

**ATTACHMENT 53 – ANSWERS TO STANDARD SET OF QUESTIONS BY THE
MINNESOTA DOT**

(65 pages)

Minnesota DOT

February 21, 2008

Italics represent the responses by the Minnesota DOT.

1. What was your procedure in reviewing consultant engineering bridge plans in the early 1960's?

Consultant Bridge Plan Review Procedures – 1960's

- *Reviews completed Preliminary Group*
 - *Geometry*
 - *Structure Type*
 - *Hydraulics*
 - *Responsibility included in position description (see Attachment A)*

- *Reviews completed by Final Design Units*
 - *Reviews made but level of review unknown*
 - *Br 9340 truss – amount of structural review unknown*

- *Process in Bridge Design Manual*
 - *1972 Bridge Design Manual (see Attachment B)*
 - *Process in place before this date but do not have official record*

- *Bridge 9340 Contract (see Attachment C)*

What is your procedure in reviewing consultant engineering bridge plans today?

Complex Bridge Review Process

- *Monthly update meetings*
 - *Review design and plan details*

- *Coordinate reviews with other technical experts*
 - *Foundations Engineer*
 - *Regional Engineer – constructability review*
 - *Involve other technical experts as needed*

- *Independent review*
 - *Design criteria for structure – Loads and specifications*
 - *Superstructure elements*
 - *Large river piers*

- *Review*
 - *Checklist items*
 - *Construction Specifications*

2. How do you ensure the QA/QC process of a consultant engineering firm is adequate? In the early 1960's and today? What procedures are in-place to ensure that the consultant does not submit an inadequate design?

Current Process to Ensure Adequate QA/QC Process

- *Pre-qualified consultant list*
 - *QA/QC Procedures (see Attachment D)*
 - *Contract Scope of Work (see Attachment E)*

- *Consultant Bridge Plan Review*
 - *Design review checklist (see Attachment F)*
 - *Included review process of Mn/DOT designs*

- *Complex structures – independent review*
 - *35W replacement*

Mn/DOT's Pre-approved Consultant List

- *Four pre-qualified lists depending on bridge type and complexity*
 - *Level 1 – Typical Bridge Designs (PC beam, steel, and slab span)*
 - *Level 2 – Complex Bridge Design (Major river crossings and curved steel girder)*
 - *Level 3 – Specialty Bridge Design (Steel box girders, segmental concrete, and arches)*
 - *Level 4 – Bridge and Structure Studies (Major bridge studies)*
 - *See Attachment D for more information*

Consultant Selection

- *Consultant selection based on:*
 - *Pre-qualified list*
 - *Bridge type and complexity*
 - *Quality Based Selection (QBS) process*
 - *Experience*
 - *Personnel*
 - *Quality procedures*
 - *Best Value process*
 - *QBS process plus cost*

3. What does the Minnesota DOT consider a red-flag item when reviewing consultant engineering bridge plans? What follow-up action is taken to address the red-flag item? Describe the level of detail the Minnesota DOT uses in reviewing consultant engineering bridge plans?

Scope of Review

- *Items of concern*
 - *Geometrics*
 - *Design*
 - *Loads*
 - *Specifications*
 - *Standards*
 - *Details*
 - *Constructability*
 - *Construction Specifications*
 - *Reach consensus*

- *Level of detail in review*
 - *Checklist*
 - *Constructability reviews by experienced designers*
 - *Additional items for complex bridges*

4. Does the Minnesota DOT review consultant engineering bridge plans concurrently with the FHWA Division Office? Does the Minnesota DOT review the consultant plans with the expectation that FHWA will be performing a similar type of review?

FHWA Oversight

- *Involved in project development*
- *FHWA concurs with structure type selection (NHS system bridges)*
- *FHWA concurs that final design is in agreement with preliminary type selection*
- *Mn/DOT review independent of FHWA quality process*
- *Oversight information (see Attachment G)*

5. What are the qualifications of the Minnesota DOT personnel who conduct the review of consultant engineering bridge plans?

Mn/DOT Reviewer's Qualifications

- *Routine bridges*
 - *Assigned to unit leader who is a Professional Engineer*
 - *Engineers review design and details*
 - *Regional Construction Engineer who is a Professional Engineer completes constructability check*
 - *Discuss findings with consultant designer*
 - *30, 60, 90% plan completion reviews*
 - *Level of experience of review engineer varies but unit leader oversees process*

- *Complex bridges – two methods*
 - *Assign unit leader/engineer if they have experience or background in design of that bridge type*
 - *Crosstown curved steel bridge*
 - *Select consultant for independent review*
 - *35W Rebuild*
 - *Unit leader is project manager*

6. What is the percentage of bridge design work that is done in-house versus the percentage that is done by consultant engineering firms?

Level of Work (FY02-06) Consultant vs. Mn/DOT

- *Trunk Highway (TH) Bridges*
 - *50% Mn/DOT*
 - *30% Consultant*
 - *20% Design Build (DB) Consultant*
- *Design Build*
 - *All consultant designed*

Bridge Construction (FY02-06)

- *FY 2002 - \$129 million total*
 - *58% Mn/DOT*
 - *41% Consultant*
 - *1% Design Build (DB) Consultant*
- *FY 2003 - \$168 million total*
 - *22% Mn/DOT*
 - *60% Consultant*
 - *18% Design Build (DB) Consultant*
- *FY 2004 - \$65 million total*
 - *72% Mn/DOT*
 - *6% Consultant*
 - *22% Design Build (DB) Consultant*
- *FY 2005 - \$116 million total*
 - *65% Mn/DOT*
 - *11% Consultant*
 - *24% Design Build (DB) Consultant*
- *FY 2006 - \$64 million total*
 - *78% Mn/DOT*
 - *5% Consultant*
 - *17% Design Build (DB) Consultant*

7. Describe the structure of the Minnesota DOT? Is the bridge office centrally organized? How many district bridge offices are located in the state? Are consultant engineering bridge plans reviewed at the central office or district bridge office?

Bridge Office within Mn/DOT Structure

- *Bridge Office is centrally organized including:*
 - *Design and review*
 - *Consultant Project Management*
 - *Office Organizational Chart (see Attachment H)*

- *There are 8 district offices (including the Metro Office)*

- *Consultant engineering bridge plans are reviewed at the central office*

State of Minnesota
CLASSIFICATION QUESTIONNAIRE

Attachment A

1. Name [REDACTED]
Last First Middle
2. Place of Work or Headquarters State Highway Building
Give Exact Location
3. Department Highway
4. Division, Section or Other Unit of Dept. Bridge
5. Payroll Title of Position Graduate Engineer
6. Usual or Working Title of Position Graduate Engineer
7. Regular daily hours of work: From 8:00 to 4:30 Hours per week 40 Days off Sat. & Sun.
8. If your job is part time, seasonal, intermittent, for a limited term, or otherwise broken, please explain _____

9. Describe below in detail the work you do. Use your own words, and make your description so clear that anyone reading it can understand exactly what you do. Either by using hours, days, fractions, or percentages show how your whole working time is used. If you are temporarily filling a position other than your regular one, indicate your present work and also your regular work. Fill in and attach additional sheets if necessary to record all duties performed.

TIME	WORK
100%	<p>To review the preliminary bridge plans which have been prepared by Consulting Engineers for the purpose of ensuring that the plans conform to M.H.D. and AASHTO Specifications.</p>
	<p>The preliminary bridge plan and preliminary report is made for the purpose of determining the geometries, design and architectural features, all critical dimensions, and general layout of the bridge. The primary purposes served by the preliminary review are as follows:</p>
	<p>1. Economic study of various types of bridge construction.</p>
	<p>2. The geometric study to show the actual adoption of the bridge to the bridge site.</p>
	<p>3. Aesthetic considerations.</p>
	<p>4. Determination of materials to be used in the structure.</p>
HOW IS	<p>5. Analysis of soil conditions involved at the bridge site to determine proper footing and pile requirements.</p>
	<p>6. Consideration of actual design requirements.</p>

The details of this work involve checking alignment from available surveying data. Horizontal and vertical clearances are checked against standard specifications. Stations and elevations on the plan are recalculated to check for errors in the Consultants computations. Any irregularities of design, layout, or standard details, and errors in computations are noted on the plan.

11. List any equipment operated or used by you in doing your work Calculator, slide rule.
12. Describe fully in what detail your assignments are made to you stating what form (such as - penciled lay-out, rough-draft, etc.) your work is in when it comes to you, what decisions have already been made for you, what decisions are left to you Prepared preliminary plans and oral instructions.
13. Summarize your work as you understand it To review Consultant's preliminary plans by checking for mathematical errors, and to make corrections on details that do not conform to MID Standards or generally accepted practice.

14. Who checks or reviews your work? [Redacted]

How is the review made? Visual check.

15. Give the names and titles of employees under your supervision. If you supervise an entire unit, simply give the name of such unit and the number of employees supervised None

I certify that I have read the instructions, that the entries made above are my own and to the best of my knowledge are accurate and complete.

Date February 24, 1960

Signed [Redacted]

Employee

PART II. TO BE FILLED IN BY IMMEDIATE SUPERIOR

16. Are the above statements of the employee accurate and complete? (Indicate any inaccuracies or incomplete items)

Yes.

17. Summarize your idea of the work and responsibilities of the position, and the supervision and guidance you provide to this employee. The accurate checking and analysis of preliminary bridge plans is very essential to the overall bridge program. The position requires a high degree of responsibility. General supervision is given but the required accuracy of the final plans and the fact that in the preliminary stage the work is not routine demands a competent person in this position.

18. If the position requires any typing or stenography (taking and transcribing dictation) fill out the following:
 Typing is essential (), incidental () to the work and requires _____ % of the employee's time.
 Stenography is essential (), incidental () to the work and requires _____ % of the employee's time.

Date February 24, 1960

Signed [Redacted]

Certification of Immediate Superior

(TO BE FILLED OUT BY DEPARTMENT HEAD)

19. Comment on the above statements of the employee and the supervisor. Indicate any inaccuracies _____

Date 2-25-60

Signed [Redacted]

Certification of Department Head

section # 9

Description of Work:

Time

Work

To review the preliminary bridge plans which have been prepared by consulting engineers for the purpose of ensuring that the plans conform to MHD and AASHTO specifications.

The preliminary bridge plan and preliminary report is made for the purpose of determining the geometrics, design and architectural features, all critical dimensions, and general layout of the bridge. The primary purposes served by the preliminary review are as follows:

1. Economic study of various types of bridge construction.
2. The geometric study to show the actual adaptation of the bridge to the bridge site.
3. Aesthetic considerations.
4. Determination of materials to be used in the structure.
5. Analysis of soil conditions involved at the bridge site to determine proper footing and pile requirements.
6. Consideration of actual design requirements.

The details of this work involve checking alignment lines available surveying data. Horizontal and vertical clearances are checked against standard specifications. Stations and elevations on the plan are recalculated to check for errors in the consultants' computations. Any irregularities of design, layout, or standard details, and errors in computations are noted on the plan.

Classification Questionnaire (Page 2)

Equipment used: Calculator, slide rule;

Prepared preliminary plans and oral instructions

Summary of work: To review consultant's preliminary plans by checking for mathematical errors, and to make corrections on details that do not conform to MHD standards or generally accepted practice.

Who checks or reviews your work? [REDACTED]

How is the review made? Visual Check

None

Date: Feb. 24, 1960

16. yes

7. The accurate checking and analysis of preliminary bridge plans is very essential to the overall bridge program. The position requires a high degree of responsibility. General supervision is given but the required accuracy of the final plans and ~~Date:~~ the fact that in the preliminary stage the work is not routine demands a competent person in this position.

Attachment B

Distribution: B

MINNESOTA HIGHWAY DEPARTMENT Developed by: Bridge Division and Standards Issued by: Office of Engineering Standards	TRANSMITTAL LETTER NO. 5-392 (72-1) MANUAL: Bridge Design DATED: April 12, 1972
SUBJECT: Bridge Design Manual	

This manual will supplement the design criteria in the AASHO Standard Specifications for Highway Bridges by providing guideline information on MHD design practices and procedures. This information concerns plan checking and reviewing, standard plan notes and details, available bridge charts and computer program capabilities, and other standard procedures.

