1.0 **PROJECT OVERVIEW** (Source Code: 1010)

STATE has identified the need to abandon the existing Trunk Highway (TH) 53 between R.P. 62.510 to 64.987 and relocate the highway to a new location. The NEPA process for this project is currently underway. The Draft Environmental Impact Statement (DEIS) is anticipated to be published in December of 2014. It contains three build alternatives (M-1, E1A and E2) and two no-build alternatives (No-build and Existing Highway 53). **Of the alternatives that are under consideration, the recommended alternative that will be identified as the preferred alternative in the DEIS is E-2. FOR THE PURPOSES OF THIS RFP, PROPOSERS SHALL USE E-2 AS THE SELECTED ALTERNATIVE.**

The intersection at the junction of TH 135 and TH 53 will be reconstructed as part of this project as an interchange. The project limits are from Bourgin Road to Second Avenue in Virginia.

Alternative E-2 may, or may not, be the final alternative eventually chosen through the environmental process. The final alternative ultimately selected could be any of the alternatives as outlined above, new alternatives, or hybrids of alternatives. Because the NEPA process requires that STATE consider all build and no-build alternatives, STATE reserves the right to terminate the Professional/Technical (P/T) service contract in the event a different alternative than presented herein or the no-build alternative, is selected.

The work included in this Exhibit is primarily referred to as Work Package 3 in Exhibit A.

The overall goal of the project is to entirely vacate the easement by November 15, 2017. In order to accomplish this, the work described herein must be completed no later than March 2016.

This project is intended to be delivered through the Construction Manager/General Contractor (CMGC) method. Extensive coordination is expected between the Consultant design team, Contractor (CMGC) and STATE. CONTRACTOR will become part of a collaborative project delivery team consisting of STATE, CONTRACTOR, Independent Cost Estimator (ICE) and the CMGC. STATE will procure the CMGC through a separate process to provide design input regarding construction means and methods, construction sequencing, risk mitigation strategies, innovations, and cost estimating.

While the CMGC’s input will serve to reduce changes and inefficiencies during construction, responsibility for the Construction Plans and Specifications (i.e. Engineer of Record) will remain with CONTRACTOR and not with the CMGC. Information on STATE’s CMGC Program, and information specific to the CMGC Request for Qualifications (RFQ) for this project can be found at: [http://www.dot.state.mn.us/const/tools/const-manager-general-contractor.html](http://www.dot.state.mn.us/const/tools/const-manager-general-contractor.html)

The CMGC will develop Opinion of Probable Construction Cost (OPPC) at the 30%, 60%, and 90% design phases, based on CONTRACTOR submittals. It is anticipated that OPPC will occur for three work packages (early steel, bridge, road/interchange construction). However, these packages may change based on input from the CMGC. The CONTRACTOR will be required to prepare plans for the CMGC to review, which may include quantities for the CMGC to price.

Project information is available at the following website:
[ftp://ftp2.dot.state.mn.us/pub/outbound/Duluth/Hwy%2053%20Relocation%20RID/](ftp://ftp2.dot.state.mn.us/pub/outbound/Duluth/Hwy%2053%20Relocation%20RID/)
(Click the RID frequently for updated information.)

1.1 **General Scope of SP 6918-80 for Detail Design**

1.1.1 Detail design of the relocated TH 53, includes grading, surfacing, bridge design over the Rouchleau Pit (Bridge #69129), interchange bridge (Bridge 69130) design at junction TH 53 & 135 B, noise walls, retaining walls, concrete barrier, ponds, culverts, storm sewer, utility design
Roadway Detail Design Scope of Work and Deliverables

and coordination, traffic control, lighting, signing, striping design, signal design (TH 53 & 2nd Street and TH 53 & 12th Avenue), and Intelligent Transportation System (ITS) design. CONTRACTOR will furnish a Final Plan Set, Special Provisions, Permit Applications, and other deliverables required for plan turn-in, review, letting and construction contract award. STATE will furnish an approved Geometric Layout to CONTRACTOR illustrating final alignments, profiles, typical sections, geometrics, drainage features and other design elements. CONTRACTOR will rely on the approved Geometric Layout and will incorporate STATE's alignments, profiles, typical sections, geometrics, drainage features and other design elements into the final plans without further analysis.

The approved Geometric Layout supplied to CONTRACTOR by STATE generally indicates the design intent of the project. Electronic files associated with the approved Geometric Layout will be provided by STATE.

1.1.2 Work will be in accordance with the MnDOT Highway Project Development Process (HPDP) Handbook, MnDOT Computer Aided Drafting and Design (CADD) standards, MnDOT Design Standards, Technical Memoranda, and will be completed using English units. Electronic file sharing with STATE is required.

1.1.3 Electronic information and data will be in formats and versions currently in use by STATE including, but not limited to, Microstation, Geopak, Excel, and Word applications. CONTRACTOR’s final MicroStation deliverables will be in V8i format.

1.1.4 CONTRACTOR will create an electronic project directory structure consistent with current MnDOT ProjectWise directory structures. The electronic project directory structure will be reproducible on the STATE’s District 1 system. Files submitted by CONTRACTOR will be in compliance with STATE District 1 file naming standards. STATE’s District 1 Electronic project directory standards and file naming standards will be provided in writing by STATE.

1.1.5 Conduct internal CADD coordination meeting to present required directory structure and CADD information to be applied to the Project.

1.1.6 CONTRACTOR will perform Quality Control and Quality Assurance activities throughout the duration of the project, in accordance with its project Quality Management Plan (QMP). The QMP must specify how CONTRACTOR will ensure delivery of a quality product in a timely manner that conforms to contract requirements established for the project.

CONTRACTOR will complete the detail design for the project, which will include, but is not limited to:

1. Utility Design and Coordination
2. Geotechnical Design
4. Surveying
5. Roadway Design
6. Hydraulics Design
7. Bridge Design
8. Structure Design (including retaining wall & noise wall design)
10. Intelligent Transportation System (ITS)
11. Construction Plans
14. Plan Formatting
15. Plan review and Approval
16. Pre-letting Support
17. Construction Support

STATE will provide the following information to CONTRACTOR:
1. Approved Geometric Layout, including profiles and preliminary cross-sections.
2. Existing and Proposed Right-of-way (RW) limits (computed)
3. Soil boring logs
4. Traffic Forecasts
5. Design Surveys
6. Wetland Delineations
7. Environmental Assessment
8. EIS when available
9. Approved Design Memorandum
10. Preliminary Drainage Information
11. STATE District 1 Electronic project directory standards and file naming standards

STATE deliverables will be provided in both hard copy and electronic format. Electronic files provided by STATE will conform to standards and requirements for similar files prepared by CONTRACTOR under this Contract.

1.1.7 STATE will provide a Roadway Detail Design Project Manager to give direction to CONTRACTOR’s activities. It will be the responsibility of the Road Design Project Manager to receive the work produced by CONTRACTOR, review the work for compliance with contract requirements, and to recommend payment for such work.

CONTRACTOR’s Detail Roadway Design Project Manager will conduct the administration of the project, which will include communication with STATE, invoicing, supplemental agreements, cost and schedule updates, billing preparation, and other non-technical work. CONTRACTOR will also create an electronic project directory for project file sharing. Project directory standards and file naming standards are available upon request to the Roadway Detail Design Project Manager. This work shall be in coordination with the Contractor’s Project Manager as outlined in Section 2.1.1 of the Bridge Design Scope of Work.

No changes in CONTRACTOR project management or lead design personnel will be made without prior written consent of the Roadway Detail Design Project Manager. STATE will notify CONTRACTOR immediately if there are changes to STATE’s project management or lead design personnel.

1.1.8 Schedule Management - The provisions of Bridge Scope of Work Section 2.1.2 (Schedule Management) apply to the Roadway Detail Design Contractor.

1.1.9 Co-Location, Project Meetings and Other Requirements - The provisions of Bridge Scope of Work Sections 2.2.1 through 2.2.6 and 2.3 (Co-Location, Design Team Kick-Off Meeting,
Roadway Detail Design Scope of Work and Deliverables

Project Design Team Meetings, Comprehensive Project Team Kick-Off Meeting, Additional Project Meetings, Public Outreach Activities and CMGC Coordination) apply to the Roadway Detail Design Contractor.

2.0 ROADWAY COORDINATION (Source Code: 1010)
CONTRACTOR will coordinate roadway activities with STATE’s TH 53 Design Engineer, the CMGC and STATE’S Bridge Office staff (as needed). CONTRACTOR will coordinate activities with other governmental agencies, utility owners, and property owners as required. These activities will include communications via face-to-face meetings, video conferences or other alternate methods of technology for remote meeting, phone, fax, e-mail, and written correspondence. In addition, CONTRACTOR will establish a Document Control System (DCS) to permit efficient transfer of project documents.

2.1 CONTRACTOR will initiate and hold bi-weekly phone conferences with STATE’s TH 53 Design Engineer (District 1). CONTRACTOR will schedule teleconferences during weeks when overall project meetings are not already scheduled. CONTRACTOR’s roadway task leader will maintain an action items log in Excel format to document project bi-weekly teleconferences, and will furnish the log to STATE’s TH 53 Design Engineer two days prior to each teleconference.

