlife as diverse as songbirds and grizzly bears.

Bumble bees are among the most important pollinators of crops such as blueberries, cranberries, and clover and almost the only insect pollinators of tomatoes. Bumble bees are more effective pollinators than honey bees for some crops because of their ability to "buzz pollinate." The economic value of pollination services provided by native insects (mostly bees) is estimated at $3 billion per year in the United States.

It needs a constant supply and diversity of flowers blooming throughout the colony's long life, April through September.

Range: Historically, the rusty patched bumble bee was broadly distributed across the eastern United States and Upper Midwest, from Maine in the U.S. and southern Quebec and Ontario in Canada, south to the northeast corner of Georgia, reaching west to the eastern edges of North and South Dakota. Its range included 28 states, the District of Columbia and 2 provinces in Canada. Since 2000, this bumble bee has been reported from only 13 states and 1 province: Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin – and Ontario, Canada.

Why is the rusty patched bumble bee declining?

Habitat loss and degradation: Most prairies and grasslands of the Upper Midwest and Northeast have been converted to monoculture farms or developed areas, such as cities and roads. Grasslands that remain tend to be small and isolated.

Intensive farming: Increases in farm size and technology advances improved the operating efficiency of farms but have led to practices that harm bumble bees: increased use of pesticides, loss of crop diversity resulting in flowering crops being available for only a short time, loss of hedgerows with flowering plants, and loss of legume pastures.

Disease: Pathogens and parasites may pose a threat, although their prevalence and effects in North American bumble bees are not well understood.

Pesticides: The rusty patched bumble bee may be vulnerable to pesticides. Pesticides are used widely on farms and in cities and have both lethal and sublethal toxic effects. Bumble bees can absorb toxins directly through their exoskeleton and through contaminated nectar and pollen. Rusty patched bumble bees nest in the ground and may be susceptible to pesticides that persist in agricultural soils, lawns and turf.

Global climate change: Climate changes that may harm bumble bees include increased temperature and precipitation extremes, increased drought, early snow melt and late frost events. These changes may lead to more exposure to or susceptibility to disease, fewer flowering plants, fewer places for queens to hibernate and nest, less time for foraging due to high temperatures, and asynchronous flowering plant and bumble bee spring emergence.

What is being done to conserve rusty patched bumble bees?

U.S. Fish and Wildlife Service: Several Service programs work to assess, protect, and restore pollinators and their habitats. Also, the Service works with partners to recover endangered and threatened pollinators and pollinator-dependent plants. Concern about pollinator declines prompted formation of the North American Pollinator Protection Campaign, a collaboration of people dedicated to pollinator conservation and education. The Service has a Memorandum of Understanding with the Pollinator Partnership to work together on those goals. The Service is a natural collaborator because our mission is to work with others to conserve, fish, wildlife, and plants and their habitats.

Other Efforts: Trusts, conservancies, restoration groups and partnerships are supporting pollinator initiatives and incorporating native plants that support bees and other pollinators into their current activities. For example, the USDA Natural Resource Conservation Service is working with landowners in Michigan, Minnesota, Montana, North Dakota, South Dakota, and Wisconsin to make bee-friendly conservation improvements to their land. Improvements include the practices of planting cover crops, wildflowers, or native grasses and improved management on grazing lands.

Research: Researchers are studying and monitoring the impacts of GMO crops and certain pesticides on pollinators. Efforts by citizen scientists and researchers to determine the status of declining bee species are underway throughout the United States.

What can I do to help conserve the rusty patched bumble bee?

Garden: Grow a garden or add a flowering tree or shrub to your yard. Even small areas or containers on patios can provide nectar and pollen for native bees.

Native plants: Use native plants in your yard such as lupines, asters, bee balm, native prairie plants and spring ephemerals. Don't forget spring blooming shrubs like ninebark and pussy willow! Avoid invasive non-native plants and remove them if they invade your yard. For more information on attracting native pollinators, visit www.fws.gov/pollinators/pdfs/PollinatorBookletFinalrevWeb.pdf.

Natural landscapes: Provide natural areas - many bumble bees build nests in undisturbed soil, abandoned rodent burrows or grasss clumps. Keep some unmowed, brushy areas and tolerate bumble bee nests if you find them. Reduce tilling soil and mowing where bumble bees might nest. Support natural areas in your community, county and state.

Minimize: Limit the use of pesticides and chemical fertilizer whenever possible or avoid them entirely. Pesticides cause lethal and sublethal effects to bees and other pollinators.

January 10, 2017

APPENDIX G

SHPO LETTER

Jason Ver Steeg

From:	Jesse Kling <jesse.kling@mnhs.org>
Sent:	Monday, February 05, 2018 5:24 PM
To:	Data Requests to SHPO
Cc:	Jason Ver Steeg
Subject:	Re: Hanover Cove SHPO Review
Attachments:	WrightHistoric.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 archaeological sites were identified in a search of the Minnesota Archaeological Inventory and Historic and Architectural Inventory for the search area requested. **A report containing the history/architectural properties 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. **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 Monday, February 5, 2018 at 1:33:34 PM UTC-6, Jason Ver Steeg wrote:

Jesse,

I am representing the land developer Paxmar LLC. Paxmar is proposing a planned unit residential development in a currently unreclaimed gravel pit in the City of Hanover. As part of our city entitlement process, we are preparing an Environmental Assessment Worksheet, which includes a review by the State Historical Preservation Office. The parcel we are looking at is located in *Section 36, Township 120 North, Range 24 West, Wright County, Minnesota.* I have included a map to help visualize the area. We would appreciate if you could review the database for historic properties in the vicinity this property and report to us any findings you might come across. You can email the information to me or send the information to the address below.

If you have any questions, feel free to contact me at (320) 978-1372. Thank you.

Jason Ver Steeg, P.E. | Director of Engineering
Duininck, Inc. | P.O. Box 208 Prinsburg, MN 56281

O: (320) 978-6011| D: (320) 978-1372| C: (320) 212-9339

F: (320) 978-4978

jasonv@duininck.com

www.duininck.com

COUNTY	CITYTWP	PROPNAME	ADDRESS	TOWN	RANGI	SEC	QUARTER	USGS	REPORTNUM	NRH	CE DOE	INVENTNUM
Hennepin												
	Hanover											
		house	xxx 109th Ave. N.	120	24	36	SW-SE-SW	St. Michael				HE-HNC-001
		house		120	24	36	SW-SE-SW	St. Michael				HE-HNC-002
		Hanover Bridge (Bridge No. 92366)	unpaved road over Crow River	120	24	36	SE-SW-SW	St. Michael		Y		HE-HNC-005
		Bridge 27532		120	24	36	SE-SE	Saint Michael				HE-HNC-006
Wright												
	Albertville											
		house	11342 60th St. NE	120	24	36	SE-SW	St. Michael	XX-2009-2H			WR-ALC-019
	Hanover											
		Hanover Roller Mill	11 Mill Pond Trail	120	24	36	SE-SW-SW	St. Michael				WR-HNC-001
		Hanover Rollermill Dam and Raceway	xxx Bridge St.	120	24	36	SE-SW-SW	St. Michael	WR-78-1H			WR-HNC-002
		blacksmith shop		120	24	36	NE-SW-SW	St. Michael				WR-HNC-004
		Double House/Store	xxx Main St.	120	24	36	NE-SW-SW	St. Michael				WR-HNC-005
		Hanover Bridge (Bridge No. 92366)	Co. Hwy. 19 over Crow Wing River	120	24	36	SE-SW-SW	St. Michael	WR-78-1H	Y		WR-HNC-006

APPENDIX H

TRAFFIC IMPACT STUDY

HANOVER COVE
RESIDENTIAL DEVELOPMENT

STS

Swing Traffic Solutions

TRAFFIC IMPACT STUDY

in

HANOVER, MN

August 13, 2018

Hanover Cove Residential Development

Hanover, MN

TRAFFIC IMPACT STUDY

PROJECT NO. 2018023

August 13, 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: 8-13-2018 Lic. No.: 41417

TRAFFIC IMPACT STUDY

Hanover Cove Residential Development

Hanover, MINNESOTA

August 13, 2018

Prepared For:

Duininck, Inc.
P.O. Box 208
Prinsburg, MN 56281

Prepared By:

Swing Traffic Solutions, LLC
4290 Norwood Lane North
Plymouth, MN 55442
612-968-4142

Project No. 2018023

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TECHNICAL APPENDICES

(Available upon Request)