Completed sections of the manual are included in this initial issue. As succeeding sections are completed they will be forwarded to you.

K. V. Benthin
Bridge Standards Engineer

Deck area shall be computed transversely edge to edge of slab and longitudinally end to end of slab, to the nearest sq. ft.

Include all standard B details and plan sheets required. If standards are changed note "modified" under B Detail or Figure Number.

Check for lighting. Check which anchorage is required.
Check for utilities.
Check project no.

Label layout lines and working points and tie piles to the working points in footing plans of all substructure units. See Layout guide sheet in Design Aid Section.

Label centerline of fascia beams or girders on staking plan.

Place control point at intersection of survey line and centerline of cross road, track, etc.

Where the distance from edge of outside traffic lane to gutter line is 6 ft. or less continue the slope of the outside lane to the gutter line, otherwise change the slope, unless superelevated.

O. ESTHETICS

The type of rustication should conform to the rustication used on adjacent retaining walls. Check with road plans for the type of rustication being used in the area.

High abutment and retaining walls should be rusticated.

One type of rustication consists of horizontal grooves spaced at 4' and vertical grooves spaced at 6' to 8'. Do not stagger vertical grooves. Horizontal grooves should be level, and lined up with grooves on adjacent retaining walls. The copings should line up with the coping and bottom of slab on the superstructure. This type of rustication is awkward to line up with adjacent abutments at different elevations. It is suitable for isolated bridge with U type abutments.

Another type of rustication consists of vertical grooves several feet apart. Boardmark finish or straited plywood may be used for texture. Coping is not necessary. This rustication is suitable for walls with a sharply sloping top.

Size of pier columns should be proportional to depth of beams.

Avoid excessively deep or wide pier caps. Except for slight slopes, bottom of cap preferably should be parallel to top, with level pads or steps for beams. Cantilever ends should taper about 1/3 the depth of cap. Ends of caps to be rounded when round columns are used.

For bridges over wilderness streams or scenic parkways, dark green paint is more appropriate than aluminum.

Bottom of pier caps should be sloped, if necessary to make depth at both ends approximately the same. If top of cap is sloped between bearings, the level area under bearings should be set back from edge of cap.

P. CHECKING CONSULTANT PLANS

Consultant prepared plans are to be reviewed and checked for the following major items to insure adequate layout control and coordination with roadway plans.

1. Control Points - Horizontal control dimensions and vertical control elevations and dimensions are to be checked for correct alignment and grade. The horizontal and vertical clearances are to be checked for compliance with all clearance requirements of M.H.D., railroad or others. Cross check elevations and stations of each substructure unit with those on staking plan.

2. Strength - The following should be reviewed for adequacy in design and conformance with M.H.D. requirements and standards.

a. Railing - Conformance with standard and proper post spacing.

b. Slab - Conformance with M.H.D. slab tables.

c. Beams or Girders - Design check for strength, shear connector spacing, and diaphragm spacing.

d. Bearings - Check selection for proper sizes.

e. Piers and Abutments - Design check for strength. Geometric check.

f. Piling - Review for type, length, and loading.

g. Railroad underpasses will not be checked for strength.

3. Miscellaneous

a. Locate floor drains, when used; to avoid endangering traffic below.

b. Checking of individual sheet quantities in bridge plan will not be required. Check that consultant has made 2 independent computations for each quantity, and that the results agree with that shown in the plans.

c. Check the addition of each sheet's quantities with those of the summary of quantities.

d. Check notes and pay items for conformance with M.H.D. specifications and practices.

Vertical text on the right side, possibly a list or index, including words like "Section", "Page", and "Number".

Section 1

Section 1.1
Section 1.2
Section 1.3

Section 2

Section 2.1
Section 2.2
Section 2.3
Section 2.4
Section 2.5

Section 3

Section 3.1
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Section 3.4

Section 3.5
Section 3.6
Section 3.7
Section 3.8

Section 4

Section 5

Section 5.1
Section 5.2
Section 5.3

Section 6
Section 7

MINNESOTA HIGHWAY DEPARTMENT

*Final Copy
As Executed*
AGREEMENT NO.
53433

DEPT. IDENT.	ITEM	ALLOT.	QTR.	FUND	AMOUNT ENCUMB.
70500	06	572	6(63)	270	\$ <u>154,500.00</u>

EST. AM'T. RECEIVABLE

S.P. No. 2783-9340

\$ None

Agreement between the
State of Minnesota,
Department of Highways, and
Sverdrup & Parcel and Associates, Inc.
Consulting Engineers
For T.H. 35W Bridge (No. 9340) over
Mississippi River in Minneapolis

AGREEMENT FOR
ENGINEERING SERVICES

THIS AGREEMENT made and entered into by and between the State of Minnesota, Department of Highways, hereinafter referred to as the "State", and Sverdrup & Parcel and Associates, Inc., a firm of registered professional engineers, having its principal place of business at 915 Olive Street, St. Louis, Missouri, hereinafter referred to as the "Consultant",

WITNESSETH:

WHEREAS the State proposes to construct as part of Trunk Highway No. 35W in Minneapolis a bridge over the tracks of the Chicago, Great Western Railway Company, the tracks of the Chicago and Northwestern Railway Company, the Mississippi River, the tracks of the Great Northern Railway Company and over Second Avenue S.E. (upstream from the present "Tenth Avenue" Bridge), said bridge to be approximately 1917 feet in length, and

WHEREAS the State desires to have complete construction contract plans prepared for said bridge which is hereinafter referred to as the "Bridge Project", and



1006-B ✓

WHEREAS by virtue of Laws of Minnesota, 1961, Chapter 71, the Commissioner of Highways is authorized to employ and engage the services of registered professional engineers to act as consultants in connection with, and to make surveys and to prepare plans and specifications themselves or by their organization and employees for the construction of Trunk Highways, and the Commissioner of Highways is authorized to negotiate for and agree upon the terms and compensation for such employment and services, and

WHEREAS said "Bridge Project", designated as State Project No. 2783, Bridge No. 9340, and as U. S. Bureau of Public Roads project No. Minn. I 35W-3 (47) 112, is a part of the National System of Interstate and Defense Highways it is contemplated that the cost of engineering services to be performed in the design and preparation of said bridge construction plans will be financed in part with Federal Funds.

NOW, THEREFORE, IT IS MUTUALLY AGREED AS FOLLOWS:

Article I

Scope of the Work

The Consultant shall make the necessary preliminary studies and designs, and prepare detailed designs and complete construction contract plans, estimates of construction quantities and costs, and special construction contract provisions or requirements for the aforesaid Bridge Project. The bridge will consist of two distinctly different types of structural spans, namely:

1. Two or more deck-trusses as the main supporting members for the river span and the spans adjacent to the river with cantilevers.
2. Steel girder spans composit with deck as the main supporting members for the remaining spans.

The Consultant shall use the data contained in the attached "Schedule A" designated as "Preliminary Design and Survey Data" as a basis for designing the bridge.

The State will make application to the United States Army Corps of Engineers for permission to construct that portion of the Bridge Project which will span the Mississippi River. Final plans for said river crossing shall not be started until permission for said structure with approved clearances has been received by the State from said Corps of Engineers and the Consultant is advised of such permission.

Article II

Regarding Surveys

Section 1. State Surveys

The State will make a complete field survey for the Bridge Project, and will furnish to the Consultant all survey data obtained by it and listed and identified in the attached "Schedule A" designated as "Preliminary Design and Survey Data".

Section 2. Consultant's Responsibility.

It will be the responsibility of the Consultant to make his own analysis and evaluation of these data in the preparation of plans. The Consultant shall request the State to furnish him any additional survey data that he may require. (The State will evaluate the Consultant's request and furnish such additional survey data it deems necessary.)

The Consultant shall plot the structure on the final survey sheets and make any minor revisions or additions that may be necessary to the final completed survey sheets.

Article III

Regarding Preliminary Studies

Section 1. State Preliminary Layout.

The State has made preliminary layout studies of the Bridge Project and will furnish the Consultant the results thereof in the form of prints listed and identified in the aforesaid "Schedule A" attached hereto.

Section 2. Consultant's Responsibility.

(a) It will be the responsibility of the Consultant to make his own analysis and evaluation of the State's preliminary studies as a basis for the preparation of final bridge plans.

(b) Preliminary studies to be submitted by the Consultant shall include drawings or sketches showing all the pertinent information that may affect the determination of locations and types of substructure and superstructure units. They shall consist of plan, elevations and cross sections. The preliminary engineering shall include studies and reports to show the most feasible and advantageous arrangement of both the truss and girder spans. The girder spans shall show the number of girders (4 or more) in cross section and the methods proposed to obtain the best results. The truss spans shall have sufficient detail to permit thorough review and analysis. The use of steels of various strengths shall be investigated to determine advisability for use either in whole or in part for stress carrying members. These preliminary studies are to be accompanied by a narrative report and cost estimate based on unit prices and estimated quantities. The narrative report must present a discussion as to the reasons for basic selections of recommended types. The Consultant shall furnish to the State four copies and one paper transparency of the preliminary studies for review by the State. If the State determines that revisions of preliminary data is necessary, the Consultant shall furnish an equal number of revised copies. No work on final design shall be started until the Consultant has received written notice from the State that the selected type of bridge layout or layouts have been approved by the State and the Bureau of Public Roads. The purpose of the preliminary plans is to give the Consultant the basis for preparing the final plans. The State may require the Consultant to furnish additional preliminary design plans at no additional cost to the State, if the plans submitted are inadequate or found to be unacceptable by the State or the Bureau of Public Roads.

Article IVRegarding General Plan

After approval of the Consultant's preliminary study by the State in writing, the Consultant shall prepare a portion of the "General Plan and Elevation" sheet which is to be included in the final plans for the Bridge Project. This sheet shall be completed only to the extent necessary to show general dimensions, elevations, architectural features and basic design data to be used in the preparation of final plans. Four copies and a paper transparency of the plan sheets referred to in this paragraph and the completed survey sheets shall be submitted to the State for review and approval of the principal features of architecture, geometrics and basic design. Because of the length and type of structure the State will require the Consultant to prepare the plans for stage construction. The State will determine the extent of each construction stage and will so notify the Consultant.

Article VPreparation of Detailed Design and
Construction Contract PlansSection 1. Design Standards.

(a) The Consultant shall prepare a complete set of final plans in accordance with the approved work performed under Articles III and IV of this agreement and any subsequent instructions given by the State to the Consultant. Unless such instructions involve a substantial change in the bridge plans requiring the Consultant to do extra work not previously contemplated by the parties, the Consultant shall not receive additional compensation for completing the plans pursuant to the directions of the State.

(b) The Bridge Project shall be designed to standards which conform to "Geometric Design Standards for the National System of Interstate and Defense Highways" adopted July 12, 1956 by the American Association of State Highway Officials and approved by the United States Bureau of Public Roads on July 17, 1956 as provided by Title 23, United States Code, section 109 (b). These standards shall be considered as minimum standards. Higher standards shall be used

where it is feasible and economically sound to do so. All work to be performed by the Consultant shall be done in accordance with the requirements and recommendations of and subject to the approval of the State and the Bureau of Public Roads.

(c) Division II (Construction Details) of the Minnesota Department of Highways "Specifications for Highway Construction" dated May 1, 1959, and supplements thereto on file in the office of the Commissioner of Highways at St. Paul, Minnesota, and which are made a part hereof by reference with the same force and effect as though fully set forth herein shall be incorporated in all plans prepared by the Consultant. Where applicable design details shall conform to the Minnesota Department of Highways' current edition of Standard Detail Plates, supplements thereto and modifications thereto in the form of Design Memoranda issued from time to time by the Minnesota Department of Highways.

(d) The State will furnish the Consultant with the final survey sheets referred to in Article II, prints of certain standard plan details that may be used by the Consultant, and available prints of State plans of other bridge projects that may be considered useful to the Consultant.

(e) The Bridge Project shall be designed in accordance with the principles set forth in "A Policy and Geometric Design of Arterial Highways in Urban Areas of the American Association of State Highway Officials" edition of 1957 or subsequent revisions, on file in the office of the Commissioner of Highways at St. Paul, Minnesota, and which are made a part hereof by reference with the same force and effect as though fully set forth herein to the extent that such principles are applicable and not in conflict with specific instructions or other requirements of the State.