2.2 CONTRACTOR will establish ongoing project coordination with STATE. CONTRACTOR will coordinate project activities with the following agencies as necessary:
1. STATE’s District 1
2. STATE’s Bridge Office
3. Federal Highway Administration (FHWA)
4. Private and Public Utilities
5. US Army Corps of Engineers
6. US Fish and Wild Life
7. City of Virginia and Virginia Public Utilities Commission
8. City of Eveleth
9. City of Gilbert
10. MN Dept. of Natural Resources
11. Minnesota Pollution Control Agency (MPCA)
12. MN Dept. of Health
13. St. Louis County
14. CMGC Contractor

2.3 CONTRACTOR will work with the CMGC to improve the quality and reduce costs. This will include meeting with the CMGC to review designs at all stages, participating in risk workshops, inviting the CMGC to participate in meetings with impacted 3rd parties, and providing information to the CGMC to price the project.

3.0 PERMITTING (Source Code: 1250)
Assumptions:
1. STATE will provide all fees associated with permit submittals.

CONTRACTOR will prepare and submit to STATE for review, signature, and agency submittal, applications for permit necessary for the completion of the constructed project. CONTRACTOR’s submittals will include the following permits:

1. NPDES permit (MPCA)
Pre-permitting meetings with regulatory officials will be required.

3.1 NPDES permit (MPCA)
   3.2.1 Prepare and submit to the STATE for review, signature, and agency submittal, the NPDES permit application (MPCA). Revise initial permit application to reflect changes in drainage system and hydraulic approach due to changes in the roadway design and drainage plans.

3.2 Stormwater Pollution Prevention Plan (SWPPP)
   3.2.1 Develop a SWPPP for the project for submittal to the MPCA per the NPDES permit requirements.

3.3 Quality Control and Quality Assurance Reviews of Permits
   3.6.1 CONTRACTOR will conduct quality control and quality assurance reviews of permits.

3.4 Deliverables
   CONTRACTOR will:
   1. Prepare permit application packages required for completion of the constructed project.
   2. Conduct pre-permitting and agency coordination review meetings as necessary.
   3. Inform the STATE Project manager of permit requirements or conditions that would require an alteration to the project design or cause significant cost or delay to the Project.

   STATE will:
   1. Attend pre-permitting and agency coordination meetings.
   2. Review, approve, and submit permit applications submitted by the CONTRACTOR.
   3. Provide direction for permit conditions or requirements that necessitate a change to the project design or add significant cost or delay to the project.
   4. Coordinate with the bridge design team for information needed to perform permitting coordination.

4.0 AGREEMENT SUPPORT (Source Code: 1250)
4.1 STATE anticipates that agreements with the following entities will be needed:
   1. City of Virginia (Cooperative Construction and Utility agreements)
   2. Affected private utilities
   3. Mesabi Trail (Cooperative Construction agreement)

   The list above is not considered all inclusive; there may be additional entities that are identified during the Detail Design phase.

4.2 STATE will complete Third Party agreements for the project. CONTRACTOR will assist STATE by providing exhibits, plan sheets, cross sections, and other project information that is required to adequately demonstrate the basis for each agreement. CONTRACTOR will also assist in the review of draft agreements prepared by STATE for consistency with the project plans, special provisions, and cost estimates.

   1. Assumes two (2) conference calls per agreement (2 hours in length each).
   2. Cooperative Agreements will require cost split information related to project costs.
   3. Utility agreements will need impacts, right-of-way and staging information.

4.3 Deliverables
   CONTRACTOR will:
   1. Assist STATE by providing exhibits, plan sheets, cross sections, etc. as requested by STATE.
2. Review draft Third Party agreements for consistency with project plans, special provisions, and cost estimates.

STATE will:
1. Provide draft Third Party agreement documents for CONTRACTOR to review.

5.0 UTILITY DESIGN and COORDINATION (Source Code: 1195)
5.1 Utility Design will include tasks necessary to be in compliance with Utility Owner standards, specifications, applicable state statutes and federal laws. Utility Coordination will include tasks necessary to be in compliance with the current version of MnDOT’s Utilities Manual and applicable State Statutes and Federal Laws. The coordination will include, but is not limited to, Gopher State-One Call contacts, submittal of preliminary plan and letter to utility owners indicating where relocation is necessary, and preparing and distributing the utility verification and information letters. CONTRACTOR will incorporate this information into the Detail Design Plans, according to STATE’s design standards:

1. Assumes that utility coordination meetings will be held at the STATE’S District Offices.

2. Utility design (Water, Sewer, Gas & Electricity) will include the tasks necessary to prepare utility plans that comply with Virginia Public Utilities standards and specifications, state statutes and rules, and federal laws. CONTRACTOR will coordinate with the STATE’s Utility Agreements and Permits Unit and district design staff to obtain information necessary to complete the design work. Additional coordination will be required with the Bridge Design Contractor for utilities placed on the Bridge.

5.2 Utility Engineering. CONTRACTOR will review the documentation and supplement the data as necessary using the following work flow tasks for coordination with utilities.

Step 1: Utility Identification
1. Contact Gopher State One Call (MN)
Conduct field review (site visit)
1. Survey overhead and underground utilities
2. Initial contact of utility owners
3. Scope of work assumes Step 1 has been completed by STATE during field verification

STATE will provide list of utility companies and contact names and phones numbers to CONTRACTOR.

Step 2: Utility Contact for Coordination – To be completed by STATE
1. Identification of utility representatives
2. Utility easement identification
3. Send preliminary plans for Utility Information Meeting

Step 3: Utility Information Meeting – To be completed by STATE
1. Purpose is to obtain additional information from utilities, and share information with utilities early in the design process.
2. Meeting will be held at STATE's Virginia or Duluth Office.

Step 4: Review of Information from Utility Owners – To be completed by STATE
1. Review and incorporate utility owner provided information into the plans.
MnDOT Contract No. 05323
Exhibit B

Roadway Detail Design Scope of Work and Deliverables

Step 5: Utility Design Meeting – To be completed by STATE
1. The purpose is to bring together involved parties to find solutions to placing utilities within a project, while maintaining good, economic design.
2. Meeting will be held at STATE's Virginia or Duluth Office.

Step 6: Request for Utility Relocation Plans – To be completed by STATE
1. Utilities are requested to provide detailed plans, schedules, and reimbursable utility relocation estimates for their work.

Step 7: Utility Coordination Follow Up – Contractor to assist STATE
1. Provides additional guidance to utilities for development of their relocation plans, schedules, and reimbursable utility relocation estimates.

Step 8: Utility Design Change Meeting – Contractor to assist STATE
1. Only necessary if major plan changes occur after the Utility Design Meeting.
2. Meeting will be held at STATE's TH 53 Virginia or Duluth Office.

Step 9: Gopher State One Call Utility Verification – To be completed by CONTRACTOR
1. Gopher State One Call to be done by design team no more than 90 days before plan is complete. Necessary for compliance with Minnesota Statute, section 216D.04.

Step 10: Utility Relocation Plan and Schedule Review – To be completed by CONTRACTOR
1. Design team meets with utility representatives as necessary to review utility relocation plans, schedules, and draft utility permits.
2. Meeting will be held at STATE's Virginia or Duluth Office.

Step 11: Utility Agreements and Reimbursement – To be completed by STATE
1. To be done as necessary were utility relocations require public agency reimbursement. Outlines financial responsibility of utility owners and public agency.

Step 12: Notice and Order and Utility Relocation Permit – To be completed by STATE
1. Public agency (STATE) issues notice and order to exercise its authority to order a utility owner to relocate to facilitate a construction project.
2. Utility owners submit required utility permits.

Step 13: Utility Information in Contract Documents – To be completed by CONTRACTOR
1. Subsurface utility information is shown on the plans per guidelines listed in CI/ASCE 38-02 “Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data.”
2. Utility tabulations are included in the plans.
3. Additional utility details and contact information is included in the project special provisions.

5.3 Quality Control and Quality Assurance Reviews for Utility Coordination tasks.

5.4 Deliverables
CONTRACTOR will:
1. Provide Utility Coordination and Plan Content.
2. Prepare and distribute Final Utility Verification and Information Letter to utility owners.
3. Obtain and submit follow-up responses to the Verification and Information Letters.
4. Provide and prepare Utility designs for all City of Virginia Public Utilities.
Roadway Detail Design Scope of Work and Deliverables

STATE will:
1. Provide Utility Engineering report.
2. Provide templates for utility coordination correspondence (e.g., Utility Coordination Letter).
3. Provide copies of preliminary utility information.

6.0 GEOTECHNICAL (Source Code: 1190)
6.1 CONTRACTOR will perform a review of STATE’s soil boring deliverables.
6.2 CONTRACTOR will supply alternate pavement designs for Final Pavement Determination.
6.3 Retaining Wall Foundation Analysis and Design Recommendations (FADR)
   1. CONTRACTOR will supply retaining wall Foundation Analysis and Design Recommendations (FADR) for review and approval by the STATE.
6.4 Quality Control and Quality Assurance Reviews for Geotechnical deliverables.
   1. Requirements for retaining wall design are detailed in SEC. 11.1 RETAINING and NOISE WALL DESIGN.
6.5 Materials Design Recommendations (MDR)
   6.5.1 The MDR will include, but is not limited to, the following (modified as directed by STATE):
   A) Project Data sheet (to be provided by the STATE)
   B) Project Scope
   C) Project Location
   D) Traffic Forecast (to be provided by the STATE)
   E) Pavement History
   F) Existing Pavement & Base
   G) R-Value information
   H) Life cycle cost analysis
   I) Culvert treatment recommendations
   J) Grading recommendations
   K) Geotextile recommendations
   L) Backfill recommendations
   M) Pavement design recommendations
   N) Drainage recommendations
   O) Compaction recommendations
   A draft MDR and all pertinent data/information will be delivered to STATE’s TH 53 Design Engineer. STATE’s Design Engineer will review and comment within two weeks of receiving all required information. After comments on the draft MDR have been received, a Final MDR and all pertinent data/information will be delivered to STATE’s TH 53 Design Engineer.