A. TRAFFIC COUNTS

B. TRIP GENERATION CALCULATIONS

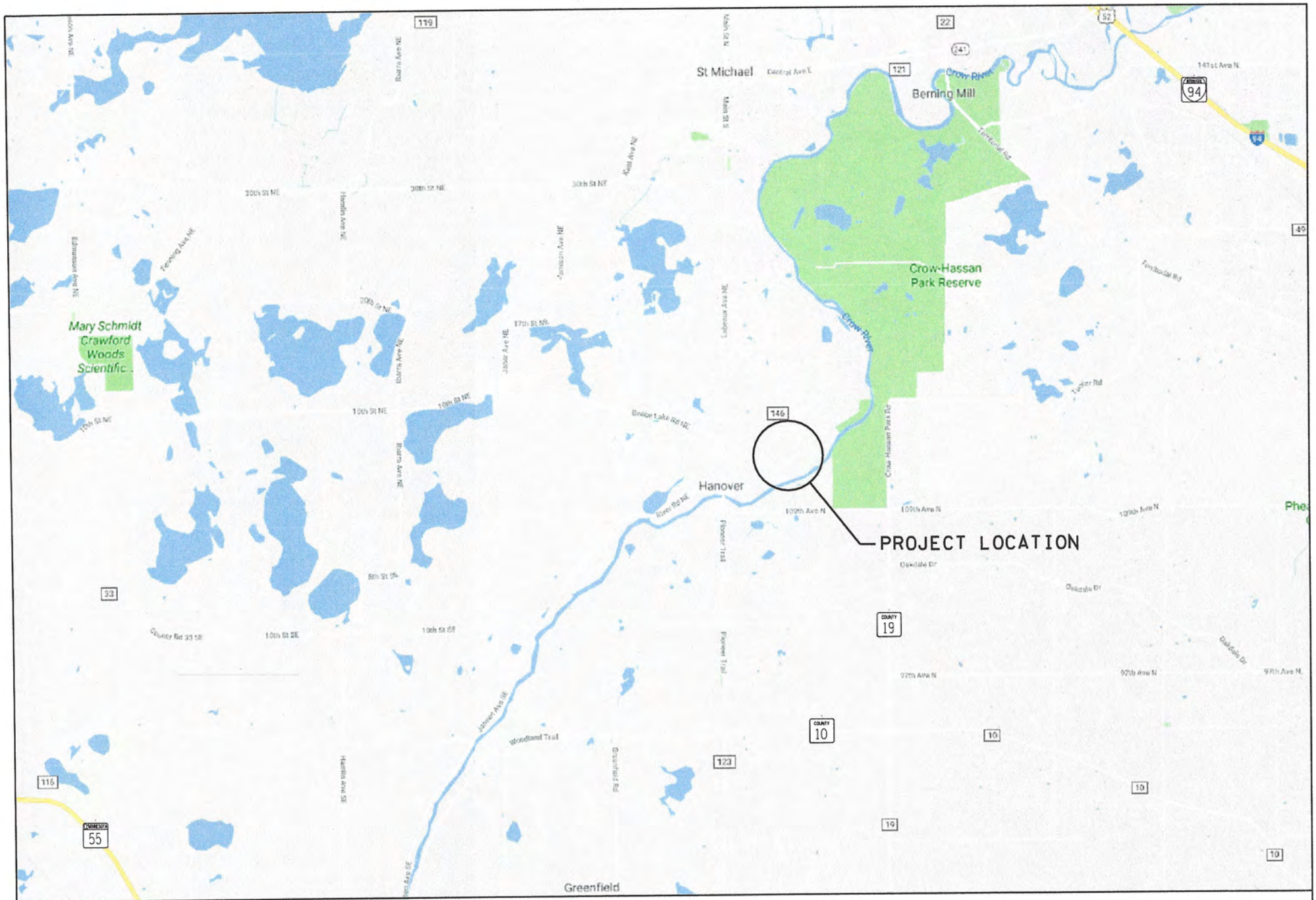
C. RESULTS OF OPERATIONAL ANALYSES

I. INTRODUCTION

Duininck, Inc. proposes to develop an approximately 82.6-acres site referred to as Hanover Cove in Hanover, Minnesota as single family detached residential homes. The project will consist of 286 single-family homes. For the purposes of this study, it is anticipated that construction will be complete, and the facilities fully occupied by 2025.

The proposed site is a former gravel mine and is located adjacent to the east side of River Road NE, adjacent to the south side of 8th Street NE, and is north and west of Riverview Road NE. The site location is illustrated on Figure 1, "Vicinity Map". Access to the site is proposed via an extension of 5th Street NE to the east from River Road NE and via an extension of Mallard Street NE to the south from 8th Street NE. The location of these accesses are illustrated on the Concept Site Plan, Figure 2.

The purpose of this study is to support the EAW completed for the Hanover Cove development, particularly to evaluate the impact of traffic generated by the proposed development 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.



STS
Swing Traffic Solutions

HANOVER COVE
HANOVER, MN

VICINITY MAP
FIGURE 1

STS
Swing Traffic Solutions

HANOVER COVE
HANOVER, MN

SITE MAP
FIGURE 2

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 June 18, 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 4:45 – 5:45 PM at the following intersections:

- 15th Street NE and Labeaux Avenue NE
- 5th Street NE and Labeaux Avenue NE
- Labeaux Avenue NE and River Road NE/River Road NE
- River Road NE and 5th Street NE
- River Road NE and 8th Street NE

Figure 3 illustrates the existing AM and PM Peak hour turning movement counts. Also, the 2016 average daily traffic volume for River Road NE, and Labeaux Avenue NE has been collected and published by MnDOT as 3,450 vehicles per day and 11,600 vehicles per day, respectively.

B. Roadway Descriptions

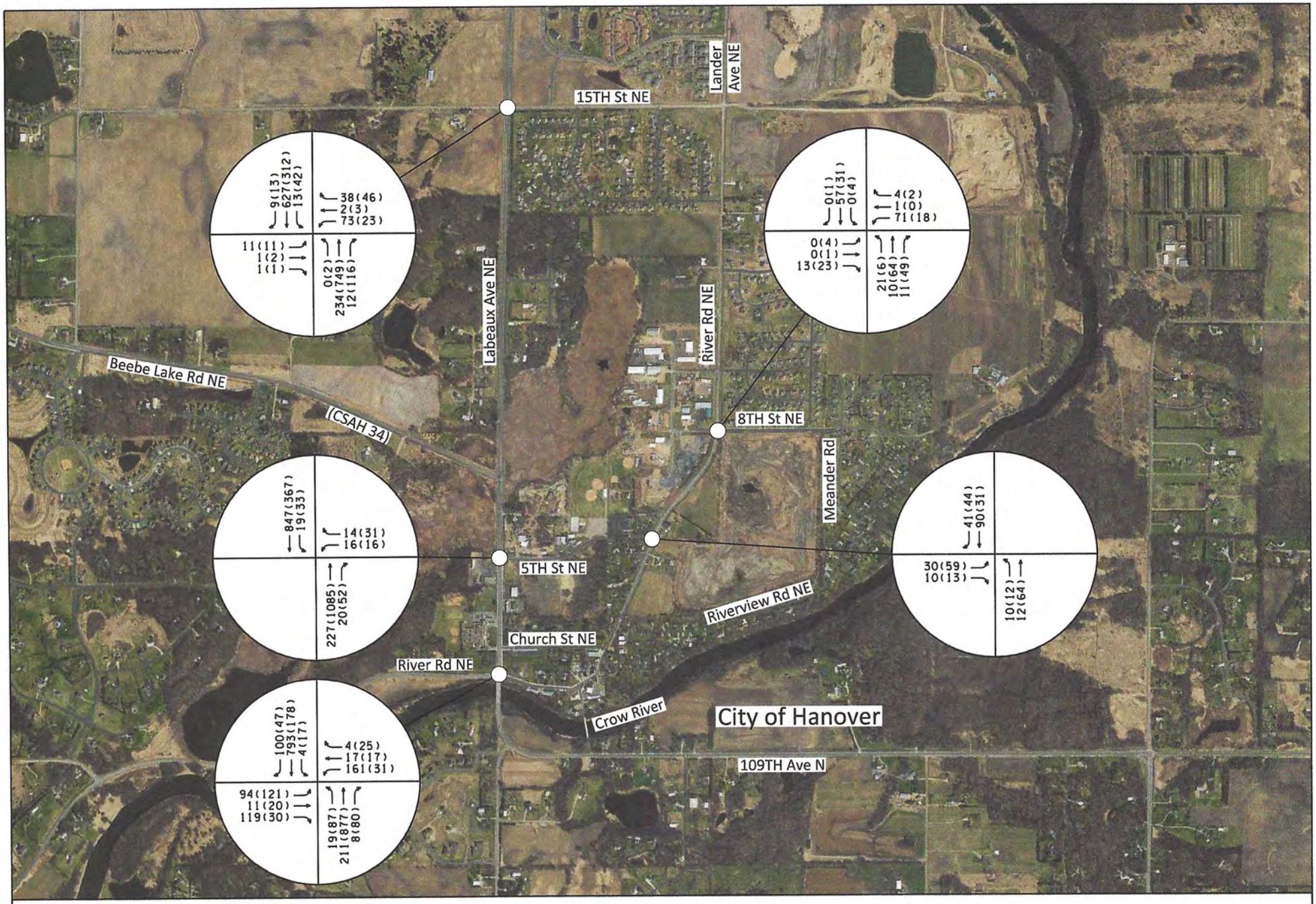
The existing geometrics of the Study Area Roadway Network have been document based on a field review. The discussion that follows details specific items such as lane and shoulder layout, roadway classifications, and turn lane storage lengths.

- **River Road NE,** which runs generally north/south along the western border of the site. It is a County State Aid Highway (CSAH 20) and is functionally classified as a B Minor Arterial to the west of Labeaux Avenue NE. It provides direct access to the site at 5th Street NE and indirectly at 8th Street NE. In the study area, River Road NE is a two-lane undivided facility including right and

left turn lanes at critical intersections. It has an urban cross-section east of Labeaux Avenue NE and a rural cross-section to the west of Labeaux Avenue NE, and it is a 30-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 a two-lane undivided rural cross-section footprint from 15th Street NE to Beebe Lake Road NE. Labeaux Avenue NE changes to 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 55 mph to the north of Beebe Lake Toad NE and changes to 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 River Road NE, 5th Street NE, and 15th Street NE.

- **15th Street NE, 8th Street NE and 5th Street NE** run east/west and are local streets that provide access to site, 15th Street indirectly, and 8th Street and 5th Street directly. They are two lane roads with undivided urban cross-sections and are 30 mph facilities.