(f) The Bridge Project shall be designed to provide for E20-S16 loading as defined by the American Association of State Highway Officials' design standards

as modified by Section 4c of the Bureau of Public Roads' Policy and Procedure Memorandum 20-4.

(g) For continuous type bridge spans the Consultant shall also furnish to the State the Moment Influence Line diagrams, together with the bridge rating computed in accordance with the requirements of American Association of State Highway Officials' Specifications. This data shall be inked on tracing cloth in approved form on sheets 11-inches high insofar as practicable.

Section 2. Bridge Lighting.

The Consultant shall as part of the construction plans for the Bridge Project make provisions for bridge roadway lighting and navigation lighting facilities with the systems ending at a junction box at each end of the bridge.

Section 3. Drainage.

The Consultant shall design all drainage facilities required for draining the Bridge Project.

Section 4. Form of Plans.

(a) Bridge plans shall be drawn to conventional scales on 23-inch x 37-inch sheets having an outside border line 22-inch x 36-inch and an inside border line of 21-inch x 33 $\frac{1}{2}$ -inch with a 2-inch margin between border lines at the left-hand side of the sheet. The final plans shall include complete reinforcing bar bending details and bar lists, as well as tabulations of quantities of items of construction work. The concrete shall be computed for each individual pour between construction joints and the Consultant shall furnish to the State four letter size copies of a tabulation listing the checked quantity of concrete in each pour computed to the nearest one-tenth (0.1) of a cubic yard. The quantities of concrete shown in the plans for the superstructure and each sub-structure unit shall be the summation of all pours for each concrete mix. All

drafting and lettering on construction plans shall be of a size and weight suitable for photographic reduction to one-half scale. Final plans shall include the survey sheets which shall contain a pencil sketch of the layout of the selected structure.

(b) Final plan sheets shall be drawn with India Ink on best grade of tracing cloth, or they shall be positive reproductions on one of the following materials:

1. Blue colored photographic process cloth.
2. Blue colored "wash off" process cloth.
3. Black line photographic process on polyester film base, 0.003 thickness and matte finish on the front or working surface.

(c) All final plan sheets shall be of such quality as will permit reducing to one-half scale and the making of first class blue line or black line prints from the reductions.

Section 5. Cost Estimate.

The Consultant shall furnish a complete construction cost estimate of the Bridge Project based on final plan quantities.

Section 6. Special Requirements.

The Consultant shall furnish a written report outlining any special requirements regarding construction which are not covered in the plans, or in said Highway Specifications, and which should be included in the Special Provisions for the construction of the Bridge Project.

Section 7. Conferences.

The Consultant shall confer with the officials of the Minnesota Department of Highways and the Bureau of Public Roads as often as is necessary in regard to design and other features and perform the travel necessary for such

conferences. When requested by the State, the Consultant shall also assist the State in negotiations with Railroad Companies and other interested parties. The Consultant shall not receive any additional compensation for participation in such conferences and negotiations.

Section 8. Progress Reports.

The Consultant shall submit to the State monthly reports in duplicate showing the progress of the preparation of detailed designs and construction plans based on percentage of completion of said detailed designs and construction plans. Sample forms will be furnished by the State upon request.

Section 9. Furnishing Advance Prints.

(a) The Consultant shall from time to time during the progress of the work prepare and present such information and studies as may be pertinent and necessary or as may be requested by the State to enable the State to pass critical judgment on the features of the work. The Consultant shall make such changes, amendments, or revisions in the detail of the plans as may be required by the State.

(b) At the request of the State, the Consultant shall during the progress of the work furnish the State such portions of plans, or other information or data in such detail as may be required, to enable the State to carry out or to proceed with related phases of the Bridge Project not covered by the agreement, or which may be necessary to enable the State to furnish information to the Consultant upon which to proceed with the further work.

(c) During the progress of preparing plans the Consultant shall furnish the State the best available information as to the probable effect of the proposed construction upon any public utility facility, railroads or buildings. Information may be submitted in letter or plan form as requested by the State. Any request

for information from the owners of any public utility facility or railroad or building shall be referred to the State.

Section 10. Checking Prints.

When detail plans have been completed and checked by the Consultant, he shall furnish to the State one set of paper transparencies of the final plans and four copies of the special construction requirements and of a complete estimated construction cost analysis of the Bridge Project, plus an equal number of revised copies if the State's review discloses that revisions are necessary. The Consultant shall also furnish to the State two copies of checked design computations and quantity computation (except four copies as noted in (a) of Section 4 for concrete quantities) and computations for moment influence line diagrams for all parts of the entire structure. Computations shall be submitted on $8\frac{1}{2}$ " x 11" sheets insofar as practicable.

Section 11. Approval of Plans.

(a) Approval and acceptance of the plans will be based on the review of the completed plans in their final form.

(b) When required to do so by the State, the Consultant shall make at no additional cost to the State such revisions in plans which have been approved and accepted by the State as are necessary to correct errors in the plans.

Section 12. Checking of Shop Drawings.

The services to be furnished by the Consultant hereunder do not include the checking of any shop detail drawings for the fabrication of structural metals.

Section 13. Revision of Plans.

(a) If the State orders alterations or revisions without a written request for an adjustment in fee, or, if the Consultant fails to submit a written request for an adjustment in fee within five days after being notified

of such alterations or revisions, it will be understood that the parties mutually agree that all work shall be completed in accordance with such alterations or revisions without any adjustment in the fee provided for herein.

(b) Should the State find it desirable for its own purposes to have previously satisfactorily completed and approved Plans or parts thereof revised, the Consultant shall make such revisions if requested and as directed by the State and such revisions shall be deemed extra work for which a supplement to this agreement will be executed.

Section 14. Utilities.

(a) When designs have reached the stage of progress that the effect of the Bridge Project on existing utilities can be determined, the Consultant shall furnish the State one transparency and two prints of plan and cross section sheets showing the existing utilities and his recommendations for such protection and relocations as may be necessary. The State will thereupon contact the owners and operators of all such utilities and determine whether or not the rearrangement or protection of the utility is to be performed by the owner thereof. The final locations of such utilities will be determined by the State and such information will be furnished to the Consultant who shall show said new locations on the final construction plans. The plans for the bridge shall provide for steel supports for utilities that are to be placed on the bridge.

(b) For those utilities which are to remain within the area affected by the proposed construction, the present, temporary and the future locations and elevations shall be shown in the plans. For those utilities which are to be permanently removed from the proposed construction area, the present (and temporary, if any) locations and elevations shall be shown, and the removal thereof shall be indicated by notes in the plans.

Article VIRegarding Payment to the Consultant
For Services PerformedSection 1. Amount of Payment.

The State shall pay the Consultant, and the Consultant agrees to accept, as compensation in full for the services to be done and performed hereunder the sum of One Hundred Fifty-four Thousand, Five Hundred Dollars (\$154,500.00).

Section 2. Invoices - Partial Payments

The Consultant may submit invoices to the State, not oftener than once each month during the progress of the work for partial payment on account, for the work completed to-date. Such invoices shall represent the value to the State of the partially completed work based on the proportion which its percentage of completion bears to the total value or total estimated value of the fully completed plans. Such invoices will be checked by the State and payments will be made in an amount of 90 percent of such amount thereof as has been found to reasonably represent the value to the State of the partially completed work, less any amounts previously paid on account.

Section 3. Reports.

(a) The Consultant shall submit monthly accomplishment reports to the State. The form for the report will be a standard one prescribed by the State, which will be the bar graph - progress curve type using weighted averages, a sample of which will be furnished to the Consultant by the State. The listing of accomplishment will be made by the State on the sample form, but the Consultant shall assign the cost percentages and have them approved by the State. The Consultant shall prepare and have available his own supply of such form.

(b) If requested by the State, the Consultant shall submit prints of partially completed plans to support this request for partial payments. The State will use these to determine the reasonable value to the State of the partially completed work and the amount of the partial payment.

Section 4. Final Payment.

Final Payment of any balance due the Consultant hereunder will be made promptly by the State after the completion of the work and its approval and acceptance by the State, and the receipt of the plans, notes, reports and other related documents which are required to be furnished.

Section 5. Material and Data furnished by the State.

It is understood that the material and data to be furnished to the Consultant by the State hereunder have been evaluated by the parties to this agreement and that their value has been taken into consideration in the determination of the fees to be paid to the Consultant.

Section 6. Extra Work.

(a) It is distinctly understood and agreed that no claim for extra work done or materials furnished by the Consultant will be allowed by the State unless such additional work is ordered by the State and a supplement to this agreement is first entered into setting forth the nature and the scope thereof and the compensation if any to be paid by the State to the Consultant for such additional work.

(b) Any such work or materials which may be done or furnished by the Consultant without such supplemental agreement shall be at his own risk, cost and expense, and he hereby agrees that without such supplemental agreement he will make no claim for compensation for work or materials so done or furnished.

Section 7. Disputes.

In any case where the Consultant believes extra compensation is due him for work and services not clearly covered by this agreement or supplement thereto,

he shall notify the State in writing of his intention to make claim for such extra compensation before he begins the work on which he bases his claim. If such notification is not given, no claim for such extra compensation will be considered. Such notice by the Consultant shall not in any way be construed as proving the validity of the claim. The claim must be passed upon by the State. If the claim qualifies as extra work within the preview of this agreement it shall be allowed and paid for as Extra Work in accordance with the terms of a supplemental agreement entered into before such work is started.

Section 8. Termination.

This Agreement may be terminated by the State at any time upon written notice to the Consultant. In the event that such termination should take place at any time other than at the completion of the work to be performed hereunder then, and in that event, the State will pay the Consultant the same percentage of the fee to be paid, therefor, as the completed work bears percentage-wise to the total work to be performed under this contract. The original copies of all drawings, prints, plans and field notes prepared by the Consultant prior to said termination shall become the property of the State. Such termination shall not affect any legal right of the State against the Consultant for any breach of this Agreement.

Article VII

Regarding Time Schedule

(a) The Consultant shall complete and deliver to the State the preliminary plans, study reports and preliminary cost estimates to be prepared by him under Article III of this agreement within 75 calendar days after execution of this agreement and receipt by him of written notice from the State to proceed with the work to be performed by him hereunder.

(b) The Consultant shall complete and deliver to the State the "General Plan and Elevation" sheet in accordance with Article IV of this agreement within 60 calendar days after receipt by him of written notice of approval by the State of his preliminary studies and plans.

(c) The Consultant shall complete and deliver to the State the final plans, special requirements and detail cost estimates to be prepared by him hereunder within 210 calendar days after receipt by him of written notice from the State to proceed with work on the final plans. It is understood that the time necessary for the State to review and approve the material furnished by the Consultant under Article IV will not be charged against said 210 calendar days.

(d) The State may extend the aforesaid time completion periods upon written request from the Consultant for delays encountered that are beyond his control. The amount of such time extension shall be determined by the Chief Engineer or the Deputy Chief Engineer of the Department of Highways who are authorized to grant such time extension by letter to the Consultant.

Article VIII

General Provisions

Section 1. Compliance with Laws.

The Consultant shall comply with all Federal, State and local laws, together with all ordinances and regulations applicable to the work. He shall procure all licenses, permits, or other rights necessary for the fulfillment of his obligation under this agreement.

Section 2. Claims.

(a) Any and all employees of the Consultant or other persons while engaged in the performance of any work or services required by the Consultant under the agreement shall not be considered employees of the State, and any and all claims that may or might arise under the Workmen's Compensation Act of

Minnesota on behalf of said employees or other persons while so engaged, and any and all claims made by any third party as a consequence of any act or omission on the part of the Consultant's employees or other persons while so engaged on any of the work or services to be rendered shall in no way be the obligation or responsibility of the State.

(b) The Consultant indemnifies, saves and holds harmless the State and any agents or employees thereof from any and all claims, demands, actions or causes of action of whatsoever nature or character arising out of or by reason of the execution or performance of the work of the Consultant provided for under this agreement.

Section 3. Contingent Fee.