7.0 SURVEYING (Source Code: 1040)
7.1 STATE will furnish previously completed Digital Terrain Mapping (DTM) files, survey control point information, Geometric Layout and other electronic files that were used as the basis for preliminary design. CONTRACTOR will review survey data information supplied by STATE, and will run quality checks in accordance with its Quality Management Plan (QMP). CONTRACTOR will review the
supplied survey information and will identify where supplementary survey work is required to complete the design deliverables.

1. Mapping and surveys will be delivered in English units (NAD83 2011 adjustments for horizontal datum and NAVD 88 for the vertical datum).
2. STATE’s Surveys Office will provide existing mapping, right of way, and topography in the same format.
3. STATE has established horizontal and vertical control points to be used in the field.
4. STATE will provide horizontal and vertical control information to CONTRACTOR in electronic and hard copy formats at kick-off meeting.
5. CONTRACTOR will update DTM based upon additional field surveys and rock outcropping locations collected in the field.

7.2 CONTRACTOR will complete supplementary survey work and will use the same datum(s) and project controls that are identified in the Geometric Layout and reference files associated with the Geometric Layout. CONTRACTOR will notify STATE’s TH 53 Design Engineer at least 5 business days before performing supplementary survey work in the field.

1. CONTRACTOR's work will be performed under the direction of a Land Surveyor licensed in the State of Minnesota and will be guided by, and in compliance with, the MnDOT CADD Level II Standards, the MnDOT Surveying and Mapping Manual, and the MnDOT Right of Way Manual.
2. No additional right of way base work or right of way surveys will be required.
3. CONTRACTOR will provide STATE with a survey needs request layout for review and approval. Upon approval, CONTRACTOR and STATE will review survey field work task hours.
4. STATE will locate and place control points in the field for use by CONTRACTOR.

7.3 CONTRACTOR will verify survey datums used for data furnished by Third Parties (i.e. affected utility owners). CONTRACTOR will ensure that third party information (if any) is consistent with datums in use for the project and consistent with Quality Control checks detailed in the QMP.

7.4 CONTRACTOR will verify that project controls and datums utilized for CONTRACTOR's tasks in completion of project deliverables are consistent with project controls and datums in use for the Rouchleau Pit Bridge (Bridge #69129) and TH 135 over TH 53 interchange bridge (Bridge#69130).

7.5 Survey information will be provided to STATE in file formats that are compatible with MicroStation.

7.6 Update mapping files provided by STATE to the photogrammetrics chapter of MnDOT's CADD Level II Standards.

7.7 Annotate the mapping files provided by STATE and supplemented by CONTRACTOR. Annotation from STATE's mapping will be used and augmented by CONTRACTOR to annotate the mapping that will appear in the final construction plan.

7.8 Update planimetric base map files and Digital Terrain Model (DTM) as needed utilizing supplemental survey data.

7.9 Quality Control and Quality Assurance for surveying deliverables.
1. CONTRACTOR will provide survey notes and DTM revision documents.

7.10 CONTRACTOR will submit appropriate electronic files with the Final Preliminary Plans, including a Digital Terrain Model (TIN) file, MicroStation files containing planimetric mapping (APL, PLN),
MicroStation files showing the location of in-place utilities and other surveyed field input (FIP), and a Geopak (GPK) file containing the chains, profiles, and shots of other surveyed features in the project area.

7.11 Deliverables
CONTRACTOR will:
1. Review STATE furnished survey data.
2. Identify supplementary survey work necessary, and notify STATE’S Roadway Project Manager.
3. Notify the STATE’s Roadway Project Manager at least 5 working days prior to field work.
4. Verify consistency of project controls relative to datums/controls in use for Third Party supplied data (if any).

STATE will:
1. Furnish previously completed DTM files, planimetric mapping, survey control point information, geometric layout, proposed alignments and other data used for preliminary design. Files will be delivered in English units (NAD83 2011 adjustments for horizontal datum and NAVD 88 for the vertical datum) and will conform to standards and requirements for CONTRACTOR deliverables under this Contract.

8.0 ROADWAY DESIGN (Source Code: 1250)

1. Specific tasks include verifying alignments and profiles, utilities, typical sections, superelevation design, sight distances, and documented design exceptions. This task does not include correction, revision or updating of design elements found to be in conflict with relevant standards or project goals.

2. Approved Geometric Layout will be complete with respect to accounting for existing and future geometric needs for the various transportation modes within the project area. For the purposes of this scope it is not anticipated that roadways, walls, bridges, or ponds will need to be evaluated or studied. The intent of this scope of work is to proceed directly into detailed final design and plan preparation.

8.2 Requirements for retaining wall design are detailed in SEC. 11: RETAINING and NOISE WALL DESIGN.

8.3 Format and standards for Construction Plans are set forth in SEC. XX: CONSTRUCTION PLANS.

8.4 Implementation of the QMP and regular QA/QC reviews of design work.

8.5 Deliverables:
CONTRACTOR will:
2. Notify the STATE Roadway Manager of conflicts between the Geometric Layout and previously noted design guidelines.
3. Propose resolutions to conflicts identified above.

STATE will:
1. Transmit necessary approvals for required deviations from referenced standards.

9.0 HYDRAULICS DESIGN (Source Code: 1250)
CONTRACTOR will perform activities necessary to analyze and design the hydraulic systems within the project area. Temporary drainage design will be required to facilitate construction staging. The plan will also show the appropriate labels, direction of surface flow, and direction of water flow into the drainage structures. The analysis and designs will be prepared in accordance with the current version of the MnDOT Drainage Manual utilizing HydroCAD or XP-SWMM, CulvertMaster or HY8, GEOPAK Drainage and associated STATE-generated spreadsheets, and Microstation V8i or other modeling software as approved by the Project Manager. The work performed in this task will also be done in compliance with applicable and active STATE Technical Memorandums. CONTRACTOR will provide the following deliverables:

1. This Task covers activities necessary to analyze and design the hydraulic systems within the project area. Temporary drainage design will be required to facilitate construction staging. The plan will also show the appropriate labels, direction of surface flow, and direction of water flow into the drainage structures. The analysis and designs will be prepared in accordance with the current version of the MnDOT Drainage Manual utilizing HydroCAD or XP-SWMM, CulvertMaster or HY8, GEOPAK Drainage and associated STATE-generated spreadsheets, and Microstation V8i or other modeling software as approved by the Project Manager. The work performed in this task will also be done in compliance with applicable and active State Technical Memorandums.

2. Construction plans and specifications will follow District 1 and the latest sample plan format.

3. GEOPAK Site will be used for BMP design

4. GEOPAK Drainage and associated STATE spreadsheets will be used for storm sewer design.

9.1 Task Management/Logs
10.1.1 Manage aspects of the water resource tasks, including permitting, coordinating survey and geotechnical requests, etc.

10.1.2 Maintain a checklist of drainage items to document decisions made throughout the process. Checklist and change/modification log will be submitted with each plan review submittal.

9.2 Data Collection/Field Visits
10.2.1 Collect and review the following data for the project area:

1. Preliminary Drainage Report

2. Topographic and contour information

10.2.2 Perform a field visit with appropriate STATE and agency staff to identify drainage issues, opportunities and constraints at the onset of the project.

9.3 Storm Sewer Design
be required to use GEOPAK Drainage software and STATE’s spreadsheet format for both the catch basin spacing and the storm drainpipe computation sheets. Storm sewer will be made of concrete gasketed pipe, and located so that potential future excavation would result in minimal traffic disruption of the mainline of the highways. Drainage plan sheets will be submitted which document the roadway cross slope and super elevations in accordance with STATE’s standard plan. Water Resource Engineering related notes, tabulations and specifications will be prepared according to STATE’s latest sample plan and will be included in final construction plans and special provisions.

9.3.1 Prepare drainage area maps for each storm drain inlet with pertinent data such as boundaries of the drainage area, topographic contours, runoff coefficients, time of concentration and land use with design curve number. The drainage plan sheets will include the roadway cross slope and superelevation, ditch drainage direction arrows and pond locations and contours in accordance with STATE’s standard plan.

9.3.2 Determine location of proposed pipe and drainage structures. These include size, class or gauge, catch basin spacing, detailed structure designs, and special designs.

9.3.3 Evaluate bridge deck drainage requirements and coordinate locations of scuppers and pipe size requirements with bridge designers.

9.3.4 Prepare specifications for the pipe bedding material on proposed pipes and pipe alternates as required for final design plans. The specifications are to be consistent with The Concrete Pipe Technology Handbook, 1993 Edition.

9.3.5 Prepare pipe profiles including: 1) pipe size, type and gradient, 2) station offsets from the centerline of the roadway, 3) length of pipe, 4) class/gauge of pipe, and 5) numbered drainage structures with coordinate location and elevations.

9.3.6 Determine class/gauge of pipe along with final adjustments to be completed after drainage structures and pipe profiles have been drafted, including the existing and proposed ground lines.