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HANOVER COVE
HANOVER, MN

EXISTING PEAK HOUR VOLUMES
FIGURE 3

C. Intersection Descriptions

- **Labeaux Avenue NE and 15th Street NE,** form a four-legged unsignalized intersection north of the site. All 15th Street NE approaches are two lanes, one lane entering and one lane exiting the intersection and are stop controlled. The Labeaux Avenue NE approaches are free flowing and include left and right turn lanes.

- **Labeaux Avenue NE and 5th Street NE** form a three-legged unsignalized intersection west of the site. The 5th Street NE approach is stop controlled and has three lanes, two lanes entering (left and right turning lanes) and one lane exiting the intersection. The Labeaux Avenue NE approaches are free flowing, and the northbound approach provides a through lane and a right turn lane, while the southbound approach includes a through lane and left turn 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 5th Street NE** form a three-legged unsignalized intersection adjacent to the site. The west leg, 5th Street NE, 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 northbound approach provides a through lane and a left turn lane, while the southbound approach includes a through lane and a right turn lane.

- **River Road NE and 8th Street NE,** form a four-legged unsignalized intersection north of the site. The west 8th Street NE approaches is two lanes, one lane entering and one lane exiting the intersection and is stop sign controlled. The east 8th Street approach is also stop sign controlled

and includes two lanes entering, a left and through lane and a right turn lane, and one lane exiting the intersection. The River Road NE approaches are free flowing, and the northbound approach includes a left turn 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

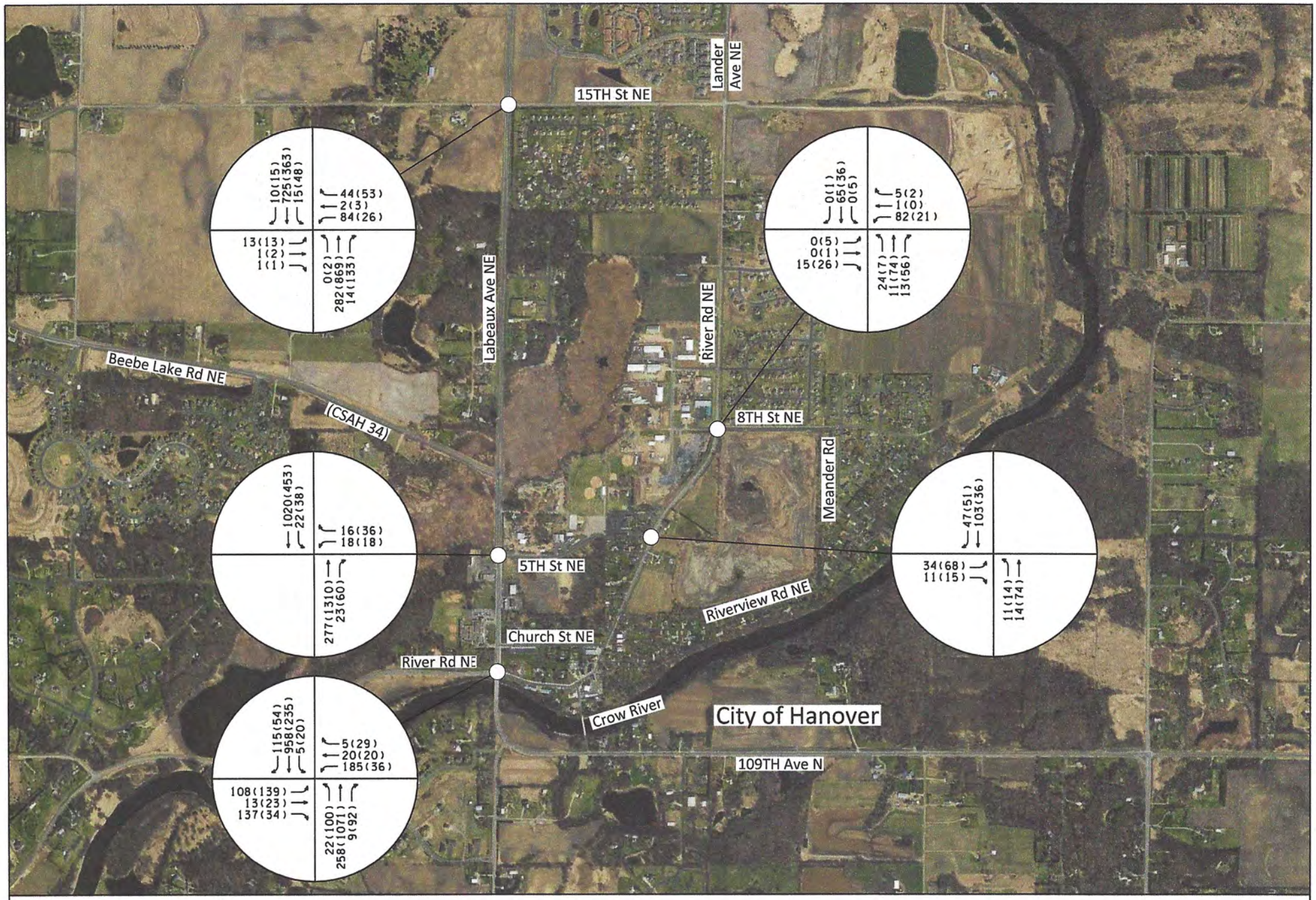
Review of the latest City of Hanover Comprehensive Transportation Plan, and historical traffic counts results in differing estimates of future conditions. The City of Hanover Comprehensive Transportation Plan completed in 2006 suggested traffic counts would grow at an annual rate of 6.5 percent per year. Review of historical counts from MnDOT indicate traffic has actually grown at 1.67 percent per year from 1998 to 2016. Further, discussions with MnDOT regarding the anticipated impact of the future Brockton interchange with I-94, as well as the future connection of TH 610 to Hennepin County 30 suggest traffic patterns along I-94 will change. It is expected that more traffic will use I-94 and divert at the new connections rather than leave I-94 early, as currently occurs, to use cut through routes such as CSAH 19. This will reduce the anticipated future background traffic growth in Hanover. However, 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. Further, it is anticipated the Crow River Heights West development will be occupied by 2025 and its traffic has been added to the 2025 and 2040 Background numbers. 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.



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HANOVER COVE
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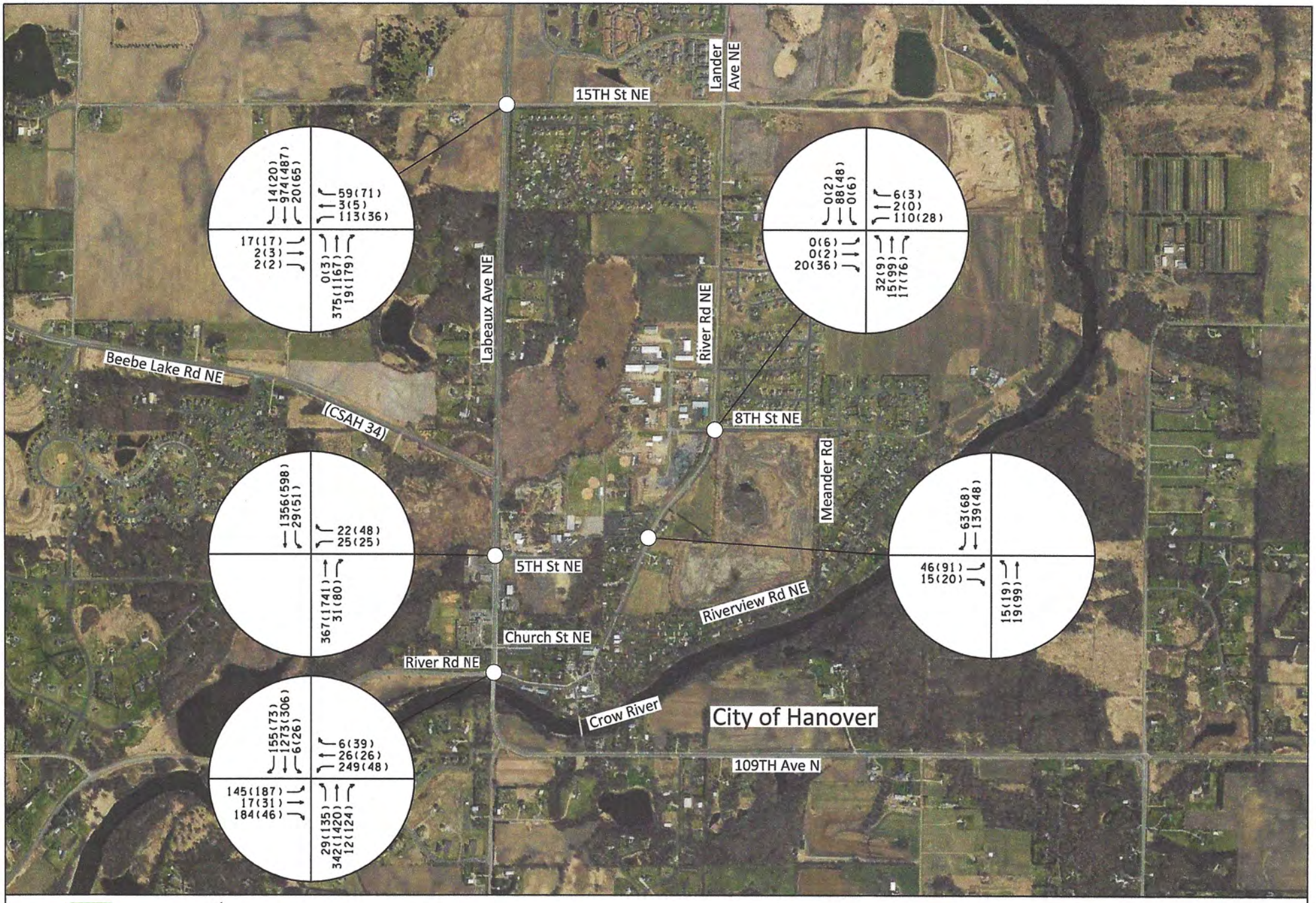
2025 NO BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 4



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HANOVER COVE
HANOVER, MN

2040 NO BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 5

IV. BUILD ALTERNATIVE

A. Site-Generated Traffic

The number of vehicle trips generated by the 286 units to be developed as part of the Hanover Cove 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). The proposed development will include single-family homes corresponding to (ITE) Land Use Code 210. 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 (127 Homes)	53 Trips	159 Trips	178 Trips	105 Trips	2,700 Trips
TOTAL	**212 Trips**		**283 Trips**		**2,700 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. It is assumed each access approach to the existing street system will include one lane in and one lane out. The River Road NE approaches to the site access at approximately 5th Street NE should include left and right turn lanes toward the site to improve safety by removing turning traffic from the through traffic path. Figure 7, titled "Trip Assignment," illustrates the estimated changes in traffic volume on the study area roadways associated with the proposed redevelopment.