The Consultant warrants that he has not employed or retained any Company or persons, other than a bona fide employee working solely for the Consultant, to solicit or secure this agreement, and that he has not paid or agreed to pay any Company or person, other than bona fide employees working solely for the Consultant, any fee, commission, percentage, brokerage fee, gifts, or any other consideration, contingent upon or resulting from the award or making of the agreement. For breach or violation of this warranty the State shall have the right to cancel the agreement and in the event of such cancellation, the State shall be relieved of any obligation to compensate the Consultant for work performed up to the time of such cancellation.

Section 4. Inspection.

Duly authorized representatives of the State and Bureau of Public Roads shall have the right to inspect the work of the Consultant whenever they deem it necessary.

Section 5. Subletting.

The services of the Consultant to be performed hereunder are personal and shall not be assigned, sublet or transferred unless written authority to do so is granted by the State and approved by the Bureau of Public Roads.

Section 6. Registration.

Plans prepared in accordance herewith shall be prepared by or under the direct supervision of a professional engineer registered in the State of Minnesota and said plans shall be certified by him as required by law.

Section 7. Use of Plans.

All plans survey notes and copies of design computations shall become the property of the State, who shall have the right to use any or all of said plans or designs for any public purpose.

Section 8. Insurance.

The Consultant shall furnish satisfactory evidence of insurance from loss by any means of all surveys notes and other data furnished to him by the State and of partially completed plans for which the State has made payment.

Section 9. Employees.

The Consultant shall not engage, on a full or part-time or other basis for work covered by the terms of this contract, any professional or technical personnel who are or have been at any time during the period of the contract in the employ of the State, except regularly retired employees, without written consent of the public employer of such person.

Article IXServices That May Be Furnished by the ConsultantAfter Completion and Acceptance of Plans

This agreement shall not be considered terminated upon completion and acceptance of the plans and specifications, or upon final payment therefor, but

shall be considered in full force and effect for the purpose of permitting the State to require the Consultant to:

1. Make such revisions in the plans as may be necessary after the starting of construction of the Project.
2. Furnish the State advice and consultation in the event that unforeseen or unusual conditions arise during construction. Payment by the State to the Consultant for services furnished by the Consultant after completion and acceptance of the plans will be made only upon execution of a supplemental agreement in writing setting forth the services to be furnished by the Consultant and any payment to be made therefor by the State.

Article X

Execution of Agreement

Before this agreement shall become binding and effective, it shall receive the approval of the Federal Bureau of Public Roads and of such State Officers as the law may provide in addition to the Commissioner of Highways.

IN WITNESS WHEREOF the parties hereof have duly executed this Agreement by their proper officers and representatives.

(Corporate Seal)

SVERDRUP, & PARCEL AND ASSOCIATES, INC.

By [Redacted] President

By [Redacted] Vice-President

DEPARTMENT OF HIGHWAYS

Recommended for Approval:

By [Redacted] Bridge Engineer

By [Redacted] Chief Engineer

STATE OF MINNESOTA:

By [Redacted] ASS'T Commissioner of Highways

Date 10/22/62
(Date of Agreement)

Approved:

Department of Administration

By [Redacted] Authorized Signature

Approved as to form and execution:

By [Redacted] Special Assistant Attorney General

50157-50000
HAS BEEN ENCUMBERED FOR THE OBLIGATION HEREOF AGAINST THE PREVIOUSLY UNENCUMBERED BALANCES OF THE PROPER APPROPRIATION AND ALLOTMENT.
OCT 24 1962
STAFFORD MISS. State Auditor
By [Redacted] Authorized Signature

[Redacted]

Agreement No. 53433

Schedule A
For Bridge No. 9340

PRELIMINARY DESIGN AND SURVEY DATA

Alignment of Bridge No. 9340 - as shown in preliminary layout sketch dated 10-3-62
Net span length - Bridge No. 9340 - approximately 1917 feet (See Item 1 below.)

Width of roadway on bridge: Two - 52 foot roadways, 4 foot center island (Roadways
curbs flared by ramps at north end.)

Number and width of ~~sidewalks~~: Two - 1.5 foot curbs

Alignment of piers and abutments to centerline of roadway: Square or skewed as
necessary to fit various in-place facilities.

Data to be Furnished to Consultant:

1. Preliminary layout sketch approved on October 3, 1962 showing general plan and elevation for Bridge No. 9340 and transverse profile of finished floor surface.
2. Nine bridge survey sheets for Bridge No. 9340 showing plat, profiles, typical cross-sections of T.H. 35W-394.
3. Three sheets of in-place utilities.
4. Split tube soil sample records will be furnished by the State.
5. Standard sheets to be furnished to the Consultant:

Standard Railing Sheet
Standard Miscellaneous Detail Sheets

Agreement No. 53433

Schedule A
For Bridge No. 9340

Mn/DOT Office of Technical Support—Consultant Services
Work Type Definition
 Rev. 1 (3/26/03)

Work Type Name	3.1 Bridge Design
<i>Work Type Owner</i>	Office of Bridges & Structures (Bob Miller)
<i>Work Type Input</i>	Inputs may include some or all of the following: <ul style="list-style-type: none"> • Approved bridge preliminary plan; • Foundation geotechnical report; • Bridge Survey; • Geometric layouts; • Road plans. • Hydraulic Reports
<i>Work Type Definition</i>	<p><i>Bridge preliminary design</i> involves preparing a preliminary plan upon which final design can be based and may include surveys, foundation report, horizontal and vertical controls, and structure type.</p> <p><i>Bridge final design</i> involves production and/or review of professionally engineered bridge plans which conform with acceptable design standards and which meet the specific requirements of Mn/DOT, American Association of State Highway & Transportation Officials (AASHTO), and/or the Federal Highway Administration (FHA).</p> <p><i>Bridge study</i> involves report preparation of specific bridge related issues.</p>
<i>Work Type Output</i>	Bridge construction plans and documents.
<i>Specific Examples of Output</i>	<ul style="list-style-type: none"> • Certified final bridge construction plans, including non-standard special provisions, 100% complete and ready for construction contract bidding, that meet all project specific requirements. • Final reports, which may require certification, that meet all project specific requirements. • Bridge preliminary plans, 100% complete, as the basis for final bridge plan design and preparation. • All design services, a set of computations and electronic design files in a format compatible with Mn/DOT's Microstation (latest version). • Cost estimates and construction documents, including special provisions.
<i>Quality Attributes of Output</i>	Consultant to check/verify bridge plans in conformance with Mn/DOT Bridge Design Manual and their documented QA/QC Plan. In some cases this requires a complete, independent analysis. Consultant's QA/QC plan must address their methods of verifying their work, including review submittals, comments from previous submittals, and final deliverables.

Mn/DOT Office of Technical Support—Consultant Services

Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design (cont.)				
Work Type Name	Levels of Work Type Output (Compare & Contrast)			
	<i>Level 1 Average Bridge Design</i>	<i>Level 2 Complex Bridge Design</i>	<i>Level 3 Specialty Bridge Design</i>	
	<ol style="list-style-type: none"> 1. Bridges with multiple spans and some aesthetic treatments. 2. Structural steel beam bridges with moderate skew. 3. Pre-stressed concrete beam bridges with moderate to high skew. 4. Substructures supported on pile or spread footings. 5. High or low parapet type abutments. 6. Long wingwalls supported on footings. 7. Includes designs for both new construction and bridge renovation. 8. Moderate staging may be required. 9. May include preliminary and final design services. 10. May include attached cantilever retaining walls. 	<ol style="list-style-type: none"> 1. Curved structural steel girder bridges. 2. Straight structural steel girder bridges with skews greater than 20 degrees. 3. Post tensioned concrete box girders supported on falsework during construction. 4. Rigid Frames with balanced lateral loads and/or moderate skew. 5. Bridges with extensive aesthetic treatments or complex geometry. 6. River crossings. 7. Railroad bridges. 8. Includes designs for both new construction and bridge renovation. 9. Significant staging may be required. 10. May include special provisions. 11. May include preliminary and final design services. 12. May include attached cantilever retaining walls or earthen walls 	<ol style="list-style-type: none"> 1. Segmental post tensioned concrete box girder bridges. 2. Steel box girder bridges. 3. Truss bridges. Concrete or steel arch bridges. 4. Major river crossings with unique geotechnical conditions. 5. Rigid Frames with unbalanced lateral loads and/or high skew. 6. Includes designs for both new construction and bridge renovation. 7. Includes development of construction specifications. 8. May include preliminary and final design services. 9. May include attached cantilever retaining walls or earthen walls. 	<p><i>Level 4 Bridges & Structure Studies</i></p> <ol style="list-style-type: none"> 1. This work involves evaluation of new or in place structures (includes bridges, retaining walls, earthen walls, culverts, other miscellaneous structures) and the preparation of studies & reports relating to the structures' design, construction, and/or maintenance issues. 2. Studies include but are not necessarily limited to: <ul style="list-style-type: none"> • Field investigations; • Structural, mechanical, electrical analysis; • Bridge ratings • Repair cost estimates; • Bridge life expectancy estimates; • Development of design and construction specifications for non-standard projects.

Mn/DOT Office of Technical Support—Consultant Services Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design Minimum Technical Qualifications	
<i>Requirements of the Professional Staff</i>	
<i>Minimum Number of Staff</i>	<ul style="list-style-type: none"> • At least two professionals are required <i>at the local office</i> for Level 1 and Level 2 Projects. One of the professionals is required to perform independent checks of data, calculations and reports of the other. • At least two professionals are required for Level 3 and Level 4 Projects. One of the professionals is required to perform independent checks of data, calculations and reports of the other. • Number of professional and technical support personnel must be recorded and updated.
<i>Professional Certification/Licensure</i>	<ul style="list-style-type: none"> • The qualified engineering personnel shall have engineering training, experience, knowledge, and expertise in the appropriate areas necessary to do the project in accordance with AASHTO, FHWA, Mn/DOT, and all other applicable design policies, procedures, practices and standards. • At least one of the engineers shall be a Minnesota Board Registered Professional Civil Engineer as specified under <i>Minimum Number of Staff</i>.

Mn/DOT Office of Technical Support—Consultant Services

Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design Minimum Technical Qualifications

Requirements of the Professional Staff (cont.)

- Level 1
 - Satisfactory experience must be demonstrated on at least two certified bridge plans of at least Level 1 complexity in the last ten years (*these projects may be from Minnesota or other states*); *and*
 - Satisfactory experience on at least three certified bridge plans in the last ten years of *any complexity* (e.g., Simple*, Level 1, Level 2, or Level 3) on the Minnesota State Highway System or Minnesota's County or Municipal Highway Systems. The purpose of this qualification is to demonstrate an understanding of Mn/DOT policies in assembling bridge plans; *and*
 - Staff of local office must be capable of total completion of project.

- Level 2
 - Satisfactory experience must be demonstrated on at least two certified bridge plans of at least Level 2 complexity in the last ten years (*these projects may be from Minnesota or other states*); *and*
 - Satisfactory experience on at least three certified bridge plans in the last ten years of *any complexity* (e.g., Simple*, Level 1, Level 2, or Level 3) on the Minnesota State Highway System or Minnesota's County or Municipal Highway Systems. The purpose of this qualification is to demonstrate an understanding of Mn/DOT policies in assembling bridge plans; *and*
 - Staff of local office must be capable of total completion of project

Note: A professional qualification of Level 2 includes automatic qualification for Level 1 and Level 4.