9.3.7 Prepare Water Resource Engineering related notes and specifications.

9.4 Pond Design
CONTRACTOR will submit a summary of existing impervious areas, proposed impervious areas, and water quality volume requirements within the ultimate project area. Where ponds are required, they will be designed utilizing HydroCAD or XP-SWMM software, GEOPAK Site software, and Microstation V8i. Ponding will be required to address water quality, water quantity, and rate control issues. Ponds will meet the National Pollution Discharge Elimination System (NPDES) requirements, local water planning organization requirements, other regulatory standards and sound engineering practice. Pond locations and applicable pond information will be developed and coordinated with State.

CONTRACTOR will develop a graphic display depicting those areas treated and not treated. CONTRACTOR will document and design other water quality methods, if necessary. The documentation will include the design basis to demonstrate that the required removal efficiencies will be attained. CONTRACTOR will submit pond plan sheets which include proposed contours generated by GEOPAK Site, structure locations and identifier nos., flow directions, pond overtopping location, and water quality design information. CONTRACTOR will also submit construction plan sheets with complete structural details and tabulated quantities for water quality structures. CONTRACTOR will include the facility maintenance plan and necessary local government or agency plan acceptance work.
The Roucheau pit is used by the city of Virginia as a public water supply and Hydraulic designs will take this into consideration and designed in accordance with all applicable State and Federal requirements.

1. This task includes best management practices that might be explored to meet the various regulatory requirements of the project, including ponds and potential infiltration practices.

2. Pond design to be performed with HydroCAD or XP-SWMM software, GEOPAK Site software, and Microstation V8i.

3. Scope of work assumed that BMPs are located within STATE right-of-way.

   9.4.1 Review available data, including the preliminary drainage report, boring logs, groundwater elevations, etc to confirm pond locations identified in the preliminary drainage report as well as other potential opportunities for other BMP's, including infiltration practices.

   9.4.2 Prepare concept sketches of the potential BMP's based on the proposed layout for discussion with staff.

   9.4.3 Meet with STATE staff to discuss the refined BMP's to approve the water quality approach for the project area.

   9.4.4 Perform hydrologic modeling of the ponds and other BMP's to design the outlet structures, overflows and to confirm conformance to design criteria.

   9.4.5 Prepare contour plans for each of the water quality BMP's with water quality design information on the construction plans.

   9.4.6 Prepare inlet and outlet details, skimmers and emergency spillway designs.

   9.4.7 Prepare a graphic display (both paper and electronic format) showing which areas are treated by each pond with the design calculations and provide to the State. The display to also show those areas not treated.

   9.4.8 Develop a draft and final facility maintenance plan for applicable BMPs.

9.5 Culvert Design
Culvert design will follow STATE’s “Drainage Manual”, “Standard Plates Manual”, and the “Standard Specifications for Highway Construction” and will be designed in accordance with the Federal Highway Administration Hydraulic Design Series No. 5 “Hydraulics Design of Highway Culverts”, September 1985, including future modifications and new editions thereof, unless otherwise specified.
CONTRACTOR will utilize HY8 or CulvertMaster software. Centerline culverts will have case treatments designed to reduce frost damage potential as required by STATE’s District 1 Soils and Materials Unit. A waterway analysis and risk assessment using STATE’s form will be completed on centerline culverts larger than 48 inches. Culverts larger than 48” will require a special riprap basin design in accordance with Federal Highway Administration HEC No. 14, Third Edition, July 2006. Energy dissipation methods other than riprap may be warranted and will be designed in accordance with Federal Highway Administration HEC No. 14, Third Edition, “Hydraulic Design for Energy Dissipaters for Culverts and Channels”, July 2006. CONTRACTOR will prepare drainage plans, culvert profiles and
tabulations to be placed in the final construction plans, in accordance to the District 1 sample format. CONTRACTOR is responsible for coordinating the culvert locations and design with the bridge designer.

9.5.1 Provide minimum design for major highways for a 50-year recurrence interval; preferred design is the 100-year storm. A waterway analysis and risk assessment using Mn/DOT’s form will be performed for centerline culverts larger than forty-eight inches (48”) in diameter. This work scope assumes up to X (X) culverts larger than 48" diameter.

9.5.2 Design centerline culverts to include the bedding design to reduce frost damage potential as shown in Mn/DOT’s "Technical Manual".

9.5.3 Analyze and design energy dissipation measures for the center line culverts and storm sewer outfalls.

9.5.4 Prepare culvert profiles including:
   a) pipe size, type, and gradient
   b) station and offsets
   c) length of pipe
   d) class of pipe

   Tabulations, scope, and hours are included in Task 10.14.

9.6 Ditch Design
Critical ditch grades, sections, and linings will be designed in accordance with Federal Highway Administration HDS No. 3, “Design Charts for Open Channel Flow”, August 1961, and the STATE’s “Drainage Manual”.

9.6.1 Design special ditch grades, where needed. When necessary, ditch linings will be designed according to HEC-15, dated September 1986 and Hydraulic Design Series No. 3, "Design Charts for Open Channel Flow", August 1961.

9.7 Storm Water Pollution Prevention Plan (SWPPP)
CONTRACTOR will complete the SWPPP and related plan details, as required for the NPDES permit.

9.7.1 Assemble the SWPPP inserts for the construction plans based on the SWPPP developed under Task X.

9.8 Temporary Erosion/Sediment Control Plan
The location and type of the temporary erosion control devices that will be used to control project runoff and sediment during construction will be shown on the construction plans. The Best Management Practices will be consistent with the EIS and the plans and comply with Minnesota Pollution Control Agency, Minnesota Department of Natural Resources (DNR), Corp of Engineers (COE), NPDES permit requirements.

9.8.1 Prepare construction plans showing the location and type of the temporary erosion control devices that will be used to control project runoff and sediment during each stage of construction.

9.9 Stage Construction
CONTRACTOR will complete a detailed analysis of drainage required to provide safe vehicular travel in the project limits during phases of construction where local traffic is being maintained. The submitted hydraulics report will include this documentation.

9.9.1 Prepare temporary drainage and erosion control designs for each major stage of construction. Present on staging plans, profiles and cross-sections. The design will include temporary erosion control ponds and other best management practices needed to satisfy the NPDES and other regulatory requirements. The water resources notes in the plans will include a description of the drainage design as it is staged to accommodate construction.

9.10 Bridge Deck Drainage
Contractor will design a roadway drainage system to connect to the bridge deck drainage system.

9.11 Turf Establishment and Permanent Erosion/Sediment Control
The plan sheets will show the locations and types of permanent turf establishment in areas of construction disturbance and permanent erosion control devices. Erosion control will be developed in conjunction with STATE’s personnel. The development efforts will be coordinated by State.

9.11.1 Prepare turf establishment and permanent erosion/sediment control plans in accordance with regulatory requirements and in coordination with STATE's personnel.

9.12 Existing Storm Sewer and Culvert Drainage Tabulations
A list of the type, size, location, and proposed construction impact of drainage structures within the project limits will be tabulated and shown on the existing topography and utility plan sheets.

9.12.1 Prepare a list of the type, size, location, and proposed construction impact of drainage structures within the project limits which are then tabulated and shown on the existing topography and utility plan sheets.

9.13 Proposed Culvert Tabulation
The tabulation will include a list of structure location, type, size, length, inlet and outlet elevations, slope, class or gauge, alternative structure types, case treatment, erosion control, riprap, granular backfill, and bedding for each proposed culvert. CONTRACTOR will submit an electronic (csv) final recommendation summary for each proposed culvert detailing the above information and also to include design peak flow, computed headwater, and outlet velocity.

9.13.1 Prepare a tabulation for the construction plans that includes: a list of structure location, type, size, length, inlet and outlet elevations, slope, class or gauge, alternative structure types, case treatment, erosion control, riprap, granular backfill, and bedding for each proposed culvert.

9.13.2 Prepare and submit an electronic (csv) final recommendation summary for each proposed culvert detailing the above information and also to include design peak flow, computed headwater, and outlet velocity.

9.14 Proposed Storm Sewer Tabulation
The tabulation will include a list of the location, structure designation, structure type, pay height, casting assembly, pipe size, length, type and class, aprons, top of casting, inlet and outlet elevations, pipe slope, steps, guide posts, turf establishment, riprap class and quantity. Also include a separate casting assembly schedule. CONTRACTOR will be required to use GEOPAK Drainage software and
STATE’s spreadsheet format for proposed storm sewer tabulations. Submittals will also include proposed energy, hydraulic and pipe/structure grade lines.

9.14.1 Prepare a tabulation for the construction plans that includes: a list of the location, structure designation, structure type, pay height, casting assembly, pipe size, length, type and class, aprons, top of casting, inlet and outlet elevations, pipe slope, steps, guide posts, turf establishment, riprap class and quantity.

9.14.2 Also include a separate casting assembly schedule.

9.14.3 Prepare and submit storm sewer profiles with the proposed energy, hydraulic and pipe/structure grade lines.

9.15 Hydraulic Report, Drainage Area Maps, Drainage Models, and Construction Plans

CONTRACTOR will submit a final hydraulic report documenting hydraulic analysis of the project as described in the MnDOT Drainage Manual, Section 1.4, and as required by the NPDES permit. Documentation of the water quality event, design event, and check storm event is required. The report will include drainage elements of the stage construction. The report will also include an evaluation of drainage effect on environmentally sensitive areas with the appropriate design controls provided in the plan. Electronic models utilized in hydraulic design and analysis will be included with hydraulic report documentation submittals.

