Technical Advisory Committee (TAC) Meeting Summary No. 2 Package

Prepared for

MHA Nation

Date

February 22, 2018

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FORT BERTHOLD COMPREHENSIVE REGIONAL TRANSPORTATION PLAN

TAC 2 Meeting Agenda

fortbertholdplan.org

FORT BERTHOLD BRIDGE FEASIBILITY STUDY

TAC #2 MEETING AGENDA

New Town, North Dakota
10:00am – 2pm
January 17, 2017

- Welcome and Introductions: Ron Hall
  - Project Introduction
  - Project Management Team (PMT)
  - Technical Advisory Committee (TAC)
  - Consultant Team
- Project Overview and Discussion: Russ Call, Kurt Wald and Dan Pitzler
  - Project Overview
    - Purpose Statement
  - Feasibility Study Process
  - Review Options / Alternatives
- WORKING LUNCH
  - Critical Success Factors for this Project
  - Project Goals and Screening Criteria
  - TAC Member Preferences (DOT Exercise)
    - Concept Screening
  - Key Assumptions and Boundaries
  - Project issues and Challenges
  - Confirm Project Schedule
- Conclusions – Next Steps: Ron Hall

TAC 2 Sign-in Sheet

Meeting: TAC Meeting #2 Date: 1/17/18

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Dan Pitzler	CH2M/Jacobs	dan.pitzler@ch2m.com	425 241 1837
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Ed Hall	Parshall	Tai@restel.net	701 421 0259
Russ Call	FIGG	RCALL@FIGGBRIDGE.COM	303-229-4210

TAC 2 Meeting Notes

MEETING SUMMARY

Technical Advisory Committee (TAC 2)

(January 17, 2018)

The Technical Advisory Council (TAC) for the Fort Berthold Bridge Feasibility Study is made up of Tribal and non-Tribal key stakeholders. The objective of the second TAC meeting was to present results of the first TAC meeting to new Tribal and non-Tribal members of the committee, and seek feedback that could shape the study outcomes and decision process.

Meeting Summary and Outcomes

A presentation was made to the meeting participants that described how the bridge feasibility study fits into the Fort Berthold Comprehensive Regional Transportation Plan. The focus of the committee meeting was to present and refine the feasibility selection criteria, measurement concepts, and priority of importance of the criteria. Additionally, the initial bridge and connecting road concepts were presented and discussed. Committee members made alignment change recommendations to roadway corridor A1 to minimize right-of-way impacts.

An additional element that was discussed was the type of facility that is envisioned, who would own and operate it, and what the process to secure the right-of-way corridor could entail. It was determined that documenting the multitude of factors to be considered will be a focus of the study to allow state and federal jurisdictional members of the committee to gauge how and to what degree they participate in the feasibility study process.

Refinement of Evaluation Criterial and Priorities

The focus of a part of the workshop was to refine and verify the screening criteria. Previous efforts have determined a set of evaluation criteria, measurement concepts, and what the most important criteria were to the committee. The participants were asked sets of questions targeted at validating the evaluation criteria and importance ranking.

The following outline was followed and the results were captured on notes and placed on the wall. New and existing screening criteria were then evaluated for importance. A “dot” exercise was conducted where participants placed dots next to criteria and goals that were important to them. The results of the exercise are captured in the revised draft of the goals and criteria matrix, and included with the meeting summary. Additionally, a summary of all the concepts shared and how they relate to the study are summarized as part of the notes.

- Project Overview
  - Purpose Statement
- Feasibility Study Process
- Review Options/Alternatives
- Critical Success Factors for this Project
- Project Goals and Screening Criteria
- TAC Member Preferences (Dot Exercise)
- Key Assumptions and Boundaries
- Project Issues and Challenges
- Confirm Project Schedule

Flip Notes Transcribed from TAC Workshop #2 Jan 17, 2018

Critical Success Factors

- Lake recreation access: ramps, parking.
- Going through recreation area to the south would improve access road.
- Navigation issues: required clearance for maritime vessels will be decided by Coast Guard. 4 Bears Bridge designed so that about 85% of boats could clear the bridge. That bridge was at mouth of lake – here 100% clearance may be required, which might result in a requirement for 60-70' of clearance. Like 4Bears bridge this bridge(s) would be designed "bluff to bluff" so the required clearance may not be difficult to achieve.
- Waves were noted as a potential concern for B3 and B4 locations.
- Emergency response: road should accommodate good access for police, fire, emergency vehicles.
- Context sensitive design: would be used here as on the 4 Bears Bridge. This would capture community needs and concerns. For 4 Bears there was a cultural advisory committee that included representatives from each section. There were many meetings during the 2-year design process. Cultural design elements were derived from work done from this committee.
- Tourism is a big issue. Being bicycle friendly is important.
- Culture is what the tribe has, but outsiders do not. The tribe wanted a culture corridor and got a diesel station instead. Zoning could help outline how bridge interacts with the community. Need community input to get this right.
- Connectivity is a big issue. Some felt that two bridges would be needed; others noted that a bridge over Charging Eagle Bay would be the first priority. It was noted that one bridge at Charging Eagle Bay would allow for connections without leaving the reservation: this has benefits to some Tribal members. It was suggested that Twin Buttes has more connections with Mandaree and New Town, less so with White Shield and Parshall.