(*Note: Simple projects are less complex than Level 1 and not included for pre-qualification but may be used for this criteria);

Mn/DOT Office of Technical Support—Consultant Services Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design Minimum Technical Qualifications	
<i>Requirements of the Professional Staff (cont.)</i>	
<i>Qualifying Experience</i>	<ul style="list-style-type: none"> • Level 3 <ul style="list-style-type: none"> ○ Satisfactory experience must be demonstrated on at least two Level 3 projects in the last ten years (<i>these projects may be from Minnesota or other states</i>); and ○ Staff from firm's out-of-state offices with project specific expertise may provide the majority of services; however, <i>local office must be capable of providing project management as a minimum.</i> <p><i>Note: A professional qualification of Level 3 includes automatic qualification for Level 4.</i> <i>Note: Professional qualifications of Level 3 will be qualified for Levels 1 and/or 2 if they are staffed locally to do the work and meet all other pre-qualification criteria.</i></p> <ul style="list-style-type: none"> • Level 4 <ul style="list-style-type: none"> ○ Satisfactory experience must be demonstrated on at least two Level 4 projects in the last ten years; and ○ Staff from firm's out-of-state offices with project specific expertise may provide the majority of services; however, <i>local office must be capable of providing project management as a minimum.</i> <p><i>Note: Professional qualifications of Level 4 will be qualified for Levels 1 and/or 2 if they are staffed locally to do the work and meet all other pre-qualification criteria.</i></p>

Mn/DOT Office of Technical Support—Consultant Services

Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design Minimum Technical Qualifications	
<i>Requirements of the Firm</i>	<ul style="list-style-type: none"> • Level 1 and 2: Firm must have a local Minnesota office capable of total completion of project that meets Mn/DOT's schedules. • Level 3 and 4: Out-of-state personnel may substantially complete the project; however, the firm must have a local Minnesota office capable of project management as a minimum extent of participation. • Firm must be capable of delivering bridge plans in Microstation (current Mn/DOT version) and special provisions and reports in Microsoft Word (current Mn/DOT version). <p>Level 1</p> <ul style="list-style-type: none"> • Firms qualifying for Levels 1 must utilize Prestress Girder, Steel Beam, Slab Span, and Pier Design programs. <p>Level 2</p> <ul style="list-style-type: none"> • Firms qualifying for Level 2 must utilize Prestress Girder, Steel Beam, Slab Span, Pier Design and Curved Steel Girder programs. <p>Levels 3 and 4</p> <ul style="list-style-type: none"> • Firms qualifying for Levels 3 and 4 must list all programs specific to the work type they are applying. <p>Levels 1, 2, 3 and 4</p> <ul style="list-style-type: none"> • Firm's Quality Assurance Plan must certify that they independently validate the accuracy of their bridge analysis and design software programs and program updates. The QA Plan must provide the methodology for the independent validation. The QA Plan must identify the person/position responsible for program updates and validation. • Firm's QA Plan must certify their methodology for checking/verifying the accuracy of their work (i.e. designs, drawings, report preparation). • <i>Note: Mn/DOT currently follows Load Factor Design (LFD) criteria for bridge designs. Load Resistance Design Factor (LRFD) will be adopted in Calendar Year 2003. All LRFD software must also be validated against design examples illustrated in Mn/DOT's LRFD Manual. The Manual will be made available prior to adoption of LRFD criteria.</i>
<i>Past Record & Experience of Firm</i>	

Mn/DOT Office of Technical Support—Consultant Services

Work Type Definition

Rev. 1 (3/26/03)

3.1 Bridge Design Minimum Technical Qualifications	
Submittal Requirements	
<i>Requirements of Professional Staff</i>	<ul style="list-style-type: none"> Qualifying experience of key personnel for each category/level of work applied for shall be documented by resumes and personal experience histories. Other professional and technical personnel used to support pre-qualification shall also be documented. Satisfactory experience of the firm in the category shall be documented by reference to completed projects. Levels 1, 2, and 3: Submit no more than three hard copies of relevant work samples (consisting of General Plan and Elevation sheets and no more than five additional representative sheets, on 11" x 17" bond) that meet the qualifications for each category. <i>Note: If the samples were not produced for Minnesota's State, County State Aid, or equivalent systems, then also submit no more than three work samples that do.</i> Level 4: Submit no more than two hard copies of relevant work samples (8 1/2" x 11" is preferred over 11" x 17"). Each sample shall consist of no more than 20 relevant sheets. Work samples of current key personnel may be submitted in lieu of work samples of the firm. To qualify as relevant work sample plans of key personnel that personnel must have been either the registered engineer who certified the plan as the Engineer of Record or a registered engineer with significant participation in plan preparation (i.e. plan sheets initialed for design and/or checking). Submit copy of <i>pertinent</i> sections of Firm's Quality Assurance (QA) Plan that addresses Levels of work being applied for. <i>It is not required to submit the entire QA Plan.</i> The QA submittal must include the firm's procedures for checking designs and plan drawings, for updating and validating design software, and verifying information and data contained in special reports. Mn/DOT reserves the right to request additional QA information.
<i>Requirements of Firm</i>	<ul style="list-style-type: none"> Project examples may be submitted electronically on CD's or you can submit project examples in hard copy (i.e. reports, plans, etc.).
<i>Project Documentation</i>	

Authorizing Signature/Date _____	Authorizing Signature/Date _____	Version 1.1
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Exhibit A Scope of Work and Deliverables

WORK DESCRIPTION

The State of Minnesota through its Department of Transportation (Mn/DOT) is currently planning a major renovation to the Interstate 35W and Trunk Highway 62 commons freeway in Minneapolis and Richfield, Minnesota, known as the Crosstown Project. There are six pre-cast segmental concrete box girder bridges proposed for construction in the Project identified as Bridges 27V65, 27V66, 27V73, 27V75, 27V76 & 27V79. Key work under this Contract includes the following specific design services related to these segmental bridges:

- Final Design Bridge 27V75.
- Final Design Bridge 27V79.
- Project Management all six segmental final bridge designs. Note: Final design for Bridge 27V66 will be provided by the MnDOT Bridge Office staff. Final designs for Bridges 27V65, 27V73, & 27V76 will be provided by other design contractors under separate contracts. Key work tasks under project management include:
 - Develop segmental design criteria.
 - Develop standard certified drawings.
 - Conduct a Quality Assurance Peer Review of designs for Bridges 27V65, 27V66, 27V73 & 27V76.
 - Develop special provisions for segmental construction and construction cost estimates for segmental and post tension systems for each bridge.
 - Conduct periodic Project Coordination Meetings
- Segmental Training to MnDOT design personnel

11 DESIGN STANDARDS

- A. All designs will conform to applicable requirements of the following:
- The current "American Association of State Highway and Transportation Officials (AASHTO) Load Resistance Factor Design (LRFD) Design Specifications."
 - American Segmental Bridge Industry (ASBI)
 - CEB/FIP Model Code For Concrete Structures, 1978 (For Time Dependent Behavior Of Concrete).
 - Mn/DOT's "LRFD Bridge Design Manual"
 - Mn/DOT's "Bridge Details Manual Parts I and II"
 - Mn/DOT's approved Bridge Preliminary Plan for each segmental bridge.
 - Plans to be delivered in Microstation Version 08.05.00.64
 - Aesthetic Design Guidelines
- B. Construction requirements of Mn/DOT's current Standard Specifications for Highway Construction and any supplements thereto on file in the Office of the Commissioner of Transportation will be incorporated into the plans.
- C. Current standard details and plans for various bridge components as illustrated in Mn/DOT's "Bridge Details Manual Part I and Part II" will be incorporated into the detail plans whenever applicable. Microstation files are available on the Mn/DOT Bridge Office Home Page <http://www.dot.Mn/DOT.mn.us/bridge>. It is Contractor's responsibility to modify these details when necessary for conformance with their design.
- E. Plan sheets will be produced using Microstation Computer Aided Drafting (CADD). The MnDOT Bridge Office has a compilation of suggested drafting procedures titled "*Bridge Design Summary of Recommended Drafting Standards*" available on the MnDOT Bridge Office Web site. Go to <http://www.dot.Mn/DOT.mn.us/bridge>. Click on CADD Standards, Bridge CADD Standards, AGREE, Miscellaneous.

Exhibit A

Scope of Work and Deliverables

III WORK TASK 1 – FINAL DESIGN BRIDGES 27V75 & 27V79

Contractor will prepare final certified construction plans for Bridges 27V75 and 27V79. Plans will be 100% complete and will provide a post tensioning system that is stand-alone and 100% constructible. Plans will be prepared in conformance with the Mn/DOT's Approved Bridge Preliminary Plan, all Design Standards specified herein, all Items Provided By and/or Completed By Mn/DOT, and the following:

A. Final Plan Content

The following is a suggested ordering of plan sheets and is not meant as comprehensive. Final plan sheets will be assembled in conformance with accepted practices for pre-cast segmental construction and the Mn/DOT's LRFD Bridge Design Manual (emphasis on Section 2) as supplemented by the following:

1. Title Sheet
Minimum items on the Title Sheet are a Plan View of the bridge showing adjacent structures and features, a Title Block with provisions for the Mn/DOT Bridge Engineer's approval signature, and an Engineering Certification Block for the Engineer of Record's signature.
2. Index of Sheets and Schedule of Quantities
This sheet will include a numerical listing of all plan sheets and Schedule of Pay Items and Quantities in tabular form. Multiple sheets may be required to avoid crowding of information.
3. General Notes and Design Data Sheet(s)
4. General Plan and Elevation Sheet(s)
5. Bridge Working Point Layout Sheet(s)
Layout sheet(s) will be detailed in accordance with Section 2.4.2.4 of the LRFD Bridge Design Manual. (Note: Corner views required for the Partial Plan Review Submittal may be included in the Bridge Layout Sheet(s) or may be integrated into the superstructure plan sheets, at the Contractor's option)
6. Foundation Layout Sheet(s)
A pile plan view will be detailed for each bridge foundation. Plan views to include pile spacing and test pile identification at each foundation. Piles to be tied into workline and working points. A pile load table with applicable pile notes will be included for each foundation.
7. Architectural Detail Sheet(s)
From preliminary plan and Aesthetic Design Guide provided by Mn/DOT.
8. Bridge Abutment Sheets
Abutments will be separately detailed and reinforced. Discrete detail sheets and reinforcement sheets will be prepared for each abutment. Reinforcement sheets for each abutment will include complete reinforcement bar bending details and reinforcement bar lists to allow separate shipment for each abutment. If stage construction is required each reinforcement bar list will contain a separate column for each stage that indicates the number of individual bars for each particular stage. Coordinate stage construction with Mn/DOT's Project Manager. Details, reinforcement dowels, and piling will be tied in and referenced to the working points. A tabulation of quantities will be provided for each abutment. Architectural details will be incorporated into the drawings.
9. Bridge Pier Sheets
Piers will be separately detailed and reinforced. Discrete detail sheets and reinforcement sheets will be prepared for each pier. Reinforcement sheets for each pier will include complete reinforcement bar bending details and reinforcement bar lists to allow separate shipment for each pier. If stage construction is required each reinforcement bar list will contain a separate column

Exhibit A

Scope of Work and Deliverables

for each stage that indicates the number of individual bars for each particular stage. Coordinate stage construction with Mn/DOT's Project Manager. A tabulation of quantities will be provided for each pier. Architectural details will be incorporated into the drawings.

10. Superstructure Segmental and Post Tension Sheets

The superstructure for each bridge will be constructed in one continuous operation consequently designs will not be required to address stage construction.

11. Miscellaneous Superstructure Sheets

- a. Railing Standard Plan Sheet(s) with complete reinforcement bar bending details and reinforcement bar list.
- b. Conduit Sheet(s) detailing conduit size, locations, hanger details and spacings, and a tabulation of quantities for each conduit system.
- c. Bearing Details
- d. Access Openings
- e. Expansion Device

12. Standard Bridge Plan Sheet(s)

Applicable standard plan sheets that appear in Bridge Details Manual Part II will be incorporated into the final plan. Contractor will modify standard plan sheets to meet plan design requirements. It is the Contractor's responsibility to examine the Details Manual and to incorporate all necessary standard sheets into the final plans and if required to appropriately modify each sheet.

13. Standard Bridge B-Detail Sheet(s)

Applicable standard B-Detail sheets that appear in Bridge Details Manual Part I will be incorporated into the final plan. Contractor will modify the B-Details to meet plan design requirements. It is the Contractor's responsibility to examine the Details Manual and to incorporate all necessary B-Details into the final plans and if required to appropriately modify each sheet. (NOTE: All modified details will display the word "MODIFIED" below the detail number).

14. As-Built Standard Plan Sheet

From Bridge Details Manual Part II.

15. Bridge Survey Sheet(s)

From Preliminary Plan supplied by Mn/DOT.