CONTRACTOR will develop readily discernable drainage area maps for each storm drain, culvert, and control structure inlet with pertinent data such as boundaries of the drainage area, drainage area identifier, and peak runoff for design event. CONTRACTOR will also develop major drainage area maps with the same data for existing conditions as well as proposed conditions and identify discharge points where runoff leaves STATE highway rights-of-way.

Hydraulic reports, drainage area maps, drainage models, and construction plans, and other drainage documentation will contain drainage area and structure labeling and other identifying information to provide direct correlation between drainage documents.

9.15.1 Prepare and submit a preliminary report documenting hydraulic analysis of the project as described in the MnDOT Drainage Manual, Section 1.4, and as required by the NPDES permit. Documentation of the water quality event, design event, and check storm event is required.

The report will include:
1. Drainage elements of the stage construction.

2. An evaluation of drainage effect on environmentally sensitive areas with the appropriate design controls provided in the plan.

3. Electronic models utilized in hydraulic design and analysis will be included with hydraulic report documentation submittals.

4. CONTRACTOR will also develop major drainage area maps with the same data for existing conditions as well as proposed conditions and identify discharge points where runoff leaves STATE’s highway right-of-way.
5. Drainage area map with readily discernible information for each storm drain, culvert, and control structure inlet with pertinent data such as boundaries of the drainage area, drainage area identifier, and peak runoff for design event.

Hydraulic reports, drainage area maps, drainage models, and construction plans, and other drainage documentation will contain drainage area and structure labeling and other identifying information to provide direct correlation between drainage documents.

9.15.2 Prepare a final report based on comments for the various reviewers.

9.16 Checklist and Change/Modification Project Log
CONTRACTOR will complete and maintain a checklist of drainage items, with changes/modifications and description of decisions made throughout the design process. The checklist and change/modification log will be submitted with each plan review submittal.

9.17 Quality Control and Quality Assurance Reviews Related to Drainage Design and Documentation

9.18 Deliverables
CONTRACTOR Deliverables:
1. Updated Water Resource Overview & Issues Map
2. Hydrologic model of existing & proposed conditions in paper and electronic format (HydroCAD or XP-SWMM)
3. Water quality model of existing & proposed conditions in paper and electronic format (P8)
4. Drainage plans, profiles, details, tabulations, notes, special provisions
5. Final drainage report
6. Final drainage cost split

STATE Deliverables:
1. Technical reports and supporting documentation (preliminary hydraulics report)
2. Record and As-built plans and available HydInfra data
3. Assist with reviewing STATE control section files
4. Participation in WRE coordination activities
5. Review & comment on drainage overview & issues map
6. Review & comment on final WRE plans and special provisions
7. Review and comment on final WRE report
8. Review and comment on final drainage cost split

10.0 STRUCTURE DESIGN
10.1 Bridge 69130 Preliminary and Final Design
10.1.1 Bridge Design Quality Assurance/Quality Control (QA/QC)
Design and Plan Sheet Check – CONTRACTOR is responsible for the completeness and accuracy of its work. Design calculations and plan sheets must be independently checked and reconciled prior to submittal to STATE. Review comments from STATE and CMGC on CONTRACTOR’s various plan submittals does not relieve CONTRACTOR of liability for an inaccurate or incomplete bridge plan.

Software Programs – All software programs and/or spreadsheets utilized by CONTRACTOR must be verified by CONTRACTOR’s in-house Quality Assurance Program.

Quality Assurance Verification – CONTRACTOR’s Project Manager or Quality Assurance Manager must review the entire plan design and production process to ensure the completeness and accuracy of
CONTRACTOR’s work and conformance with CONTRACTOR’s QA procedures.

10.1.2 Preliminary Design and Plan Preparation:
CONTRACTOR will perform necessary engineering and design to determine the type, size, location and geometrics of Bridge No. 69130. CONTRACTOR will perform the necessary number of concept iterations to determine proper bridge structure depth.

CONTRACTOR will complete preliminary design in accordance with the following design standards and governing documents:

- MnDOT Load and Resistance Factor Design (LRFD) Bridge Design Manual
- American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications
- MnDOT Surveying And Mapping Manual
- MnDOT Drainage Manual
- MnDOT Checking List for Preliminary Plans (dated 5/23/2008 or later)
- MnDOT Bridge Details Manual (Parts I and II)
- MnDOT Standard Specifications for Highway Construction
- MnDOT Computer Assisted Design and Drafting (CADD) Standards
- MnDOT Summary of Recommended Drafting Standards
- MnDOT Aesthetic Design Guide (if applicable)

At a minimum, CONTRACTOR will submit Preliminary Plans at the following stages of design:

1. 30% Preliminary Plans
   1. General Plan and Elevation Sheet
   2. Proposed alignment, profile grades, structure type, and substructure locations
   3. Aesthetics Sheet
   4. Bridge Surveys Sheet
   5. Foundation Sheet(s)

2. Final Preliminary Plan
   The Final Preliminary Plan will show the general dimensions, elevations, sections, aesthetic features, survey information, foundations borings, and design data. It will include:
   1. General Plan and Elevation Sheet
      1. General Plan and Elevation
      2. Profile Of Finished Bridge Deck
      3. Design Data
      4. Proposed Type Of Structure Block
      5. Projected Traffic Volumes
      6. Title Block
   2. Bridge Survey Sheet
      1. Contracted Profile
      2. Plat and Index Map
      3. Typical Roadway Sections
      4. Engineers Observations
      5. Hydraulic Recommendations
      6. Bench mark Data
      7. In-place (and proposed) Utility Locations
   3. Foundation Sheet
Roadway Detail Design Scope of Work and Deliverables

1. Boring Plan
2. Geotechnical Boring Logs
3. Existing Footing Locations
4. Aesthetics Details Sheet(s)
5. Other Sheets as Required
   1. Construction Plan
   2. Alignment Tabulations

10.1.3 Final Bridge Design and Plan Preparation
CONTRACTOR will coordinate final design plan reviews with the Bridge Office Project Manager. If STATE determines at any time during final design that major plan revisions are necessary due to CONTRACTOR plan errors, CONTRACTOR will furnish revised plan sheets at no cost to STATE.

At a minimum, CONTRACTOR will submit plans for STATE AND CMGC review at the following stages of design:

1. 30% Plan Review
   The 30% Plan provides STATE an early review of the final plan preparation for conformance with the approved Preliminary Plan, aesthetic guidelines, and key design specifications. The intent of this review is to identify design discrepancies at an early stage and avoid major plan modifications resulting from future reviews. At a minimum, the 30% Plan will include:

   1. General Plan and Elevation Sheet(s)
      For this submittal, the General Plan and Elevation sheet(s) need to be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed box type, architectural features, stage construction information, and basic design data. The sheet(s) will be based on the approved Preliminary Plan.

   2. Framing Plan
      Include a preliminary beam run with computations.

   3. Bridge Layout Sheet(s)
      For this submittal, the Bridge Layout Sheet(s) must show a line diagram that indicates the control point, work line, reference lines, and proposed working point locations. The tabulations required do not need to be completely filled in; however, the sheet(s) will indicate the diagonal and other dimensions that will be included in the Final Plan. It will also contain any corner views sections, and notations (i.e. expansion joint details at gutters, sidewalks, barriers, etc.) needed to clarify the working point locations. Corner details may be detailed on a separate sheet for clarity.

   4. Architectural or Special Detail Sheet(s)
      Architectural or special detail sheet(s) showing any standardized shapes proposed to maximize repeatability of pier forms and other special details that require early coordination between CONTRACTOR and STATE prior to Final Plan preparation.

   5. Aesthetics Sheet(s)
      Bridge aesthetics will be established in collaboration with STATE.

   6. Bridge Survey Sheet(s)
Roadway Detail Design Scope of Work and Deliverables

Survey sheets from the approved Preliminary Plan are to be included in this submittal; however, they are not required to be completed.

7. Any supporting design computations used to develop the aforementioned items.

CONTRACTOR will submit two sets of the 30% Plan and design calculations to STATE for review. STATE will return 30% Plan comments to CONTRACTOR within 15 working days. CONTRACTOR may proceed with design during this review period.

2. 60% Plan Review
The intent of the 60% Plan Review is to verify CONTRACTOR’s progress toward plan completion and evaluate against project and contract timelines. The 60% Plan submittal will include two full sets of in-progress plan sheets, design calculations, draft special provisions, and working copies of electronic design files (MicroStation, Geopak). Include PC beam design, abutment details, and pier design and details. STATE’s Bridge Office will return 60% Plan review comments within 15 working days. CONTRACTOR will be allowed to continue with design during this submittal. CONTRACTOR will submit draft Special Provisions for State’s review with this submittal.

3. 90% Plan Review
The intent of the 90% Plan Review is for STATE to verify that the plan is acceptable for the State Bridge Engineer’s signature. The 90% Plan should be complete in all areas to the extent that it can be certified by CONTRACTOR, although a certification signature is not required until after this review has been completed. CONTRACTOR will submit the 90% Plan, design calculations, and finalized special provisions to STATE. STATE’s Bridge Office will return 90% Plan review comments within 10 working days.

4. Construction Elevations
Upon reconciliation of STATE’s comments on the 90% Plans, CONTRACTOR will produce construction elevations for the bridges. CONTRACTOR may use STATE’s construction elevation program, or another software program (with approval of STATE’s Project Manager). Regardless of the software used, the output format for construction elevations must be consistent with STATE’s construction elevation program. STATE will provide instructions and an example of construction elevations output. The construction elevations output must be submitted to STATE with the Final Certified Bridge Plans.