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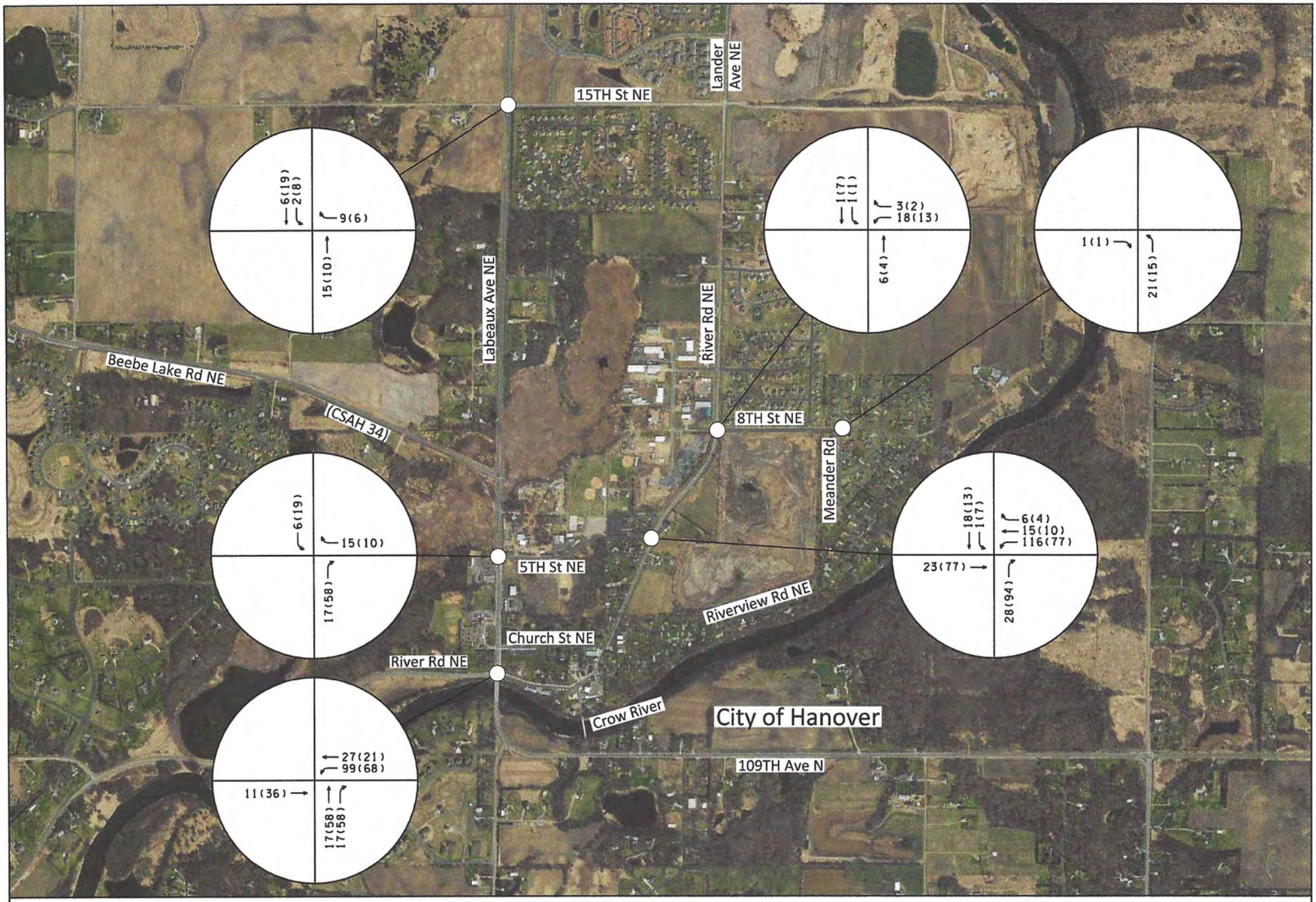
TRIP DISTRIBUTION
FIGURE 6



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HANOVER COVE
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TRIP ASSIGNMENT
FIGURE 7

C. Build Traffic Volumes

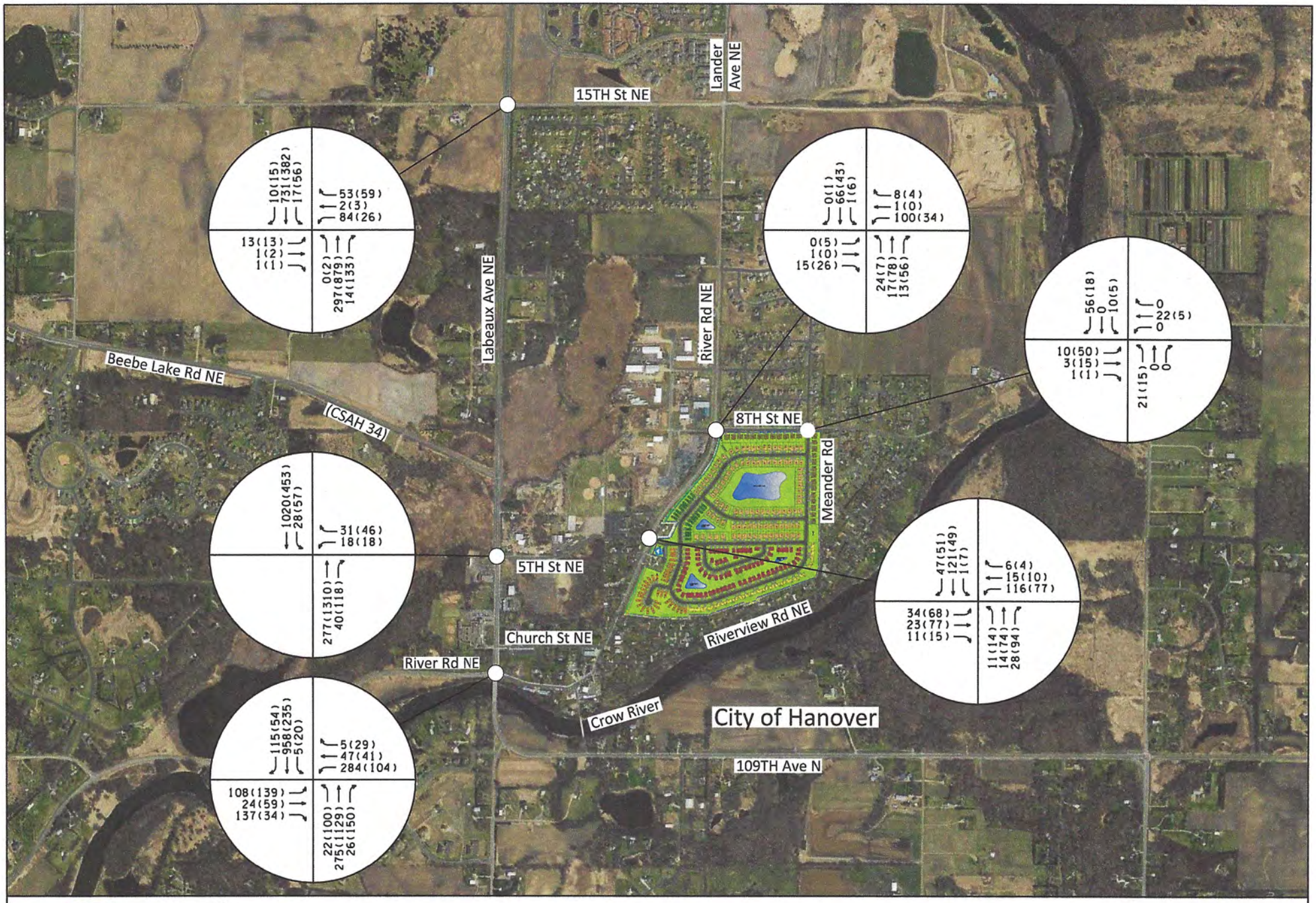
When combined, the site-generated traffic volumes and No-Build scenario traffic volumes result in the Build scenario traffic volumes, shown on Figures 8 and 9 for the 2025 and 2040 design years, respectively.

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. The Chart below summarizes the level of service and delay criteria for signalized and unsignalized intersections.

LOS Designation	Signalized Intersection Average Delay/Vehicle (Sec.)	Unsignalized Intersection Average Delay/Vehicle (Sec.)
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

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.