16. Bridge Survey Sheet(s) Plan and Profile

From Preliminary Plan supplied by Mn/DOT. Sheets to be completed as follows: 1) Detail a sectional plan layout and centerline sectional elevation of the proposed substructure with each unit identified; 2) When test piles are to be used, they will be numbered and shown in proper plan location and also shown to proper batter and scale length in the sectional elevation view.

B. Independent Analysis – Quality Control
See Article VIII of this Exhibit for QC requirements.

C. CADD Files

See Article IX of this Exhibit for CADD file requirements and conventions.

D. Final Plan Certification

The final plans for each bridge will be certified by a professional engineer licensed under the laws of the State of Minnesota and as provided for under Minnesota Statute Section 326.12 and the

Exhibit A Scope of Work and Deliverables

Minnesota State Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience, and Interior Design.

- E. Intermediate Plan Review Submittals.
See Article IV of this Exhibit
- F. Deliverables
See Article VII of this Exhibit.

IV PLAN REVIEW SUBMITTALS – BRIDGE 27V75 & 27V79

The Contractor will submit 30% complete, 60% complete, and 95% complete plans for the Mn/DOT's review and comment. See Article VII of this Exhibit for submittal schedules.

A. 30% Complete Review Plan Submittal

The 30% Complete Plan allows Mn/DOT an early review of the final plan preparation for conformance with the Bridge 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.

1. 30% Plan Content

At a minimum the 30% plan will consist of the following:

a. General Plan and Elevation Sheet(s)

For this submittal the General Plan and Elevation sheet(s) need be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed beam type and spacing, architectural features, stage construction information, and basic design data. The sheet(s) will be based on the preliminary Bridge Plans supplied by Mn/DOT.

b. Bridge Layout Sheet(s)

For this submittal the Bridge Layout sheet(s) will show a line diagram that indicates the control point, work line, reference lines, and proposed working point locations. The tabulations required need not be completely filled in, however the sheet(s) will indicate the diagonal and other dimensions that will be included in the final plans. 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.

c. Architectural or Special Detail Sheet(s)

Architectural or special detail sheet(s) are only required for details that require early coordination between the Contractor and Mn/DOT prior to final plan preparation.

d. Bridge Survey Sheet(s)

Survey sheets provided by Mn/DOT in the Bridge Preliminary Plan are to be included. For this submittal they are not required to be completed.

2. 30% Plan Submittal

The Contractor will submit for Mn/DOT's review two sets of the 30% Plan along with any design computations made for its preparation. The review plans will be on 11" x 17", 20-lb white bond paper or approved equivalent. Mn/DOT will meet with the Contractor to return a copy of the Partial Plan containing its red-lined notations and corrections. Mn/DOT will authorize the Contractor in writing to proceed with final design in conformance with the red-lined copy of the Partial Plan. If the Contractor differs with Mn/DOT's notations and corrections these differences

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must be reconciled. The Contractor may proceed to final design prior to the written authorization at its own risk.

If Mn/DOT determines that major revisions are necessary the Contractor will prepare and furnish a revised Partial Plan.

B. 60% Complete Review Plan Submittal

1. 60% Plan Content

The 60% Plan will be a "snap shot" of the final bridge plan's progress at the 60% complete stage. Any required construction staging sheets will be substantially complete for this submittal.

2. 60% Plan Submittal

The Contractor will submit for Mn/DOT's review two sets of prints of the Intermediate Plan. The review plans will be on 11" x 17", 20-lb white bond paper or approved equivalent. Computations will not be required unless requested. Mn/DOT will perform a cursory "page-through" review to assess the Contractor's progress. The Contractor may continue with final plan preparation during this review. Mn/DOT will return to the Contractor a copy of the Intermediate Plan containing red-lined notations and corrections. If the Contractor differs with Mn/DOT's notations and corrections these differences must be reconciled. If necessary a review meeting will be held.

C. 95% Complete Review Plan Submittal

1. 95% Review Plan Content

The 95% complete review plan submittal is to be considered by the Contractor as 100% complete, ready for the Contractor's certification and approval by the State's Bridge Engineer.

2. 95% Review Plan Submittal

- Two hard copy prints on 11" x 17", 20-lb white bond paper or approved equivalent.
- Bound and indexed design calculations - one hard copy.
- Bound and indexed quantity calculations, two independent sets - one hard copy each

Mn/DOT will meet with the Contractor to return a copy of the 95% review plan containing its red-lined notations and corrections. If the Contractor differs with Mn/DOT's notations and corrections these differences must be reconciled. All corrections must be made prior to submittal of final deliverables.

If Mn/DOT determines that major revisions are necessary the Contractor will prepare and furnish a revised 95% review plan.

V WORK TASK 2 - PROJECT MANAGEMENT SEGMENTAL DESIGNS

Provide project management services for the design and plan preparation for each of the six segmental bridges.

A. Develop Standard Design Criteria

1. Review segmental bridge preliminary plans prepared by MnDOT. (Note: Bridges 27V65, 27V75, 27V76, & 27V79 have the AASHTO-PCI-ASBI Standard Box Section 8-2. Bridges 27V66 & 27V73 have the AASHTO-PCI-ASBI Standard Box Section 8-1.)
2. Develop Segmental Design Criteria to be utilized by the designers of each of the six segmental bridges.

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B. Develop Standard Certified Drawings

Standard drawings will be developed for inclusion in the individual bridge plans. The drawings will be 100% complete, ready for insertion in the plans with no additional work by the individual designers. Drawings will consist of the following:

- General Notes
- Transverse Post Tension Details
- Typical Segment Blister Details and Reinforcement
- Access Opening Details
- Bearing Details
- Standard Bar Bend Details
- Typical Section Sheets
- Bulkhead Details

C. Quality Assurance Peer Review

1. Conduct a Quality Assurance Peer Review of the design and plan preparation of Segmental Bridges 27V65, 27V66, 27V73, and 27V76. The review is not meant to involve a complete Quality Control plan check. The review is meant to assure the plan has been designed in accordance with all applicable design requirements and includes the following:

- Review designs for post-tension requirements.
- Review erection sequence
- Review movements; thermal, contraction, shrinkage, creep, etc.

2. Plan reviews with commentary will be provided at the 30%, 60%, and 95% completion milepoints
3. Provide periodic tech memos to the segmental designers to update design issues general to all bridges and specific to individual bridges.

D. Special Provisions and Cost Estimates

1. Develop special provisions, pay items, and construction cost estimates for segmental and post tension systems for Bridges 27V75 & 27V79.
2. Develop special provisions, pay items, and construction cost estimates for segmental and post tension systems for Bridges 27V65, 27V66, 27V73, & 27V76.

E. Coordination Meetings

Conduct nine project management coordination meetings with designers of each segmental bridge. Meetings will discuss and resolve design issues related to project management subtasks defined in this exhibit. Contractor will prepare agendas and lead each meeting. Meetings to be held at the MnDOT Bridge Office on an intermittent basis throughout the length of the Contract.

VI SEGMENTAL TRAINING

Develop and present technical training to MnDOT's Bridge Office design staff on post tension segmental design. One eight hour meeting at the Bridge Office is assumed. Mn/DOT will provide the training facilities.

VII SCHEDULE OF INTERMEDIATE SUBMITTALS AND FINAL DELIVERABLES

The following schedule is based on a December 1, 2004 Authorization to Start Work and an April 28, 2006 Construction Letting.

A. Final Design Plans – Bridges 27V75 & 27V79

1. 30% Review Submittals
February 1, 2005 (60 days after Authorization to Start Work)
2. 60% Review Submittal
July 1, 2005 (At approximate 60% completion milestone)

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3. 95% Review Submittal
November 6, 2005 (60 days prior to final deliverable)
- B. Final Certified Plan
Deliverables due no later than January 6, 2006 (16 weeks prior to construction letting) and include the following:
1. A final certified plan for each bridge will be delivered on 11" x 17", 20-lb white bond paper or approved equivalent. The plan will be 100% complete and correct.
 2. Electronic File
An electronic file of the Final Certified Bridge Plan in Microstation Version 08.05.00.64 format. See CADD FILE REQUIREMENTS in this Exhibit for required file conventions and procedures.
 3. Computations
 - Final design calculations, bound and indexes, one copy.
 - Final quantity calculations, bound and indexed, one copy of each independent set.
- C. Standard Design Criteria and Certified Drawings
1. Design Criteria and Certified Drawings
 - Design Criteria
December 30, 2004 (30 days after Authorization to Start Work).
 - Draft Standard Drawings
February 28, 2005 (90 days after Authorization to Start Work)
 - Final Certified Standard Drawings
March 31, 2005 (120 days after Authorization to Start Work)
 2. The Contractor will supply the individual segmental designers with certified plan sheets for the design criteria and each standard drawing prepared for the individual bridges. The certified plan sheets will be on 11" x 17", 20-lb white bond paper or approved equivalent.
 3. Electronic Files of Certified Drawings
An electronic file of the Certified Standard Drawings will be delivered to MnDOT in Microstation Version 08.05.00.64 format. See CADD FILE REQUIREMENTS in this Exhibit for required file conventions and procedures. A separate file for each of the five segmental bridges is required. A file of each individual bridge will be provided to the individual designers.
- D. Special Provisions and Cost Estimates
1. Draft Submittal
December 6, 2005 (45 days prior to final deliverable)
A hard copy of draft segmental special provisions will be delivered on 8 $\frac{1}{2}$ " x 11" bond paper. A hard copy of preliminary construction cost estimates will be delivered on 8 $\frac{1}{2}$ " x 11" bond paper. An electronic file of draft special provisions and cost estimates will be delivered in Microsoft word.
 2. Final Delivery
January 20, 2006 (12 weeks prior to construction letting)
A certified hard copy of segmental special provisions will be delivered on 8 $\frac{1}{2}$ " x 11" bond paper. A hard copy of construction cost estimates will be delivered on 8 $\frac{1}{2}$ " x 11" bond paper. An electronic file of special provisions and cost estimates will be delivered in Microsoft word.

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Scope of Work and Deliverables

E. Segmental Bridge Peer Review

1. Peer Review

Provide individual segmental designers and MnDOT with written commentary on the findings of each individual plan review within two weeks of receipt.

XIII DESIGN AND QUANTITY COMPUTATIONS (QUALITY CONTROL)

A. Design and Plan Sheet Check

The Contractor is responsible for the completeness and accuracy of their work. Final design calculations and plan sheets must be completely checked and reconciled prior to submittal. Review comments from Mn/DOT on the Contractor's various plan review submittals does not relieve the Contractor of its liability for an inaccurate or incomplete bridge plan.

B. A complete independent design and analysis check is required for the segmental and post tension design. The personnel performing this check must be completely independent from the main design team responsible for plan production.

C. Quantity Check

Final quantities shown in the plans will be the reconciliation of two independently made sets of calculations. Each set of calculations will be included in Contractor's submittals and deliverables.

D. Computer Programs.

All computer programs and/or spreadsheets utilized by the Contractor must have been verified by the Contractor in its in-house Quality Assurance Program. Input and output forms with the specific title of the program/spreadsheet will be included in the Contractor's design and quantity calculations.

E. Quality Assurance Verification

The Contractor's Project Manager or Quality Assurance Manager will review the entire plan design and production process to insure the final deliverables are 100% complete and 100% correct.

IX CADD FILES

Electronic CADD files of the final certified bridge plan are included in the final deliverables for this Contract. All files must be submitted in MicroStation^J™ Version 08.05.00.64 format. Files will be assembled in accordance with the following conventions and procedures.

A. File Requirements

1. Use the correct file naming convention for all files.
2. For each plan set there shall be only one file per file naming convention; therefore, merge/copy plan sheets/details or files into one file.
(Example: if you have separate files for the north and south abutment details, and/or reinforcement, combine them into one file with the "abt" file extension. If you have separate files for each pier combine them into one file with the "pir" file extension.)
3. All reference files that are part of the finished plan sheet must be merged into a master file. Reference files are not allowed; therefore, detach all reference files after merging needed files and details.
4. Remove all elements that are not part of the final plan sheet; remove all elements that do not reside within the boundaries of the sheet border.