5. Final Certified Bridge Plan
Upon incorporation of STATE’s 90% Plan comments, CONTRACTOR will submit the Certified Final Bridge Plans and Final Special Provisions to STATE.

10.2 Retaining and Noise Wall Design
CONTRACTOR will prepare retaining wall plans (including location, profile, and cross-sections) in accordance with current STATE standards. CONTRACTOR will provide changes in drawings to comply with foundations and/or subgrade corrections recommended by STATE’s Foundations Unit and STATE’s District Soils Office reports.

- Retaining wall designs will be based upon current wall standards which allow for walls up to 30 feet in height without special designs. Therefore, no special retaining wall designs are anticipated.
State standards governing retaining wall plans will be represented by the following sheets in the current Sample Plan downloaded from STATE's website on June 24, 2013. Form and contents of retaining wall plans will conform to the following Sample Plan sheets. Additional plan content exceeding that illustrated in the following Sample Plan sheets is not included in this scope and will be considered to be Extra Work:

1. "Retaining Wall Plans and Profiles Narrative" (Revision date 04/12/11) - 1 sheet
2. "Retaining Wall Plans and Profiles Checklist" (Revision date 04/12/11) - 1 sheet
3. "Retaining Wall No. 3 Plans and Profile, Sheet 1 of 3" (Revision date 5/07/99) - 1 sheet labeled Sheet No. 44 of 88.
4. "Retaining Wall Plans and Profile and Tabulation, Retaining Wall No. 2, Sheet 2 of 3" (Revision date 06/24/10) - 1 sheet labeled Sheet No. 45 of 88.
5. "Tabulation, Concrete Retaining Wall, Sheet 3 of 3" (Revision date 06/24/10 - 1 sheet labeled Sheet No. 46 of 88.
6. "Retaining Wall Details Narrative and Checklist" (Revision date 06/28/10) - 1 sheet
7. "Retaining Wall Details Alternating Recessed Panel Typical Section, Sheet 1 of 3" (Revision date 06/02/03) - 1 sheet labeled Sheet No. 47 of 88
8. "Retaining Wall Details, Sub Surface Drainage Crossings, Sheet 2 of 3" (Revision date 06/30/10) - 1 sheet labeled Sheet No. 48 of 88.
9. "Retaining Wall Details, Shear Key Details and Reinforcement, Sheet 3 of 3" (Revision date 06/28/10) - 1 sheet labeled Sheet No. 49 of 88.
10. Noise wall Standard Plan 5-297.661

If CONTRACTOR incorporates design elements that may preclude other wall types from being constructed, an explanation of methodology will be provided to STATE.

10.2.1 Plan Preparation
CONTRACTOR will follow the following procedure for the preparation of Bid Documents and Plans:

Wall plans fall into three categories; standard design, proprietary design, and special design. Currently, cast-in-place cantilever walls and dry cast concrete modular block walls have standard plan sheets. Preparation of plans and bid documents for walls excluding proprietary walls will be in accordance with STATE's Sample Plan sheets referenced above.

Plans for proprietary design walls should include pertinent information necessary for location and alignment including cross sections, plans, and profiles. Locations of utilities or other features impacting the design or construction should also be shown. The balance of the details necessary for construction will be provided by the wall vendor via the Construction CONTRACTOR as described in the Special Provisions.

Special design walls include cast-in-place cantilever walls taller than those shown on the standard sheets, steel sheet pile, soil nail, soldier pile and anchored walls. Preparation of plans...
Roadway Detail Design Scope of Work and Deliverables

for these walls should include complete details necessary for the construction of the wall using project specific details and standards or special requirements that may apply.

- Special designs are not anticipated and not included in this scope of work.

10.2.2 Preparation of Bid Documents and Plans for Proprietary Design Walls

Proprietary wall designs will contain the following geometric and project specific information:

1. List of acceptable wall types and/or systems for each wall on the project.

2. Geometrics
   a) Beginning and end of wall stations.
   b) Top of wall profile.
   c) Original and proposed ground line profiles in front of and behind the retaining wall. Profiles will show existing and proposed infrastructure (i.e., utilities and other existing or proposed structures) in the profile section.
   d) Cross sections at relevant wall locations, usually at no more than 50 feet intervals. Cross sections will show temporary and permanent ROW easement limits and existing utilities.
   e) Plan view(s) of wall alignment showing ROW limits, existing and proposed utilities, etc.
   f) Wall alignment geometric data will be shown and tabulated (similar to roadway alignment data).
   g) Details of footing, leveling pad, aesthetics, or other detailed wall requirements.
   h) Details of wall appurtenances such as traffic barriers, moment slabs, coping, fencing, drainage, or other obstructions including but not limited to the location and configurations of signs and lighting including conduit locations and right-of-way limits.
   i) Construction staging requirements, if applicable, including sequence of traffic control, access, temporary construction, temporary fencing, temporary or permanent barrier, and temporary and permanent drainage.
   j) Elevation of highest permissible level for foundation construction.
   k) Location, depth and extent of unsuitable material to be removed and replaced. Details of required ground improvement.
   l) Quantities table showing estimated wall area and quantity of appurtenances and traffic barriers, together with notes identifying the assumptions made in estimating.
   m) At abutments, elevations of bearing pads, location of bridge seat, skew angle and horizontal and vertical survey control data including clearance and details of abutments.
   n) At stream locations, extreme high water, normal water levels and estimated scour depth.
   o) Grading material requirements adjacent to the wall, including details of needed perforated pipe drainage or other drainage requirements.

3. Geotechnical Information
A copy of the subsurface investigation report and specific design values for the following parameters (where required)

a) Plan view of sampling and field-testing locations across project site.

b) Subsurface profile across project site.

c) Boring logs.

d) Laboratory test data and results.

e) Engineering properties of the foundation soil, the reinforced soil, and the retained soil as appropriate to ensure the proper long-term performance of the MSE wall structure.

f) Required soil modification.

g) Global and compound stability analysis.

h) Allowable or factored bearing resistance and ultimate or factored bearing pressure beneath the wall footing and the reinforced earth mass.

i) Settlement analysis for the foundation soil beneath the wall and the reinforced earth mass.

j) Groundwater elevations, free water conditions, anticipated high water conditions and required drainage schemes.

k) Recommendations concerning items that may be appropriate to ensure the proper long-term performance of the wall structure.

l) Shear strength (drained and undrained for fine grained soils) of foundation soils.

m) Required shear strength and unit weight ranges of select backfill.

n) Shear strength of random fill or in-situ soil behind wall.

4. General Structural and Geotechnical Design Requirements

The following are general design requirements for retaining walls that will be shown on the drawings or addressed in the contract documents. Specific design requirements for each of the wall types are discussed in the following sections:

a) Design Life of the structure (example: permanent mechanically stabilized earth walls are designed, for minimum corrosion service life of 100 years)

b) Driving force and resistance for overturning, sliding and stability of temporary construction slopes. Analysis for global and compound stability is performed by Foundation Unit.

c) Ultimate and nominal foundation bearing pressure, minimum wall footing embedment depth and maximum tolerable total and differential settlements.

d) Internal design requirements for mechanically stabilized earth wall products.

e) Magnitude, location and direction of external loads due to bridge, overhead signs and lights, traffic surcharge and rapid ground water draw down or displacements and other external loads.
Roadway Detail Design Scope of Work and Deliverables

f) Limits and requirements for drainage features beneath, behind, or through retaining structure.

g) Backfill requirements for both within and behind retaining structure.

h) Requirements for special facing panels, module finishes, colors, and/or protective coatings.

i) Governing sections of construction specifications.

10.3 Deliverables

CONTRACTOR Deliverables:

1. Bridge Preliminary Design submittals (30%, Final Preliminary Plans)
   a. 2 sets of 11”x17” plans, design calculations, draft special provisions, and working copies of electronic design files

2. Final Bridge Design submittals (30%, 60%, 90%, Final Certified Bridge Plan)
   a. 2 sets of 11”x17” plans, design calculations, draft special provisions, and working copies of electronic design files

3. Construction elevations output (with the Final Certified Bridge Plan)

4. Retaining wall plans prepared in accordance with the STATE's sample plan as referenced above.

5. Retaining wall special provisions.

STATE Deliverables:

1. Review comments on bridge plan submittals

2. Data, computations, reports and analysis supporting the choice of wall types and locations depicted on the geometric layout.

11.0 SIGNING, LIGHTING, PAVEMENT MARKING, AND SIGNALIZATION

11.1 Signing (Source Code: 1255)

Any signs on the bridge structure must be addressed in the early stages of design. CONTRACTOR will perform the following tasks:

1. Prepare a conceptual signing layout for the overall project and submit it to STATE’s TH 53 Design Engineer for review and comments prior to developing plan sheets. The concept layout will help ensure uniform signing throughout the project corridor and compliance with STATE’s signing requirements. The concept layout will be a roll layout (not plan sheets) depicting existing signing and proposed guide signing.
   • STATE will supply concept signing plan developed during preliminary design.