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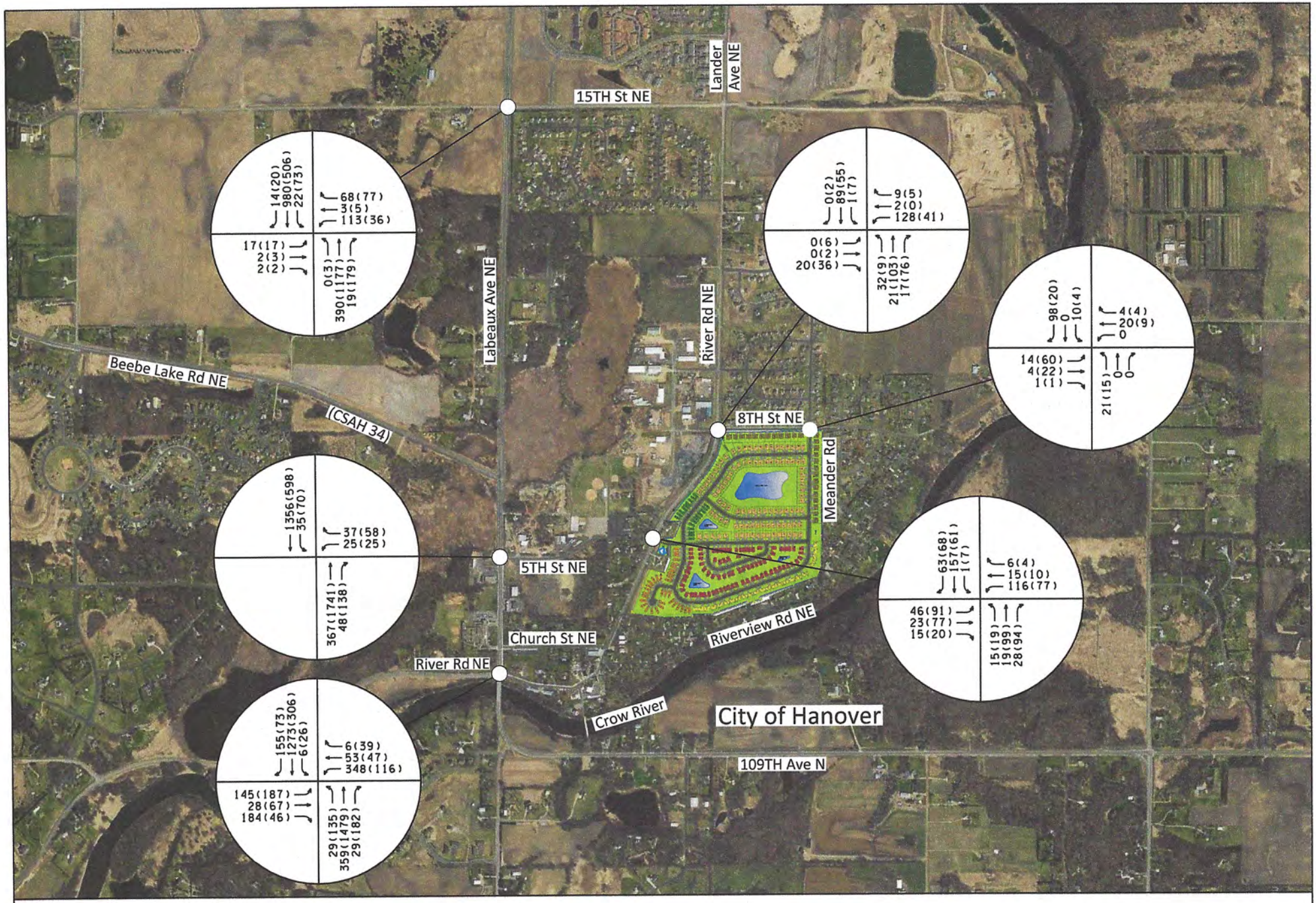
2025 BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 8



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HANOVER COVE
HANOVER, MN

2040 BUILD AM & PM PEAK HOUR TRAFFIC
FIGURE 9

E. Results of Analysis

This section contains the results of the intersection operational analyses based on Synchro/Simtraffic, 10th Edition, and provides recommendations, as necessary to mitigate the impacts. Table 2 summarize the results of the operational analyses for the 2025 No Build scenario.

Table 2
2025 No-Build Operations

Intersection	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**a (4.7 sec)**	**a (3.2 sec)**	-	-
	EB Left	d (29.5 sec)	f (60.9 sec)	34	24
	EB Thru	d (29.5 sec)	f (60.9 sec)	34	24
	EB Right	d (29.5 sec)	f (60.9 sec)	34	24
	WB Left	e (39.1 sec)	e (42.2 sec)	325	86
	WB Thru	e (39.1 sec)	e (42.2 sec)	325	86
	WB Right	e (39.1 sec)	e (42.2 sec)	325	86
	NB Left	a (0)	a (8.1 sec)	-	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	6
	SB Left	a (7.9 sec)	b (11.0 sec)	22	60
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
Labeaux Ave NE & 5th Street NE	**Overall**	**a (0.7 sec)**	**a (1.8 sec)**	-	-
	WB Left	c (23.5 sec)	f (53.2 sec)	33	9
	WB Right	c (23.5 sec)	f (53.2 sec)	33	19
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	7	1
	SB Left	a (8.0 sec)	b (13.8 sec)	26	27
	SB Thru	a (0)	a (0)	-	-
Labeaux Ave NE & River Road NE	**Overall**	**C (28.7 sec)**	**C (26.7 sec)**	-	-
	EB Left	D (43.1 sec)	F (90.2 sec)	133	176
	EB Thru	A (9.6 sec)	C (26.6 sec)	153	170
	EB Right	(N/A)	(N/A)	-	-
	WB Left	F (85.2 sec)	D (52.7 sec)	289	75
	WB Thru	C (31.6 sec)	C (27.1 sec)	224	86
	WB Right	(N/A)	(N/A)	-	-
	NB Left	A (8.4 sec)	A (3.4 sec)	52	457
	NB Thru	A (8.9 sec)	C (26.1 sec)	103	1023
	NB Right	(N/A)	(N/A)	-	-
	SB Left	A (7.0 sec)	A (7.1 sec)	-	47
	SB Thru	C (27.8 sec)	A (6.6 sec)	707	138
	SB Right	A (6.5 sec)	A (1.5 sec)	132	64
River Road NE & 5th Street NE	**Overall**	**a (2.7 sec)**	**a (3.6 sec)**	-	-
	EB Left	a (9.6 sec)	a (9.8 sec)	50	55
	EB Right	a (9.6 sec)	a (9.8 sec)	50	55
	NB Left	a (7.5 sec)	a (7.4 sec)	5	5
	NB Thru	a (0)	a (0)	-	-

	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
River Road NE & 8th Street NE	**Overall**	**a (5.5 sec)**	**a (2.6 sec)**	-	-
	EB Left	-	a (2.8 sec)	27	45
	EB Thru	-	a (2.8 sec)	27	45
	EB Right	a (8.7 sec)	a (2.8 sec)	27	45
	WB Left	b (10.1 sec)	b (10.0 sec)	47	40
	WB Thru	b (10.1 sec)	b (10.0 sec)	47	40
	WB Right	b (10.1 sec)	b (10.0 sec)	47	40
	NB Left	a (7.4 sec)	a (7.3 sec)	11	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	-	a (0)	-	-
	SB Thru	a (0)	a (0)	-	-
	SB Right	-	a (0)	-	-

1. Overall Level of Service reported from Synchro 10, 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. It is suggested the traffic signal be modified to provide protect permitted left turn phasing for the eastbound and westbound approaches, and right turn lanes should be considered (if feasible) for the east, west and south approaches. Table 3 summarizes the results of the 2025 No-Build conditions with the suggested mitigation. With the suggested improvement the westbound operations at Labeaux Avenue and River Road NE improve and the queue is reduced to a more manageable 198 feet. 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 15th Street NE to the south across the Crow River Bridge. It is further noted, the minor street approaches to Labeaux from 15th Street and 5th Street in the PM peak are expected to at or near capacity and experience long delays.

Table 3
2025 No-Build Operations with mitigation

Intersection	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**a (4.7 sec)**	**a (3.4 sec)**	-	-
	EB Left	d (29.5 sec)	f (65.7 sec)	34	32
	EB Thru	d (29.5 sec)	f (65.7 sec	34	32
	EB Right	d (29.5 sec)	f (65.7 sec)	34	32
	WB Left	e (39.1 sec)	e (45.2 sec)	325	124
	WB Thru	e (39.1 sec)	e (45.2 sec)	325	124
	WB Right	e (39.1 sec)	e (45.2 sec)	325	124
	NB Left	a (0)	a (8.4 sec)	-	14
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	12
	SB Left	a (7.9 sec)	b (11.2 sec)	26	39
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
Labeaux Ave NE & 5th Street NE	**Overall**	**a (0.7 sec)**	**a (2.2 sec)**	-	-
	WB Left	c (23.5 sec)	f (56.4 sec)	39	103
	WB Right	c (23.5 sec)	f (56.4 sec)	24	85
	NB Thru	a (0)	a (0)	-	7
	NB Right	a (0)	a (0)	-	25
	SB Left	a (8.0 sec)	b (14.7 sec)	29	112
	SB Thru	a (0)	a (0)	-	-
Labeaux Ave NE & River Road NE	**Overall**	**C (27.5 sec)**	**C (25.6 sec)**	-	-
	EB Left	D (36.6 sec)	F (121.6 sec)	121	175
	EB Thru	D (49.8 sec)	E (61.6 sec)	78	111
	EB Right	B (18.6 sec)	A (2.0 sec)	145	42
	WB Left	D (45.7 sec)	D (52.2 sec)	182	90
	WB Thru	D (47.2 sec)	E (58.0 sec)	198	71
	WB Right	A (0.2 sec)	A (1.8 sec)	16	54
	NB Left	A (9.2 sec)	A (3.9 sec)	51	267
	NB Thru	A (9.2 sec)	C (20.7 sec)	123	1053
	NB Right	A (0)	A (2.9 sec)	26	62
	SB Left	A (6.8 sec)	A (4.8 sec)	55	41
	SB Thru	C (32.1 sec)	A (7.1 sec)	708	129
	SB Right	A (3.9 sec)	A (0.6 sec)	117	57
River Road NE & 5th Street NE	**Overall**	**a (2.7 sec)**	**a (3.6 sec)**	-	-
	EB Left	a (9.6 sec)	a (9.8 sec)	49	54
	EB Right	a (9.6 sec)	a (9.8 sec)	49	54
	NB Left	a (7.5 sec)	a (7.4sec)	-	11
	NB Thru	a (0)	a (0)	-	-
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
	Overall	**a (5.5 sec)**	**a (2.8 sec)**	-	-
	EB Left	-	a (8.8 sec)	27	41
	EB Thru	-	a (8.8 sec)	27	41
	EB Right	a (8.7 sec)	a (8.8 sec)	27	41
	WB Left	b (10.1 sec)	b (10.1 sec)	47	48
	WB Thru	b (10.1 sec)	-	47	48