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5. Sheet numbers are to be numeric. The exception is on revised plan sheets where an "R" follows the sheet number

B. File Naming Convention

1. File name shall be: "BR" + "bridge number" + "_" + "file extension.dgn"
(Example: BR12345_abt.dgn)

C. File Extension

1. New Plans

abt	Abutment Details and Reinforcement
det	B-Details, Standard Sheets, and As-Built Bridge Data Sheet
exp	Expansion Device Details ***
pcb	Concrete Beam Details ***
pir	Pier Details and Reinforcement
ral	Railing and Median Details ***
s12	General Plan and Elevation, Bridge Layout, Variable Super Charts, and Quantities
stl	Steel: Beams, Framing Details, etc.***
sup	Superstructure: Deck Plan, Framing Plan, Integral Diaphragm, Deck Transverse and Longitudinal Sections, and Sidewalk and Median Sheets.
sur	Survey: Plan and Profile
sys	Conduit Systems: Power, Lighting, Phone, Signals, etc.

*** These plan sheets may be included in the "sup" file extension.

2. Rehabilitation Plans

app	Approach Panels
rem	Removals
rep	Repair
stg	Staging Plans

X ITEMS PROVIDED BY THE STATE

A. Bridge Preliminary Plans

A bridge preliminary plan prepared by Mn/DOT's Bridge Office and approved by the State Bridge Engineer will be provided for each segmental bridge. The Contractor's design will be based on information contained in the preliminary plan and other information defined in this Exhibit. The preliminary plan will have been prepared in accordance with Mn/DOT's Bridge Design Manual - Section 200 and will consist of preliminary design, architectural, and survey data as follows.

1. General Plan and Elevation Sheet
This sheet will identify the bridge type. It will show general dimensions and geometries, substructure locations and types, a bridge plan, elevation, and bridge deck-cross section.
2. Architectural Sheet
Contain aesthetic details (i.e. rustication) to be incorporated into the final plan.
3. Bridge Survey Sheet
This sheet includes a survey of the site or sites, platted alignments, grades, profiles, and cross-sections.
4. Bridge Survey Sheet Plan and Profile
This sheet includes plotted foundation test borings. The borings will have been provided by Mn/DOT's Foundation Unit.

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The preliminary plan will be provided electronically in MicroStation Vesion 7 format. The Contractor will incorporate preliminary plan sheets into the final plan as appropriate.

The Contractor may request modifications to information contained in the preliminary plan to improve their design, however the Contractor will not base their design on the suggested modifications unless approved in writing by the Mn/DOT's Project Manager.

B. Bridge Foundation Recommendations

A recommendation form that includes pile type, capacity, and estimated lengths and/or foundation earth pressures for spread footings.

C. Aesthetic Design Guidelines

It is the Contractor's responsibility to examine all materials provided by the State for completeness and to notify Mn/DOT if additional information is required.

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WORK DESCRIPTION

The Contractor will prepare Final Certified Bridge Construction Plans for Bridge No. 19R05 in accordance with the following.

Section 1. - Detailed Project Tasks by the Contractor

- Task - 1** Final Certified Bridge Construction Plan
The Contractor will prepare Final Certified Bridge Construction Plans in accordance with the following.
- A. Partial Review Plan Content
The Partial Review Plan will consists of the following:
1. "General Plan and Elevation" sheet (or sheets)
For this submittal the "General Plan and Elevation" sheet (or sheets) need be completed only to the extent necessary to show general dimensions, elevations, cross section with proposed beam spacing, architectural features, and basic design data. The sheet will be based on the preliminary Bridge Plans Supplied By the State.
 2. "Bridge Layout" sheet (or sheets)
For this submittal the "Bridge Layout" sheet (or sheets) will show the required corner views and sections and by line diagram indicate the control point, reference line, and working point locations proposed. The tabulation required on this sheet need not be completely filled in for this submittal. However, for the State's review, the Contractor will indicate the diagonal and other dimensions that will be included in the final plans.
 3. Architectural or special detail sheet (or sheets)
Architectural or special detail sheets are only required for special details which require coordination between the Contractor and the State prior to final design and detailing. Details need not be fully developed and may be submitted in sketch form.
 4. Bridge survey sheets
Survey sheets provided by the State in Bridge Preliminary Plan to be included.
 5. The intent of the partial plan is to allow the State an early review to insure the Contractor's understanding of the project.
- B. Intermediate Review Plan Content
If an Intermediate Review Plan is required in Article 2 of the Contract Special Conditions of this agreement, it will be a "snap shot" of final bridge plans progress to date at the percent complete as stated. The Contractor will be allowed to continue with Final Design during this submittal.
- C. Final Review Plan and Final Certified Bridge Plan content
The Final Review Plan will be considered by the Contractor as 100% complete and ready for the Contractor's certification and the State Bridge Engineer's approval.
1. A "General Plan and Elevation" sheet(s) showing general dimensions of the structure, elevations (including high and low water elevations for bridges over waterways), clearances, architectural features, basic design data used in the preparation of the plans, a

"EXHIBIT A"
SCOPE OF WORK AND DELIVERABLES

typical cross-section of the proposed superstructure, sheet index, construction notes, and schedule of quantities for the entire bridge.

2. A "Bridge Layout" sheet(s) on which is shown by line diagram and tabulation the principal dimensions to working points together with any corner views, sections, and notations needed to clarify the working point locations. The layout sheet will also indicate a "control point" and a reference line from which to start the field layout of the bridge substructure units. The layout sheet will contain all pertinent information needed to stake and check all working point locations in the field. Generally, three working points will be shown for each substructure unit designated either by letter or numeral.
3. Detail plans for each substructure unit and for the superstructure will include complete reinforcement bar bending details and bar lists as well as tabulations of quantities of items of construction work. Detailed substructures and superstructure plans will be tied in and referenced to the working points.
4. All required Standard Plan Sheets and B-Details as illustrated in the State's Bridge Details Manual.
5. Survey sheets developed under previous Tasks will be completed as follows: 1) Detail a sectional plan layout and centerline sectional elevation of the proposed substructure with each unit identified; 2) When test piles are to be used, they will be numbered and shown in proper plan location and also shown to proper batter and length in the sectional elevation view.

Section 2. – Deliverables and Submittal

- A. All plan submittals will be on 11" x 17" 20 lb white bond paper or approved equivalent. Plan sheets will be prepared in accordance with the State's newly developed "LRFD Bridge Design Manual" and "Summary of Recommended Drafting Standards".
- B. Plan sheets will be produced using Microstation Computer Aided Drafting (CAD).
- C. Review Submittals
 1. The Contractor will furnish for the State's review two sets of 11" x 17" prints of the Partial Review Plan, Intermediate Review Plan (if required under Article 2 of the Special Conditions of this agreement) and Final Review Plan along with any computations made for their preparation that may assist the State in its review. If the State determines that major revisions are necessary the Contractor will prepare and furnish a revised set of Final Review Plans.
 2. The State will return to the Contractor a copy of the Partial Review Plan, Intermediate Review Plan (if required under Article 2 of the Special Conditions of this agreement) and Final Review Plan containing redlined notations and corrections. No work on final design will be started until the Contractor has received written notice from the State approving the Partial Review Plan as a basis for final design and authorizing the Contractor to proceed with the final design in conformance with the redlined check print.
- D. Final Deliverables
 1. The Contractor will furnish to the State an electronic file of the Final Certified Bridge Construction plan delivered in Microstation SE or higher format.

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2. One hard copy of the Final Certified Bridge Construction Plan.
3. One bound hard copy set each of final design and quantity calculations.

Section 3. - Design Standards

- A. All designs for highway bridges will conform to the requirements of the current American Association of State Highway and Transportation Officials (AASHTO) "Load and Resistance Factor Design (LRFD) Bridge Design Specifications", the State's newly developed "LRFD Bridge Design Manual", and the State's approved Bridge Preliminary Plan.
- B. All designs for railroad bridges will conform to requirements of the current American Railway Engineering Association (AREA) design criteria and the State's approved Bridge Preliminary Plan. The affected railway company will approve details and loadings used.
- C. ~~If the bridge project is part of a Federal Aid Highway, design will be in accordance with applicable provisions of the Federal Highway Administration, Federal Aid Highway Program Manuals, Volume 6, Chapter 2, Section 1, Subsection 1, "Design Standards for Federal Aid Projects", and Volume 6, Chapter 3, Section 2, Subsection 4, "Policy on Interstate System Projects".~~
- D. Construction requirements of the State's current Standard Specifications for Highway Construction and any supplements thereto on file in the Office of the Commissioner of Transportation will be incorporated into the plans.
- E. Current standard details and plans for various bridge components as illustrated in the State's "Bridge Details Manual" will be incorporated into the detail plans whenever applicable. Microstation files are available on the State's Bridge Office Home Page www.dot.state.mn.us/bridge. It is the Contractor's responsibility to modify these details when necessary for conformance with their design.
- F. Current design instructions given in the State's newly developed "LRFD Bridge Design Manual" are to be considered as design standards and applicable to the preparation of detail plans.

Section 4. - Design and Quantity Computations

- A. Design and Plan Detail Check
~~The Contractor~~ is responsible for the completeness and accuracy of their work. Final design calculations and plan details must be completely checked prior to submittal. As a minimum checking will conform to the State's procedures for checking in-house plans specified in its newly developed LRFD Bridge Design Manual, Section 5-392.420(25) W.
- B. Quantity Check
 Final quantities shown in the plans will be the reconciliation of two independently made sets of calculations. Each set of calculations will be included in the Contractor's submittals.
- C. Computer Programs.
 If an approved computer program is used in design computations, input and output forms with the specific title of the computer program used will be submitted.

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D. Prestressed Beam Design

If Prestressed concrete beams conforming to one or more of those shown in the State's "Bridge Detail Manual" are to be used, the beam designs will be verified by the State. All data necessary to complete the State's standard prestressed concrete beam plan sheets (for inclusion in the plans) will be given to the Contractor. The Contractor will furnish the State with data (i.e., proposed beam type and spacing, span lengths, loadings, etc.) on which to base the design (or designs). Data on which to base the design will be submitted no later than the Contractor's partially completed plans submittal and preferably sooner.

E. Revised Calculations

Revised copies of design and quantity computations will be furnished when the State's review of the plans indicates that revisions are necessary.

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1.2.4 Limit States to Consider in Design

Bridge designs shall typically consider Strength, Service, Extreme Event, and Fatigue limit states. The limit state checks will vary with the component under consideration. Not all elements will require consideration of all limit states. For example, the fatigue limit state need not be considered for fully prestressed pretensioned elements.

1.3 Procedures

This section covers the Bridge Office procedures for checking of bridge plans, scheduling of projects, and revising or creating standards.

1.3.1 Checking of Mn/DOT Prepared Bridge Plans

The general practice of most engineering offices is to require that designs they produce be checked before they are reviewed and certified by the "Engineer in Responsible Charge". Although this practice has always been required for structures designed for Mn/DOT, it is recognized that the quality of the checking process often varies according to time restraints, confidence in the designer, and the instructions given to the checker. Therefore, in order to maintain a consistent design checking process the following guidance is given for routine bridge designs.

For more complex or unusual designs, the checker is advised to discuss additional requirements with the design unit leader. Also, the checking process described is not meant to apply to the check or review functions required for Mn/DOT review of consultant plans (see Section 1.3.2.) or for construction false work reviews. (See the Bridge Construction Manual.)

Three types of design checking will apply:

- 1) An independent analysis of the completed design.
- 2) A check of original design computations for mathematical accuracy, application of code, and accepted engineering practice.
- 3) A review of drafted details for constructibility and accepted engineering practice.

Generally, an independent analysis to confirm the adequacy of the complete design is preferred. Significant differences should be discussed and resolved before the plan is certified. The separate set of calculations should be included with the design file as a record of the completed design check.

When circumstances prevent a complete independent analysis, as a minimum, an independent analysis shall be completed for the following:

- 1) Live and dead loads
- 2) Critical beam lines
- 3) A pier cap

- 4) A pier footing
- 5) Main reinforcement for high abutments
- 6) An abutment footing

However, for the elements not independently analyzed, the original computations should be checked for mathematical accuracy of original design computations, applications of code, and accepted engineering practice. Checked computations should be initialed by the checker, and the independent analysis should be included in the design file.