2. Prepare 95% plans showing required signing for the completed project. Appropriate signs are anticipated by STATE to include regulatory signs, warning signs, guide signs, route markers and auxiliaries, delineators, and miscellaneous signs. Required sign types will include, but are not limited to, final plans for Types A, C, D, EA, EO and OH signs. Plans will be prepared at a scale of 1" = 100’. Submit 95% signing plans, special provisions, and engineer's estimate (PS&E) for agency review. Address review comments. Submit 100% PS&E as part of overall final submittal.

3. Confer with STATE regarding legends to be shown on each sign, and design each sign using SignCAD (Version PV 8.24 and Standards Version: SV 3.00 or newer) computer software and the criteria contained in the 2010 version of the MnDOT Traffic Guide Sign Design Manual, including future modifications and new editions thereof, unless otherwise specified.
4. Provide the detailed design of each sign, including a cross section at each Type A or OH sign recommended in the plans.
5. Prepare data sheets of each sign type that include the number, size, area, and quantity of each sign, the total quantity of each sign type, and appropriate notes.
6. Incorporate sign placement details and structural details into the plans.
7. Show on the signing plan existing pertinent signs that are to be relocated or salvaged.
8. Quality Control and Quality Assurance reviews of the signing plans.

11.2 Lighting (Source Code: 1252)
CONTRACTOR will prepare and review the Preliminary and Final Lighting Plan with STATE in determining the appropriate locations of lighting within the project area. This must be done early in the bridge design process in order to be included in bridge visualizations, and to plan locations for light anchorages. CONTRACTOR will also perform the following tasks:

1. Prepare the Preliminary and Final Lighting Plan with special provisions.
2. Prepare plan sheets showing layout, standard plates that apply to the lighting construction, symbols and abbreviations, quantity tabulations, service cabinets, lighting unit(s) and luminaries(s) detail, plan view including wiring diagram and source(s) of power, and a sheet showing existing utilities.
3. Provide a temporary lighting design for staging the lighting.
4. Quality Control and Quality Assurance reviews of the lighting plans.
5. Plans must be submitted at 60%, 95% and 100% in microstation with all reference files and a scale hard copy.

11.3 Striping and Pavement Marking (Source Code: 1252)
CONTRACTOR will perform the following tasks:

1. Provide plans showing permanent striping and markings. Markings will include centerlines, lane lines, stop lines, signal ahead messages, turn arrows, and other markings or messages that the geometric design may dictate.
   • Scope of work includes preparing special provisions and engineer's estimate.
2. Include appropriate detail sheets in the plans that will better define striping and messages and their dimensions and locations.
3. Prepare quantity tabulations sheet in the plans showing the various pavement marking items, their locations, quantities at each location, and the total quantity of each pavement marking item.
4. Quality Control and Quality Assurance reviews of the pavement marking plans.

11.4 Signalization (Source Code: 1251)
CONTRACTOR will perform the following tasks:

1. Provide signal plans and provisions for the TH 53 and 2nd Avenue intersection.
   • Signal plans will include: a) plans for underground (conduit and handholes) work to be performed as part of the interchange construction project. b) intersection layout sheets
Roadway Detail Design Scope of Work and Deliverables

for traffic signals showing signal hardware, detector locations and functions, and controller phasing charts.

2. Quality Control and Quality Assurance reviews of the signal plans.

3. Plans must be submitted at 60%, 95% and 100% in microstation with all reference files and a scale hard copy.

11.5 Deliverables

CONTRACTOR Deliverables:
1. Signing layout
2. Signing plans, details and special provisions
3. Lighting plans (preliminary and final), details and special provisions
4. Striping and Pavement Marking plans, details and special provisions
5. Traffic Signal plans, details and special provisions

STATE Deliverables:
1. Signing layout will be returned to CONTRACTOR with review comments providing direction or concurrence on location, size, type and other data for signing for incorporation into the final design and plans. No significant alterations to signing type, size, location, legend or other features will be made subsequent to CONTRACTOR’s receipt of these layout comments.

12.0 Intelligent Transportation System (Source Code: 1251)
The following automated systems will be incorporated into the Project:

12.1 Dynamic Changeable Message Signs
1. CONTRACTOR will perform the following tasks:
2. Include STATE supplied standard plans and specifications for DMS systems into the plans.
3. Include Special Provisions in the final Special Provisions Package for DMS System Pay Items
4. Include Pay Item(s) in the Statement of Estimated Quantities
   a) STATE will provide Dynamic Changeable Message Sign information and location to CONTRACTOR for incorporation into plan set.
   b) Scope of work assumes Two (2) DMS’s.

12.2 Deliverables

CONTRACTOR Deliverables:
1. As noted in Task 13 description above

STATE Deliverables:
1. As noted in Task 13 description above

13.0 BICYCLE AND PEDESTRIAN FACILITIES (Source Code: 1250)
The approved Geometric Layout contains Bicycle and Pedestrian facilities as part of the Project. CONTRACTOR will complete detailed design for Bicycle and Pedestrian Facilities consistent with the Geometric Layout, Visual Quality Plan, MnDOT Bikeway Facility Design Manual, Road Design Manual, and applicable Technical Memoranda. NOTE: any connections with bicycle trails may require coordination with the bridge security assessment.

- Scope of work does not include revisions, changes or modifications to bicycle and pedestrian facilities as shown on the geometric layout.
13.2 Quality Control and Quality Assurance Review of Bicycle and Pedestrian facility plans.

14.0 CONSTRUCTION PLANS (Source Code: 1250)
CONTRACTOR will prepare a complete set of detailed construction plans for proposed construction elements depicted on the approved Geometric Layout and for elements developed through detailed design under this Scope of Work. The construction plans will be dependent on the number of work packages that CMGC will bid for construction. CONTRACTOR will be required to detail sufficient plan content so that the project is constructible and achieves the final horizontal and vertical alignments, typical sections, and construction limits identified in the Geometric Layout. The plans will also be consistent with findings and recommendations identified in the EIS and ROD and in accordance with Federal and State laws, rules, and regulations.

1. Plan review and PS&E submittals will be made solely through the STATE Project Manager.

2. For the purposes of this scope, plan sheet count and hours necessary to develop are based upon overlapping sheet borders and do not include matchlines on each sheet.

3. For the purposes of this scope, plan sheet plotting will be via Microstation V8i standard plotting routines.

4. For the purposes of this scope, the use of corridor modeler and the development of machine control data are not included.

The Construction Plan set will consist of, but is not limited to the following sheets, and not necessarily in the order listed below and might be included in one or more CMGC work packages:

14.1 Title Sheet
The Title Sheet will contain the location map, signature block, sheet index, project data, State and Federal Numbers, station equations, traffic data, and station-reference point comparison.

14.2 General Layout
A layout of the project showing the plan sheet layout and sheet numbers for reference will be prepared.

14.3 Statement of Estimated Quantities (SEQ)  
Tabulation will show Mn/DOT’s standard pay item numbers, item descriptions, quantity of materials needed to complete the project, and columns for State and Federal funding. Columns should exist for referencing the individual item’s tabulation. Notes will be included where necessary for clarification.

14.4 Soils, Construction Notes and Standard Plates
Notes covering special requirements and critical information contained in the Materials Design Recommendation Letter will be listed as well as other special construction requirements that have been identified. Mn/DOT Standard Plates used on this project will also be listed on this sheet.

14.5 Typical Sections
Typical section views of the existing and proposed roadway will be shown. The sections will be consistent with the Geometric Layout, Materials Design Recommendation Letter, and the EA. Surface type, base materials, and subgrade work will be shown.

14.6 Quantity Tabulations
Detailed quantity breakdown of most items contained in the SEQ, including earthwork volumes between stations, will be provided.

14.7 Utility Tabulations
Detailed breakdown of the existing utility located within the project limits will be provided. This tabulation is required to have the following columns: Station, Location, Inplace Facility Description, Owner, and Remarks.

14.8 Miscellaneous Details
Details necessary for the construction of unique or non-standard elements identified during detail design will be provided.

14.9 Standard Plan Sheets
Mn/DOT Standard Plan Sheets and Standard Plates will be included as needed to supplement the construction details in the plan. The Standard Plan Sheets and Standard Plates are provided on the Internet site for the Mn/DOT’s Office of Technical Support at:
http://www.dot.state.mn.us/tecsup/index.html

14.10 Construction Staging Plans
CONTRACTOR will develop staging plans for the bridge and associate roadway approaches. This task includes coordination and meetings with STATE staff regarding staging, schedules, and detours, if any.

14.11 Alignment Plan and Tabulations
CONTRACTOR will prepare alignment plans showing proposed roadway centerlines, stationing, and identifying alignment points with point numbers, curves with curve numbers, and permanent horizontal control points. CONTRACTOR will prepare tabulation sheets showing alignment and curve data (PC, PT, PI, POT, POC, PCC) for alignment points shown on the alignment plan. Tabulated data will include station, delta, degree of curve, radius, tangent, curve length, superelevation rate, and X-Y coordinates.

14.12 Inplace Topography, Utility, and Right of Way
From the survey base mapping provided by STATE, CONTRACTOR will review supplemental field survey data to determine adequacy of coverage, organize and format in accordance with STATE standards, complete base mapping, and prepare plan sheets showing the inplace topographic features along with private and public utilities, including wells, septic tanks, drain fields, and field tiles within the project limits. Show existing centerlines and right of way lines.

14.13 Removal Plans and Tabulations
CONTRACTOR will prepare detailed plans and tabulations that show the removal of pavement, pipes, culverts, drainage structures, etc. Clearing and grubbing areas will also be noted.