River Road NE & 8th Street NE	WB Right	b (10.1 sec)	b (10.1 sec)	47	48
	NB Left	a (7.4 sec)	a (7.3 sec)	9	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	-	a (0)	-	11
	SB Thru	a (0)	a (1.4)	-	11
	SB Right	-	-	-	11

1. Overall Level of Service reported from Synchro 10. 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 2025 Build analysis includes traffic from the proposed development and assumes the signal and turn lane modifications at Labeaux Avenue and River Road NE discussed above. Table 4 contains a summary of the analysis results.

Table 4
2025 Build Operations

Intersection	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**a (5.2 sec)**	**a (3.7 sec)**	-	-
	EB Left	d (31.6 sec)	f (70.2 sec)	30	40
	EB Thru	d (31.6 sec)	f (70.2 sec)	30	40
	EB Right	d (31.6 sec)	f (70.2 sec)	30	40
	WB Left	e (41.8 sec)	e (46.9 sec)	136	166
	WB Thru	e (41.8 sec)	e (46.9 sec)	136	166
	WB Right	e (41.8 sec)	e (46.9 sec)	136	166
	NB Left	-	a (8.2 sec)	-	9
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (8.0 sec)	b (11.3 sec)	23	51
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
Labeaux Ave NE & 5th Street NE	**Overall**	**a (0.8 sec)**	**a (2.2 sec)**	-	-
	WB Left	c (19.6 sec)	f (56.6 sec)	59	39
	WB Right	c (19.6 sec)	f (56.6 sec)	42	67
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	17
	SB Left	a (8.0 sec)	b (14.9 sec)	34	62
	SB Thru	a (0)	a (0)	64	-
Labeaux Ave NE & River Road NE	**Overall**	**C (31.1 sec)**	**C (26.3 sec)**	-	-
	EB Left	D (42.9 sec)	F (97.6 sec)	77	162
	EB Thru	E (58.6 sec)	E (62.4 sec)	28	115
	EB Right	C (20.0 sec)	A (1.9 sec)	101	34
	WB Left	E (68.8 sec)	E (68.6 sec)	175	143
	WB Thru	D (52.8 sec)	E (58.2 sec)	682	75
	WB Right	A (0.2 sec)	A (1.6 sec)	8	45
	NB Left	A (8.3 sec)	A (4.1 sec)	49	579
	NB Thru	A (9.3 sec)	C (22.1 sec)	151	1400
	NB Right	A (0)	A (3.3 sec)	53	65

	SB Left	A (7.2 sec)	A (5.2 sec)	41	63
	SB Thru	C (29.0 sec)	A (7.3 sec)	1470	85
	SB Right	A (0)	A (0.7 sec)	153	31
River Road NE & 5th Street NE	**Overall**	**a (5.5 sec)**	**a (5.9 sec)**	-	-
	EB Left	b (10.3 sec)	b (11.9 sec)	58	62
	EB Thru	b (10.3 sec)	b (11.9 sec)	58	62
	EB Right	b (10.3 sec)	b (11.9 sec)	58	62
	WB Left	b (11.4 sec)	b (12.3 sec)	55	42
	WB Thru	b (11.4 sec)	b (12.3 sec)	55	42
	WB Right	b (11.4 sec)	b (12.3 sec)	55	42
	NB Left	a (7.3 sec)	a (7.5 sec)	-	5
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (7.4 sec)	a (7.6 sec)	-	12
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
River Road NE & 8th Street NE	**Overall**	**a (5.9 sec)**	**a (2.9 sec)**	-	-
	EB Left	-	a (8.9 sec)	-	40
	EB Thru	-	a (8.9 sec)	33	40
	EB Right	a (8.7 sec)	a (8.9 sec)	33	40
	WB Left	b (10.4 sec)	b (10.3 sec)	64	46
	WB Thru	b (10.4 sec)	b (10.3 sec)	64	46
	WB Right	b (10.4 sec)	b (10.3 sec)	64	46
	NB Left	a (7.4 sec)	a (7.3 sec)	13	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (0)	a (0)	-	-
	SB Thru	a (0.1 sec)	a (1.0 sec)	-	-
	SB Right	-	a (1.0 sec)	-	-
8th Street NE & Site Access	**Overall**	**a (6.9 sec)**	**a (6.6 sec)**	-	-
	EB Left	a (0.1 sec)	a (0.2 sec)	-	-
	EB Thru	a (5.4 sec)	a (5.6 sec)	-	-
	EB Right	a (5.4 sec)	a (5.6 sec)	-	-
	WB Left	-	-	-	-
	WB Thru	a (0)	a (0)	-	-
	WB Right	-	-	-	-
	NB Left	a (9.6 sec)	a (9.7 sec)	47	32
	NB Thru	-	-	47	32
	NB Right	-	-	47	32
	SB Left	a (8.7 sec)	a (8.6 sec)	54	40
	SB Thru	-	-	54	40
	SB Right	a (8.7 sec)	a (8.6 sec)	54	40

3. Overall Level of Service reported from Synchro 10. 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 and no mitigation are summarized in Table 4.

Table 5
2040 No-Build Operations

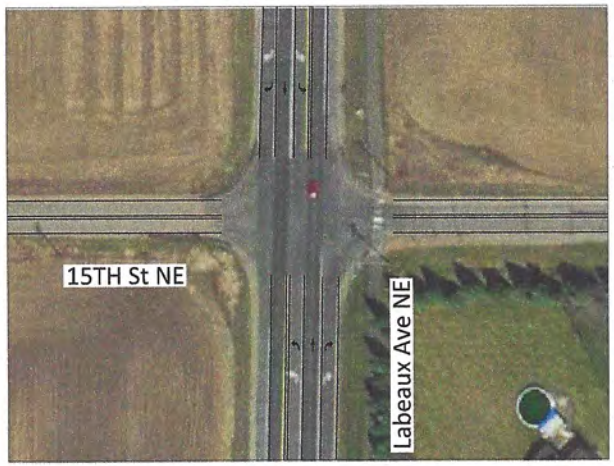
Intersection	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**d (32.6 sec)**	**c (22.6 sec)**	-	-
	EB Left	f (61.3 sec)	f (361.3 sec)	39	72
	EB Thru	f (61.3 sec)	f (361.3 sec)	39	72
	EB Right	f (61.3 sec)	f (361.3 sec)	39	72
	WB Left	f (289.9 sec)	f (339.5 sec)	1481	1292
	WB Thru	f (289.9 sec)	f (339.5 sec)	1481	1292
	WB Right	f (289.9 sec)	f (339.5 sec)	1481	1292
	NB Left	-	a (8.5 sec)	-	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	9
	SB Left	a (8.2 sec)	b (14.2 sec)	32	74
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
Labeaux Ave NE & 5th Street NE	**Overall**	**a (1.4 sec)**	**a (7.5 sec)**	-	-
	WB Left	f (50.4 sec)	f (247.3 sec)	205	224
	WB Right	f (50.4 sec)	f (247.3 sec)	34	213
	NB Thru	a (0)	a (0)	-	7
	NB Right	a (0)	a (0)	-	23
	SB Left	a (8.3 sec)	c (19.8 sec)	954	96
	SB Thru	a (0)	a (0)	(3705)	-
	Overall	**E (71.3 sec)**	**E (69.7 sec)**	-	-
	EB Left	E (67.4 sec)	F (274.7 sec)	175	175
	EB Thru	D (50.8 sec)	E (59.3 sec)	355	1533
	EB Right	D (42.1 sec)	A (5.9 sec)	198	45
	WB Left	F (277.2 sec)	D (52.2 sec)	177	96
	WB Thru	D (51.8 sec)	E (57.7 sec)	1355	83