When doing a separate analysis, the checker may make simplifying assumptions to streamline the checking process. However, when major differences are found, results must be discussed and resolved with the designer. For instance, for normal piers, piling might be analyzed for dead and live loads only if lateral loads appear to have been reasonably applied in the original computations or the "AISC Beam Diagram and Formula Tables" may be used to approximate pier cap moment and shear.

Whether the check is a completely independent analysis or a minimal analysis combined with a computations check, some details, such as the reinforcing details in a wall corner, also require review by the checker. Often referencing old bridge plans with similar details allows the checker to compare the current design to details that have performed well in the past.

1.3.2 Checking of Consultant Prepared Bridge Plans

Consultant prepared bridge plans are created by private engineering firms through contracts with the Department. The finished plans are complete to the extent that they can be used for construction.

Since these plans receive final approval of the State Bridge Engineer, there must be assurance that the plans are geometrically accurate and buildable; structural design is adequate and design codes have been correctly applied; proper direction is given to the construction contractor; and all construction costs are accounted for. Plan errors may cause costly construction delays or safety may be compromised by an inadequate design.

To keep consultant plan reviews consistent and timely, a procedure was developed as a guide that assigns priority to specific items in the plans. The overall review includes "a Thorough Check" and "Cursory Review" of various items. The distinction between "Thorough Check" and "Cursory Review" is as follows:

Thorough Check refers to performing complete mathematical computations in order to identify discrepancies in the plans, or conducting careful comparisons of known data and standards of the Project with values given in the plan.

Cursory Review refers to a comparative analysis for agreement with standard practice and consistency with similar structures, all with application of engineering judgment. Mathematical analysis is not required, but may be deemed necessary to identify the extent of a discrepancy.

The review procedure is listed on the CONSULTANT BRIDGE PLAN REVIEW form following this section. Headings on this list are defined as follows:

PARTIAL PLAN: In order to assure that the consultant is proceeding in the right direction, an early submittal of the plan is required. This submittal usually consists of the General Plan and Elevation sheet showing the overall geometry of the structure and the proposed beam type and spacing; the Bridge Layout Sheet; the Framing Plan sheet; and the Bridge Survey sheets. Errors and inconsistencies found in this phase can be corrected before the entire plan is completed. For example, a framing plan, including the proposed beams, must be assured as workable on the partial plan before the consultant gets deep into the design of the remainder of the bridge.

FINAL PLAN: A final plan should be complete in all areas to the extent that it can be certified by the designer, although a certification signature is not required for this phase.

THOROUGH CHECK: Items indicated for checking on the consultant's partial plan must be correct. Given geometry must fit the roadway layout. Most of this information can be checked using data from the approved preliminary plan. Approval of the partial plan will indicate that Mn/DOT is satisfied with the geometry and proposed structure, and the consultant may proceed with further development of the plan. For the final plan, obvious drafting and numerical errors should be marked to point out the errors to the consultant, however, the reviewer should not provide corrections to errors in the consultant's numerical computations.

Checking on the final plan should be thorough to eliminate possible errors that may occur, such as the pay items in the Schedule of Quantities. Plan notes and pay items can be difficult for a consultant to anticipate because of frequent changes by Mn/DOT. Pay items must be correct

because these are carried throughout the entire accounting system for the Project. Plan (P) quantities must also be correctly indicated.

CURSORY REVIEW: Normally, a cursory review would not require numerical calculations. This type of review can be conducted by reading and observing the contents of the plan in order to assure the completeness of the work. The reviewer should be observant to recognize what looks right and what doesn't look right. Obvious errors or inconsistencies on any parts of the plan should be marked for correction.

Although structural design is usually the major focus of any plan, most consultants are well versed in design procedures and should need only minimal assistance from our office. A comparison of the consultant's calculations with the plan details should be performed to assure that the plans reflect their design and that the applicable codes are followed. An independent design by our office is time consuming and is not recommended unless there is a reasonable doubt as to the adequacy of the consultant's design.

NO REVIEW: A thorough review of these items would be time-consuming and may not produce corrections that are vital to construction; therefore, it is recommended that little or no time be spent on the listed items. Numerous errors can occur in the Bills of Reinforcement and quantity values. However, checking this information is also time-consuming, hence the burden of providing correct data should be placed on the consultant.

CONSULTANT BRIDGE PLAN REVIEW

Br. No. _____ RTE _____ DATE: PARTIAL PLAN REC'D. _____ DATE FINAL PLAN REC'D. _____

DESIGN GROUP _____ CONSULTANT _____

No. OF SHEETS IN PLAN _____ DESCRIBE COMPLEXITY _____

EST. REVIEW TIME BY DESIGN GROUP _____ (hrs.) ACTUAL REVIEW TIME _____ (hrs)

PARTIAL PLAN		FINAL PLAN	
THOROUGH CHECK		THOROUGH CHECK	
	Horizontal and vertical clearances		Pay items and plan quantities
	Stations and elevations on survey line		Project numbers
	Deck and seat elevations at working points		Design data block & Rating on GP&E sheet
	Deck cross-section dimensions		Job number
	Working line location and data		Certification block
	Coordinates at working points and key stations		Standard plan notes
	Substructure locations by station		Concrete mix numbers
	Framing Plan		Construction joint locations
	Conformance to preliminary plan		Prestressed beam design if inadequate design is suspected
	Design loads		Bridge seat elevations at working points
			Utilities on bridge
			Existing major utilities near bridge
		CURSORY REVIEW	
			Steel beam splice locations and diaphragm spacing; flange plate thickness increments (enough to save 800+ # of steel)
			Abutment and Pier design to be checked against consultant's calculations
			Conformance to foundation recommendations.
			Pile loads and earth pressures. Check against consultant's calculations.
CURSORY REVIEW			Rebar series increments (min. 3")
	Proposed precast beams [per 5-393.509(2)]		Interior beam seat elevations
	Precast conformance to industry standards		Bottom-of-footing elevations (for adequate cover)
	Proposed steel beam sections		Railing lengths and metal post spacing (check for fit)
			Use of B-details and standard plan sheets
			Conformance to aesthetic requirements
			Notes - General, construction, reference, etc.
			Quantity items on tabulations
			Precast beam design (Check against consultant's calculations)
		NO CHECK OR REVIEW REQUIRED	
			Diagonals on Layout sheet
			Figures in Bills of Reinforcement
			Bar shapes and dimensions
			Rebar placement dimensions
			Bar marks on details against listed bars
			Quantity values (including total of tabulations)

The Federal Highway Administration (FHWA) is one of the outside agencies that reviews bridge projects. The following categorizes bridge projects according to the amount of FHWA oversight required and also sets forth submittal requirements:

- **Bridge Projects that Require Full Oversight by FHWA**
This category includes new or reconstruction (rehabilitation and improvement) bridge projects on the Interstate System with total project cost more than \$1,000,000 (bridges that carry interstate traffic and interchange bridges). It also includes other National Highway System bridges in which the bridge structure estimated cost is equal to or over \$10 million. Preliminary bridge plans, if prepared, as well as final plans, specifications and estimates (PS&E) will be submitted to FHWA for approval. Final plans at 85% to 90% completion will also be submitted to FHWA for concurrent review. Please note that preliminary plans are not normally prepared for bridge improvement projects.
- **Bridge Projects that Require Partial Oversight by FHWA**
This category includes new or reconstruction (rehabilitation and improvement) bridge projects that carry traffic over the Interstate Highway regardless of funding source. Preliminary bridge plans, if prepared, will be submitted to FHWA for approval. This submission is only for the purpose of evaluating horizontal and vertical clearances on the Interstate System.
- **Bridge Projects for which Mn/DOT Maintains Oversight**
This category includes any bridge project not included in the above full and partial oversight categories.

The following apply to Bridge Projects that Require Full Oversight by FHWA, Bridge Projects that Require Partial Oversight by FHWA, and Bridge Projects for which Mn/DOT Maintains Oversight:

The Preliminary Bridge Plan will be submitted to FHWA with a transmittal letter. FHWA will not require a preliminary cost estimate but will review the preliminary plan, elevation, and transverse sections. It is very important that these plans be submitted to FHWA as soon as they are developed and prior to proceeding with final design.

Funding source does not change the above processes.

For Mn/DOT oversight projects, a courtesy copy of the letter transmitting the Preliminary Bridge Plan for the proposed bridge project will be sent to FHWA (without the plans) for informational purposes.

FHWA Headquarters Bridge Division shall be responsible for the approval of preliminary plans for unusual bridges and structures on the Interstate System. FHWA Headquarters Bridge Division will be available for technical assistance on other Federal-aid and non-Federal-aid highways when requested.

For the purpose of this guidance, unusual bridges are those bridges: (1) that have difficult or unique foundation problems, (2) that have new or complex designs with unique operational or design features, (3) with exceptionally long spans, (4) being designed with procedures that depart from currently recognized acceptable practices. Examples of unusual bridges include cable-stayed, suspension, arch, segmental concrete, movable, or truss bridges. Other examples are bridge types that are not addressed by the AASHTO bridge design standards and guide specifications, bridges requiring abnormal dynamic analysis for seismic design, bridges with spans exceeding 500 feet, and bridges with major supporting elements of "ultra" high strength concrete or steel.

Unusual structures include tunnels, geotechnical structures featuring new or complex wall systems or ground improvement systems, and hydraulic structures that involve complex stream stability countermeasures, or designs or design techniques that are atypical or unique.

Preliminary documents submitted to FHWA Headquarters should include the Preliminary Bridge Plan and supporting data along with FHWA Division's review comments and recommendations. Supporting information should include bridge/structures related environmental concerns and suggested mitigation measures, studies of bridge types and span arrangements, approach bridge span layout plans and profile sheets, controlling vertical and horizontal clearance requirements, roadway geometry, design specifications used, special design criteria, special provisions (if available), and cost estimates. Hydraulic and scour design studies/reports should also be submitted showing scour predictions and related mitigation measures. Geotechnical studies/reports should be submitted along with information on substructure and foundation types.

For these projects, the State Bridge Engineer will submit two copies of the Preliminary Bridge Plan along with a transmittal letter requesting approval directly to the Division Engineer of the Federal Highway Administration. The transmittal letter also includes the estimated contract construction cost of the structure. (See Figure 2.3.1.1 for a sample transmittal letter). The FHWA is the only outside agency to which the Bridge Office sends a direct request for approval. All other outside agencies are contacted through other offices of Mn/DOT.

- 3) The Preliminary Bridge Plan is used as a basis for preparing permit drawings to accompany applications to construct structures and approaches over navigable waters of the United States within or bordering our state. Such drawings are prepared in the Preliminary Plans Unit in accordance with detailed instructions issued by the U.S. Coast Guard. The Coast Guard is charged with the responsibility of issuing permits for bridges over navigable waters of the United States within or bordering our state. This includes all bridge spans (including land spans) from abutment to abutment. The Corps of Engineers is responsible for issuing permits for any other miscellaneous structures or work to be performed in navigable waters of the United States.

There are two Coast Guard districts that have jurisdiction within the State of Minnesota; the 9th Coast Guard District based in Cleveland has jurisdiction over the Duluth harbor and navigable portion of the St. Louis River, and the 8th Coast Guard District based in St. Louis has jurisdiction over the navigable portions of the Mississippi, Minnesota, and St. Croix Rivers.

After receiving a permit application, the Coast Guard issues a public notice of application with prints of the permit drawings. These are sent to shipping interests, other agencies, displayed in post offices, etc. Generally, if no comments are received from others within 30 days of the notice of application, and if environmental statements have been submitted and a certification given by the Minnesota Pollution Control Agency, a permit will be issued.

Correspondence to the Coast Guard is generally prepared for the signature of the State Bridge Engineer.

- 4) When all approvals have been obtained, the Preliminary Bridge Plan is used as the basis for the bridge design and for the preparation of final detailed plans. If the design is to be by a consulting engineer, the

Preliminary Bridge Plan is also used as the basis for negotiation of the consultant fee.

Preliminary Plans for Local Bridges

Consult the State-Aid Bridge Web site at:

<http://www.dot.state.mn.us/bridge/StateAidBridge/> for the submittal and approval process of State-Aid Preliminary Bridge Plans.

BRIDGE OFFICE

Management	AFC/SME
M/EC	M/A
M/PE	Commissioner's Plan

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