14.14 Construction Plan Sheets
CONTRACTOR will prepare detailed plans of the project providing information on the location of items such as roadways, shoulders, radii, turn lanes, acceleration lanes, driveways, curb and gutter, tapers, right-of-way, railroad property, easements, obliterations, station equations, fencing, permanent signing, etc.

14.15 Intersection and Driveway Layout Details
Detailed plan layouts showing grades, radii, widths, and cross slope details will be prepared.
14.16 **Roadway Profile Sheets**
Profile sheets of the proposed mainline, cross roads, and driveways will be prepared. Information shown on the profiles will include items such as vertical control, vertical curve data, top of finished surface, top of grading grade, top of special ditch grade, culverts, subgrade corrections, removal of unsuitable material and utilities. Profiles along gutter flow lines will also be shown. The profiles will also be analyzed for snow drift potential and possible drift mitigation.

14.17 **Paving Plans**
CONTRACTOR will prepare detailed paving plan sheets based on the Soils and Pavement Recommendations. The project will include both concrete and bituminous pavements.

14.18 **Superelevation Plans**
CONTRACTOR will prepare a detailed superelevation plan that patterns the superelevation transition, showing cross slopes where superelevation transition begins and ends and where the superelevation is zero.

14.19 **Cross Section Matchline Layout**
CONTRACTOR will prepare sheets showing the locations of cross sections and associated matchlines as necessary.

14.20 **Cross Section Sheets**
CONTRACTOR will prepare cross sections at 100-foot intervals with intermediate sections in critical areas with unique physical features (e.g., culverts and OH signs). The plan sheets will show existing ground line, proposed roadway template, grading grade, existing and proposed utilities, existing and proposed culverts, existing and proposed right-of-way, temporary and permanent easements, drainage easements, entrance slopes, subgrade corrections, unsuitable soil removal, rock lines and topsoil placement.

1. Development of machine control information/output is not included in the scope of work.

2. Cross sections will be developed to illustrate each stage of construction.

14.21 **Earthwork volumes**
Earthwork volumes will be shown on separate tabulation sheets, and developed for each stage of construction.

14.22 **Discipline Coordination Reviews (DCR)** will be held in conjunction with each planned document submittal, assume three (3) formal submittals.

14.23 **Independent Technical Reviews (ITR) and Constructability Reviews of submittal documents**, assume three (3) formal submittals.

14.24 **Quality Assurance Audits of submittal documents**, assume three (3) audits.

14.25 Document control, maintenance of database containing comments received during DCR and ITR reviews along with comment resolutions.

14.26 **Deliverables**
CONTRACTOR Deliverables:
Roadway Detail Design Scope of Work and Deliverables

1. Construction plans in hard copy and electronic format. Submittals will be made at the milestones identified in conformance with the deliverables schedule in Exhibit A, Bridge Design Scope of Work.
2. Design Coordination Meeting minutes.
4. Database of comments and resolution during design, DCR and ITR process.

STATE Deliverables:
1. For each plan review submittal, STATE will return to CONTRACTOR a single complete official record copy of the submitted plan containing of STATE’s review comments.

15.0 LANDSCAPE DESIGN
CONTRACTOR will prepare landscape construction plans for STATE review and comment. Landscape plan will include all landscape planting design within the construction limits consistent with the landscape massing concept plan developed and approved by the STATE during the preliminary visual quality planning process as follows:

a. Graded areas and tie-slopes
b. Open areas left by demolition of existing roadway and bridge features
c. Stormwater pond edges
d. Landscape areas in tiered retaining wall conditions
e. Additional accent landscape areas as determined in the VQM

Current MnDOT Standard Planting Detail sheets will be the basis for design and included in the plan set. Species selections will be based on input from the STATE, United States Fish and Wildlife Service, and the Minnesota Department of Natural Resources.

16.0 SPECIAL PROVISIONS (Source Code: 1250)
16.1 CONTRACTOR will prepare the entire Division S special provisions for each work package within this project. Each provision will contain a description, materials, construction requirements, method of measurement, and basis of payment for each item. Deletions from, and additions to Standard Specifications will be written and included as necessary. Construction contract time and traffic provisions (timeline and CPM schedule) will be developed by STATE. Copies (10 sets) of the Special Provisions will be submitted to STATE for review along with the 60%, 95%, and 100% Construction Plan submittals. Electronic copies of the final Special Provisions in Microsoft Word format will be submitted with the Final Construction Plans.

16.2 Independent Technical Reviews (ITR) of submittal documents, assuming three (3) formal submittals.

16.3 Deliverables
CONTRACTOR Deliverables:

STATE Deliverables:
1. For each Special Provision submittal, STATE will return to CONTRACTOR a single complete official record copy of the submitted Special Provisions document containing of STATE’s review comments.

17.0 PLAN FORMAT (Source Code: 1250)
The format of the Construction Plans will comply with the MnDOT Technical Manual Section 5-292.600, related appendices, and STATE’s current design concepts and practices. Sheets contained in the Construction
Roadway Detail Design Scope of Work and Deliverables

Plans and cross sections will be submitted to STATE in Microstation V8i and Geopak formats. The Plans and cross sections will be in compliance with the MnDOT CADD Standards Manual.

Electronic project design information will be in Microstation V8i and Geopak formats. Upon completion of this project or termination of the contract, the electronic project files become the property of STATE.

Plans submitted for reviews will be delivered on 11”x17” bond sheets. The detail design plan will be submitted on 11”x17” bond and only the title sheets will be on an 11” x 17” sheet of vellum.

1. Plan review and PS&E submittals will be made solely through STATE Roadway Manager.

18.0 PLAN REVIEW AND APPROVAL (Activity Code 1250)
The Initial Detail Design is approximately 30% complete and includes the Geometric Layout, horizontal and vertical alignments, preliminary drainage concepts, right-of-way requirements, initial utility information, and typical sections. CONTRACTOR will submit Construction Plans and documents for review and approval at the following milestones:

18.1 Intermediate Design (60% Complete)
CONTRACTOR will submit five (5) sets of prints and 1 PDF version showing elements of the Construction Plan listed in Section 14.0 of this Scope of Work and Deliverables. CONTRACTOR will submit five copies of the Special Provisions along with the Construction Plan. CONTRACTOR will also conduct a constructability review in cooperation with STATE staff to confirm the feasibility of staging and plan implementation. STATE’s staff will complete review and comment on this submittal within 20 working days of the submittal date. CONTRACTOR will make a single iteration of revisions required by STATE. Multiple iterations of revisions are not included in this task. CONTRACTOR may proceed with further design during this review period.

• These hours are solely for coordination with STATE at the 60% milestone and preparing the submittal package. Hours for the constructability review are shown in Task 15.26.

18.2 Detail Design (95% Complete)
CONTRACTOR will submit five (5) sets of prints and 1 PDF version of the proposed Construction Plan, five (5) copies of the Special Provisions, and two (2) copies of the Permits for STATE’s Review and Comment. STATE will complete review and comment on this submittal within 10 working days of the submittal date. Selected sheets will be sent to STATE’s Central Office for preparation of necessary Agreements. CONTRACTOR will make a single iteration of revisions required by STATE staff. Multiple iterations of revisions are not included in this task.

19.3 Construction Plan (100% Complete)
CONTRACTOR will submit five (5) sets of prints for the proposed Construction Plan, (5) copies of the Special Provisions, and five (5) copies of the Permits. STATE will complete review and comment on this submittal within 10 working days of the submittal date. CONTRACTOR will make a single iteration of revisions required by STATE staff. Multiple iterations of revisions are not included in this task.

Upon making the revisions to the 100% Construction Plan submittal, CONTRACTOR will submit one signed and certified set of bond prints with the vellum title sheet, and five (5) additional copies. The original prints will be submitted to District 1 or Bridge Office as set forth in SEC. 19.0 PLAN TURN-IN AND SUPPORT. STATE’s Central Office Design Liaison Unit will make a final review and comment on the certified Construction Plan.
Upon making the revisions requested by STATE’s Central Office Design Liaison Unit, the CONTRACTOR will submit new signed and certified sheets, as necessary. An electronic copy of the project’s Geopak design files (.gpk) and each sheet in Microstation V8i format will be submitted. One copy of the design computations and quantity calculations will also be submitted.

18.4 Deliverables

CONTRACTOR Deliverables:
1. Submittals as noted in hard copy and electronic format. Refer also to individual separate tasks.

STATE Deliverables:
1. For each submittal, STATE will return to CONTRACTOR a single complete official record copy of each component of the submittal containing of STATE’s review comments for that component.

19.0 PLAN TURN-IN AND SUPPORT

CONTRACTOR will coordinate with STATE’s Roadway Project Manager and Bridge Office Project Manager to ensure that roadway deliverables accommodate the bridge deliverables schedule in Exhibit A, Bridge Design Scope of Work. This is desired to allow the CMGC process to be applied to bridge and roadway deliverables at the same time.

1. CONTRACTOR will provide up to 100 hours of Plan Turn-in support prior to letting for edits, corrections, or supplementary information that is required by STATE. CONTRACTOR will respond to support requests by STATE in a timely manner to ensure that Project letting will be kept on schedule.

2. CONTRACTOR will plan for up to 250 hours of Post-letting Construction support and will be available to respond to questions or design related issues that arise during prosecution of the construction contract. CONTRACTOR will attend Pre-construction meetings as requested by STATE. CONTRACTOR will also respond to requests for information (RFI) and attend design issue meetings as requested by STATE.

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