Labeaux Ave NE & River Road NE	WB Right	A (0.2 sec)	A (2.8 sec)	12	64
	NB Left	A (9.2 sec)	A (3.8 sec)	52	552
	NB Thru	A (7.1 sec)	E (77.9.0)	131	5483
	NB Right	A (0)	A (2.3 sec)	30	58
	SB Left	A (5.0 sec)	A (6.7 sec)	61	52
	SB Thru	E (64.6 sec)	A (7.4 sec)	5000+	170
	SB Right	A (4.2 sec)	A (2.3 sec)	144	69
River Road NE & 5th Street NE	**Overall**	**a (2.4 sec)**	**a (3.8 sec)**	-	-
	EB Left	b (10.1 sec)	b (10.4 sec)	49	72
	EB Right	b (10.1 sec)	b (10.4 sec)	49	72
	NB Left	a (7.7 sec)	a (7.5 sec)	9	72
	NB Thru	a (0)	a (0)	-	21
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
River Road NE & 8th Street NE	**Overall**	**a (5.9 sec)**	**a (2.7 sec)**	-	-
	EB Left	-	a (9.0 sec)	31	43
	EB Thru	-	a (9.0 sec)	31	43
	EB Right	a (8.8 sec)	a (9.0 sec)	31	43
	WB Left	b (11.0 sec)	b (10.4 sec)	61	42
	WB Thru	b (11.0 sec)	-	61	42
	WB Right	b (11.0 sec)	b (10.7 sec)	61	42
	NB Left	a (7.5 sec)	a (7.3 sec)	8	-
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	-	a (0)	-	9
	SB Thru	a (0)	a (0.9 sec)	-	9
	SB Right	-	a (0.9 sec)	-	9

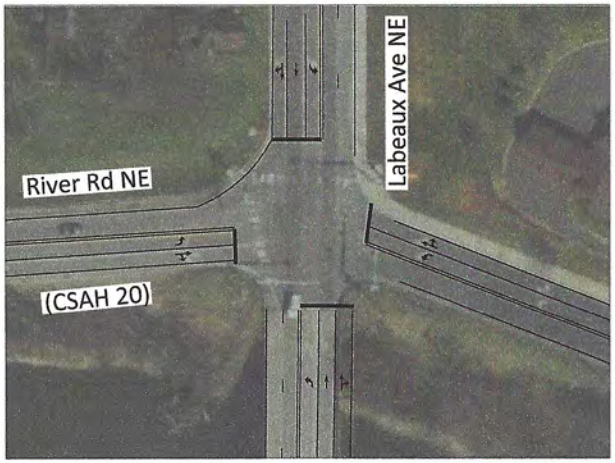
1. Overall Level of Service reported from Synchro 10. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.
3. (XXX) queue from River Road NE intersection.

The results shown in Table 5 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. The estimated queues for the north and southbound approaches are over 5,000 feet in length and do not clear during the signal cycle. Further, the intersections of 15th Street NE and River Road NE with Labeaux Avenue NE will experience very long east and westbound vehicle queues that are not able to clear during the hour. It is recommended that Labeaux Avenue NE be improved to provide an additional through lane in each direction beginning just to the north of the intersection with 15th Street and continuing to the south beyond the Crow River bridge, with left turn lanes at critical intersections. Additionally, a traffic signal should be considered at the intersection of 15th Avenue NE and Labeaux Avenue NE. Figure 10 conceptually illustrates potential improvements.

CURRENT CONDITION



PROPOSED CONDITION



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HANOVER, MN

PROPOSED IMPROVEMENTS
FIGURE 10

It is assumed the recommended capacity improvements will occur between 2025 and 2040 resulting 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 6.

Table 6
2040 Mitigated No-Build Operations

Intersection	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**A (7.5 sec)**	**A (4.7 sec)**	-	-
	EB Left	B (13.9 sec)	B (18.0 sec)	27	35
	EB Thru	B (11.5 sec)	B (15.0 sec)	13	12
	EB Right	-	-	13	12
	WB Left	B (18.4 sec)	B (19.4 sec)	91	44
	WB Thru	A (6.2 sec)	A (8.4 sec)	26	66
	WB Right	-	-	26	66
	NB Left	-	A (3.0 sec)	-	13
	NB Thru	A (5.2 sec)	A (4.9 sec)	74	104
	NB Right	A (2.6 sec)	A (1.1 sec)	11	55
	SB Left	A (5.1 sec)	A (7.3 sec)	37	83
	SB Thru	A (7.3 sec)	A (3.4 sec)	116	69
	SB Right	A (2.9 sec)	A (1.7 sec)	20	18
Labeaux Ave NE & 5th Street NE	**Overall**	**a (0.7 sec)**	**a (4.8 sec)**	-	
	WB Left	c (20.2 sec)	f (151.7 sec)	68	46
	WB Right	c (20.2 sec)	f (151.7 sec)	31	60
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (8.3 sec)	c (20.0 sec)	40	63
	SB Thru	a (0)	a (0)	-	-
Labeaux Ave NE & River Road NE	**Overall**	**C (24.4 sec)**	**B (17.0 sec)**	-	-
	EB Left	C (32.4 sec)	D (51.4 sec)	144	185
	EB Thru	D (37.1 sec)	C (22.7 sec)	178	194
	EB Right	-	-	178	194
	WB Left	D (48.9 sec)	D (38.8 sec)	204	98
	WB Thru	C (32.6 sec)	D (32.8 sec)	204	108
	WB Right	-	-	204	108
	NB Left	B (12.7 sec)	A (6.9 sec)	65	103
	NB Thru	B (12.1 sec)	B (15.5 sec)	123	300
	NB Right	A (0)	A (2.1 sec)	27	51
	SB Left	B (10.7 sec)	A (7.8 sec)	38	53
	SB Thru	C (22.6 sec)	B (10.3 sec)	401	88
	SB Right	A (4.8 sec)	A (0.3 sec)	164	61
River Road NE & 5th Street NE	**Overall**	**a (2.4 sec)**	**a (3.8 sec)**	-	
	EB Left	b (10.1 sec)	b (10.4 sec)	55	62
	EB Right	b (10.1 sec)	b (10.4 sec)	55	62
	NB Left	a (7.1 sec)	a (7.5 sec)	11	9
	NB Thru	a (0)	a (0)	-	-
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-

River Road NE & 8th Street NE	**Overall**	**a (5.9 sec)**	**a (2.7 sec)**	-	-
	EB Left	-	a (9.0 sec)	11	44
	EB Thru	-	a (9.0 sec)	11	44
	EB Right	a (8.8 sec)	a (9.0 sec)	11	44
	WB Left	b (11.0 sec)	b (10.7 sec)	34	49
	WB Thru	b (11.0 sec)	-	34	49
	WB Right	b (11.0 sec)	b (10.7 sec)	34	49
	NB Left	a (7.5 sec)	a (7.3 sec)	1	6
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	-	a (0)	-	14
	SB Thru	a (0)	a (0.9 sec)	-	14
	SB Right	-	a (0.9 sec)	-	14

1. Overall Level of Service reported from Synchro 10. 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 6 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 operations for the minor 5th Street NE approach to the intersection with Labeaux Avenue NE are still include long delays during the PM Peak hour, however, the predicted vehicles are manageable.

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	Movement	LOS & Delay (sec)	LOS & Delay (sec)	Queue Length (ft)	
		AM Peak	*PM Peak*	*AM Peak*	*PM Peak*
Labeaux Ave NE & 15th Street NE	**Overall**	**A (7.5 sec)**	**A (4.8 sec)**	-	-
	EB Left	B (13.9 sec)	B (18.2 sec)	9	24
	EB Thru	B (11.5 sec)	B (15.2 sec)	2	7
	EB Right	-	-	2	7
	WB Left	B (18.3 sec)	B (19.6 sec)	48	63
	WB Thru	A (6.1 sec)	A (8.4 sec)	27	87
	WB Right	-	-	27	87
	NB Left	-	A (3.0 sec)	-	10
	NB Thru	A (5.6 sec)	A (4.9 sec)	18	110
	NB Right	A (2.6 sec)	A (1.0 sec)	4	52
	SB Left	A (5.1 sec)	A (8.1 sec)	9	114
	SB Thru	A (7.3 sec)	A (3.4 sec)	67	66
	SB Right	A (2.9 sec)	A (1.6 sec)	4	13

Labeaux Ave NE & 5th Street NE	**Overall**	**a (0.8 sec)**	**a (6.4 sec)**	-	-
	WB Left	c (18.0 sec)	f (184.4 sec)	35	132
	WB Right	c (18.0 sec)	f (184.6 sec)	34	53
	NB Thru	a (0)	a (0)	-	19
	NB Right	a (0)	a (0)	-	10
	SB Left	a (8.4 sec)	c (23.3 sec)	41	143
	SB Thru	a (0)	a (0)	-	-
Labeaux Ave NE & River Road NE	**Overall**	**C (28.9 sec)**	**C (20.2 sec)**	-	-
	EB Left	C (27.8 sec)	D (50.4 sec)	165	182
	EB Thru	D (39.2 sec)	D (46.2 sec)	197	231
	EB Right	-	-	197	231
	WB Left	D (47.2 sec)	D (42.9 sec)	195	143
	WB Thru	C (31.9 sec)	D (45.2sec)	337	106
	WB Right	-	-	337	106
	NB Left	B (17.3 sec)	A (7.5 sec)	52	96
	NB Thru	B (15.8 sec)	B (17.5 sec)	105	388
	NB Right	A (0.1 sec)	A (2.8 sec)	36	73
	SB Left	B (14.3 sec)	A (8.7 sec)	44	66
	SB Thru	C (29.7 sec)	B (11.1 sec)	498	112
	SB Right	A (6.1 sec)	A (1.8 sec)	168	42
River Road NE & 5th Street NE	**Overall**	**a (5.4 sec)**	**a (6.1 sec)**	-	-
	EB Left	b (10.9 sec)	b (13.0 sec)	53	109
	EB Thru	b (10.9 sec)	b (13.0 sec)	53	109
	EB Right	b (10.9 sec)	b (13.0 sec)	53	109
	WB Left	b (12.2 sec)	b (13.3 sec)	72	62
	WB Thru	b (12.2 sec)	b (13.3 sec)	72	62
	WB Right	b (12.2 sec)	b (13.3 sec)	72	62
	NB Left	a (7.7 sec)	a (7.5 sec)	5	10
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (7.3 sec)	a (7.7 sec)	-	8
	SB Thru	a (0)	a (0)	-	-
	SB Right	a (0)	a (0)	-	-
River Road NE & 8th Street NE	**Overall**	**a (6.3 sec)**	**a (6.3 sec)**	-	-
	EB Left	-	a (9.1 sec)	12	39
	EB Thru	-	a (9.1 sec)	12	39
	EB Right	a (8.8 sec)	a (9.1 sec)	12	39
	WB Left	b (11.3 sec)	b (11.0 sec)	37	56
	WB Thru	b (11.3 sec)	-	37	56
	WB Right	b (11.3 sec)	b (11.0 sec)	37	56
	NB Left	a (7.5 sec)	a (7.4 sec)	2	6
	NB Thru	a (0)	a (0)	-	-
	NB Right	a (0)	a (0)	-	-
	SB Left	a (0)	a (0)	-	10
	SB Thru	a (0.1 sec)	a (0.9 sec)	-	10
	SB Right	-	a (0.9 sec)	-	10
	Overall	**a (7.5 sec)**	**a (6.0 sec)**	-	-
	EB Left	a (0.1 sec)	a (0.3 sec)	-	-
	EB Thru	a (5.5 sec)	a (5.4 sec)	-	-
	EB Right	a (5.5 sec)	a (5.4 sec)	-	-

8th Street NE & Site Access	WB Left	-	-	-	-
	WB Thru	a (0)	a (0)	-	-
	WB Right	a (0)	a (0)	-	-
	NB Left	b (10.2 sec)	b (10.0 sec)	41	36
	NB Thru	-	-	41	36
	NB Right	-	-	41	36
	SB Left	a (8.9 sec)	a (8.7 sec)	42	43
	SB Thru	-	-	42	43
	SB Right	a (8.9 sec)	a (8.7 sec)	42	43

1. Overall Level of Service reported from Synchro 10. 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.

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 development of the Hanover Cove residential project, on the operations of the study area intersections. The site is located along the east side of River Road NE and along the south side of 8th Street 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 Hanover Cove site by 2025 is expected to result in approximately 2,700 new vehicle trips on the study area roadway network per average weekday. Peak hour trips generated by the development are estimated at 212 during the AM peak hour and 283 during the PM peak hour. The site access approaches to the existing street system will consist of one lane in and one lane out. The access from River Road NE at 5th Street NE should provide left and right turn lanes on River Road NE to remove the turning traffic from the path of the through vehicles. The development trips were distributed through the site access routes to the regional roadways according to existing regional patterns. Growth in background traffic at a 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 Hanover Cove 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 15th Street NE on the north, to the south side of the Crow River Bridge on the south to manage No-

Build traffic conditions. Also, a traffic signal should be considered at Labeaux Avenue NE and 15th Street NE. 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.

STS
Swing Traffic Solutions

August 24, 2018

To: **Jason Ver Steeg, PE, Director of Engineering, Duininck Inc.**

From: **Vernon Swing, PE**

Re: **Traffic Study Addendum – Hanover Cove, Hanover, MN**

Per your request, Swing Traffic Solutions, LLC has conducted additional 2025 Build traffic analysis to test the potential benefits to the traffic operations at the intersection of Labeaux Avenue and River Road that were suggested to improve operations for the 2025 No-Build scenario. The intersection experiences long southbound queues during the AM peak hour and long northbound queues during the PM Peak hour. Also, during the AM peak traffic from Hanover residents on the east leg of River Road experience long delays and long queues. Ultimately, mitigation of these conditions will require an additional lane of traffic in each direction on Labeaux Avenue beginning to the south of the bridge and extending to 15th Street. However, there are some strategies that can be adopted to reduce some of the travel time and delay experienced by the residents of Hanover. In particular, during the AM Peak the westbound traffic on River Road would benefit by the addition of protected/permitted left turn phasing. In the PM peak this strategy is not as useful and the signal could return to permitted phasing only. During the PM peak the addition of capacity at the intersection by way of right turn lanes reduces the northbound delay and queues. The Tables that follow summarize the results of analyses conducted for the intersection of Labeaux and River Road for the no improvement scenario, the protected/permitted signal phasing scenario, the addition of right turn lanes scenario, and the combined strategies scenario. The combined strategies include the turn lanes and the protected permitted phasing for the AM Peak, which is reduce to permitted only during the PM peak.

Table 1
2025 Build - No Improvements
LOS (delay in Sec) and Queue in Feet

AM Overall	Direction	Movement	Queue	PM Overall	Direction	Movement	Queue
D (38.1)	EB B (19.0)	L - C (34.0)	143	D (37.7)	EB (65.4)	L – F (82.1)	144
		T – A (8.9)	153			T – D (40.5)	110
		-	-			-	-
	WB E (74.8)	L – F (83.1)	187		WB E (56.0)	L – E (70.7)	156
		T – C (29.0)	721			T – C (34.5)	131
		-	-			-	-
	NB B (11.3)	L – B (11.4)	57		NB D (37.1)	L - A (3.6)	644
		T – B (12.3)	175			T – D (39.7)	1872
		-	-			-	-
	SB D (39.4)	L – A (8.4)	44		SB A (5.9)	L – A (5.9)	61
		T – D (43.4)	1670			T- A (6.9)	103
		R – A (7.5)	138			R – A (1.6)	60

As shown in Table 1, the westbound and southbound queues are quite long during the AM Peak, and the northbound queue left and through queues are very long in the PM Peak. Table 2 summarizes the changes in operations if protected permissive left turn phasing is added to the east and westbound River Road approaches.

Table 2
2025 Build – Protected/Permissive Phasing
LOS (delay in Sec) and Queue in Feet

AM Overall	Direction	Movement	Queue	PM Overall	Direction	Movement	Queue
C (33.9)	EB C (30.1)	L - D (36.5)	161	D (37.7)	EB E (72.4)	L – F (83.2)	142
		T – C (25.7)	212			T – E (56.3)	105
		-	-			-	-
	WB E (64.6)	L – E (68.6)	195		WB E (57.5)	L – E (65.6)	176
		T – D (42.2)	656			T – D (45.6)	189
		-	-			-	-
	NB B (11.0)	L – B (10.5)	51		NB D (46.0)	L - A (4.6)	647
		T – B (11.0)	188			T – D (49.3)	1902
		-	-			-	-
	SB C (32.0)	L – A (8.2)	43		SB A (6.9)	L – A (7.2)	60
		T – D (35.8)	1556			T- A (8.3)	116
		R – A (1.9)	156			R – A (0.7)	50

The results in Table 2 show marginal improvement to the overall LOS, and marginal reduction in the AM Peak westbound and southbound queues. However, the PM LOS is slightly worse and the northbound queues are longer. Table 3 summarizes the changes in operations if instead short right turn lanes are added to the east, west and south approaches.

Table 3
2025 Build – Turn Lanes
LOS (delay in Sec) and Queue in Feet

AM Overall	Direction	Movement	Queue	PM Overall	Direction	Movement	Queue
C (29.8)	EB C (20.5)	L - D (40.3)	144	C (24.0)	EB E (67.7)	L – F (88.4)	150
		T – C (34.8)	26			T – D (52.4)	89
		R – A (7.4)	143			R – A (9.4	34
	WB E (57.4)	L – E (75.6)	175		WB D(54.4)	L – E (69.2)	154
		T – D (35.5)	1218			T – D (50.9)	110
		R – A (0.0)	15			R – A (6.8)	41
	NB A (9.8)	L – A (8.0)	46		NB B (16.7)	L - A (3.4)	197
		T – A (9.1)	135			T – B (19.6)	776
		R – (0.7)	45			R – A (3.9)	68
	SB C (29.8)	L – A (6.4)	16		SB A (5.4)	L – A (4.2)	49
		T – C (28.0)	858			T- A (6.5)	87
		R – A (5.9)	104			R – A (1.5)	56

The results in Table 3 show improved LOS in both the AM and PM Peak hours with substantially reduced vehicle queues on the southbound approach in the AM Peak and on the northbound approach in the PM peak. This is offset, however, by the increased vehicle queues on the westbound approach in the AM Peak hour stretching to the north and potentially blocking the site access. Table 4 summarizes the combined strategies.

Table 4
2025 Build – Combined Improvements
LOS (delay in Sec) and Queue in Feet

AM Overall	Direction	Movement	Queue	PM Overall	Direction	Movement	Queue
C (30.8)	EB C (32.1)	L - D (41.6)	165	C (24.7)	EB (67.7)	L – F (88.4)	150
		T – E (58.6)	120			T – D (52.4)	89
		R – C (20.0)	175			R – A (9.4)	34
	WB E (65.6)	L – E (68.8)	175		WB D(54.4)	L – E (69.2)	154
		T – D (52.8)	656			T – D (50.9)	110
		R – A (0.2)	5			R – A (6.8)	41
	NB A (8.9)	L – A (8.9)	55		NB B (16.7)	L - A (3.4)	197
		T – A (9.8)	151			T – B (19.6)	776
		R – A (0.0)	46			R – A (3.9)	68
	SB C (26.1)	L – A (7.2)	41		SB A (5.4)	L – A (4.2)	49
		T – C (29.0)	1311			T- A (6.5)	87
		R – A (2.0)	153			R – A (1.5)	56

The combined strategies offer the best combination of improvements for the AM and PM peak hours, with queues that are shorter than the no improvement scenario and reduced overall driver delay.