Ownership Issues

- Who owns the bridge has yet to be decided. That decision will drive many other aspects of the project such as design criteria. Be clear about how "ownership" is defined e.g., who maintains the bridge?
- Important to decide this soon so that the appropriate staff are represented. For example, additional FHWA could be formally invited to this TAC meeting. Contact is Mark Schrader 701-221-9468. Local contact is Tom Craymans at 605 226-7645.
- State inspects all bridges other than those on BIA routes regardless of ownership.
- If the roads leading to a bridge are state roads, the bridge will be maintained.
- Note the bridge will result in some level of pass-through traffic (e.g., oil traffic).
- Ownership should be a function of who the bridge serves. The traffic study will help clarify this issue. Need to look cross-region and state-wide: model is statewide.
- It was noted that the 4 Bears Bridge resulted in 11,000 AADT through New Town i.e., need to recognize the potential for off-reservation traffic impacts on reservation.

- Participants were unaware of a BIA-owned bridge of this size: perhaps on Navajo reservation. Navajo may also have shared jurisdiction on a bridge: unlikely, but worth exploring.

Key Assumptions

- The two general locations for bridge crossing, that encompass all 8 initial alternatives) are fixed.
- Screening will be done on the basis of cost, reducing travel times and connecting communities.
- Ownership is not yet defined, but an assumption will be made prior to evaluation of the two alternatives.
- The study needs to consider future developments, zoning issues, and Tribal governance for right-of-way, ownership, infrastructure development.
- The bridge design will be the most economical type possible: likely to be similar to the 4 Bears bridge design.
- The study will rely on publicly-available data (e.g., no additional geotechnical studies at this stage).
- Study will recognize the need for all regulatory permits (e.g., Section 10, 404, 408).
- Study will recognize need for agency interface, but much more interaction needed during environmental review (e.g., Fish and Wildlife). Note that road and bridge elements will require engagement with different agencies.
- There is no pressing need for additional connectivity between state routes.
- Project does align with and needs to consider needs of the oil sector. For example, roads could be wide and strong gravel that meets the "oil industry standard". Note, this type of road is sensible and easier to maintain than paved roads.

Other Issues

- Tolling possibilities would be affected by ownership and who maintains the bridge. It's legal for tribe to own and toll, but likely it's never been done before. How could oil companies contribute?
- Pipeline aside the bridge. Could be designed and could be a possible revenue source. If state owned, only water or non-flammable products could be used. 4 Bears Bridge has a fuel line, "hot fuels" that flow in all temperatures: there was a line on the original bridge.
- Ask traffic modelers what they know about next phase of refinery and any possible impact on travel demands.
- It was noted that B1/B2 could link oil fields around Mandaree to the Refinery: some felt the Mandaree fields were too far away from the refinery for the road to make a difference. Note, the project team may want to make contact with the oil industry. Possible contacts include Jeff Hunt, Josh Ruffo (Ener Plus who is a member company of the council) and sits on the Petroleum Council, and the ND Industrial Commission.

TAC Member List

Name	Organization/Segment	Phone	Email
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Project Goals and Screening Criteria

Fort Berthold Bridge Feasibility Study

Alternatives Evaluation Criteria, Measures, Dots

Evaluation Criteria	Important Measurement Concepts	Priority "Dots" from TAC
1. Enhance Safety		9
1A. Safe intersections and road connections	Number of non-separated intersections	1
1B. Good EMS and crash response (e.g., shoulder width)		-
1C. Safe bicycle and pedestrian travel	Constraints to providing safe bike/ped travel	-
1D. Improved lighting and other safety enhancements (e.g., grades)	Improved safety on tribal road network	-
2. Improve Tribal connections and access	Population-weighted tribal time savings	11
3. Improve travel times	Annual travel time savings from current conditions	3
4. Provide Transportation System Redundancy	Improve transportation options when other roads may close	1
5. Avoid Adverse Local Impacts		1
5A. Connections mainly for Tribe, not non-residents	Non-tribal truck traffic trips through MHA reservation	-
5B. Limit visual and water pollution	Qualitative scale regarding light orientation to Tribal communities	-
6. Coordinated Transportation and Land Use Planning / Zoning	Consistency with Tribal and local plans	6
7. Avoid Adverse Environmental Impacts	Avoid known environmental factors that will be difficult to mitigate; locate project where hazards are low	3
8. Compliment Foreseeable Regionally-Significant Projects	Need a list of regional projects, then a qualitative scale	-
9. Conducive to Partner Funding Participation	Need an analysis of regional infrastructure, then a qualitative scale	1
10. Promotes/Facilitates Economic Development	Provides connections and/or revenue streams	1
11. Estimated Construction and Long-Term Maintenance Cost	Cost will be compared to the non-monetary aspects of alternatives	6

TAC 2 Presentation

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Fort Berthold Bridge Feasibility Study

Technical Advisory Committee

January 17, 2018
**Revised 2-21-2018

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Project Overview

1. **Charging Eagle Bay Bridge Feasibility Study**
2. **Elbowoods Bridge Feasibility Study**
3. Update MHA Nation's Long-Range Transportation Plan (LRTP)
4. Update MHA Nation's Safety Plan and develop a Strategic Highway Safety Plan (SHSP)
5. Aviation Needs Assessment Study
6. Public transit and ferry system – feasibility and planning
7. Railroad – inventory, assessment, and feasibility
8. Pipeline – inventory, assessment, and feasibility
9. Electric Power Plan
10. Coordination and collaboration with neighboring city, county, and state governments and regional planning organizations

Foundation Principals of the Fort Berthold Comprehensive Regional Transportation Plan

- **Grassroots Based – Leadership Driven**
- **Build on community strengths to answer key questions**
  - Where Did We Come From?
  - Where are We Today?
  - Where Do We Want to Be in 20 to 50 years?
- **Address Community Readiness**
  - Education through engagement and in-depth research
  - Support informed decisions (consideration of tradeoffs)
  - Build consensus around values
  - Establish baseline of data and facts
- **Positive Engagement with Stakeholders and Partners**

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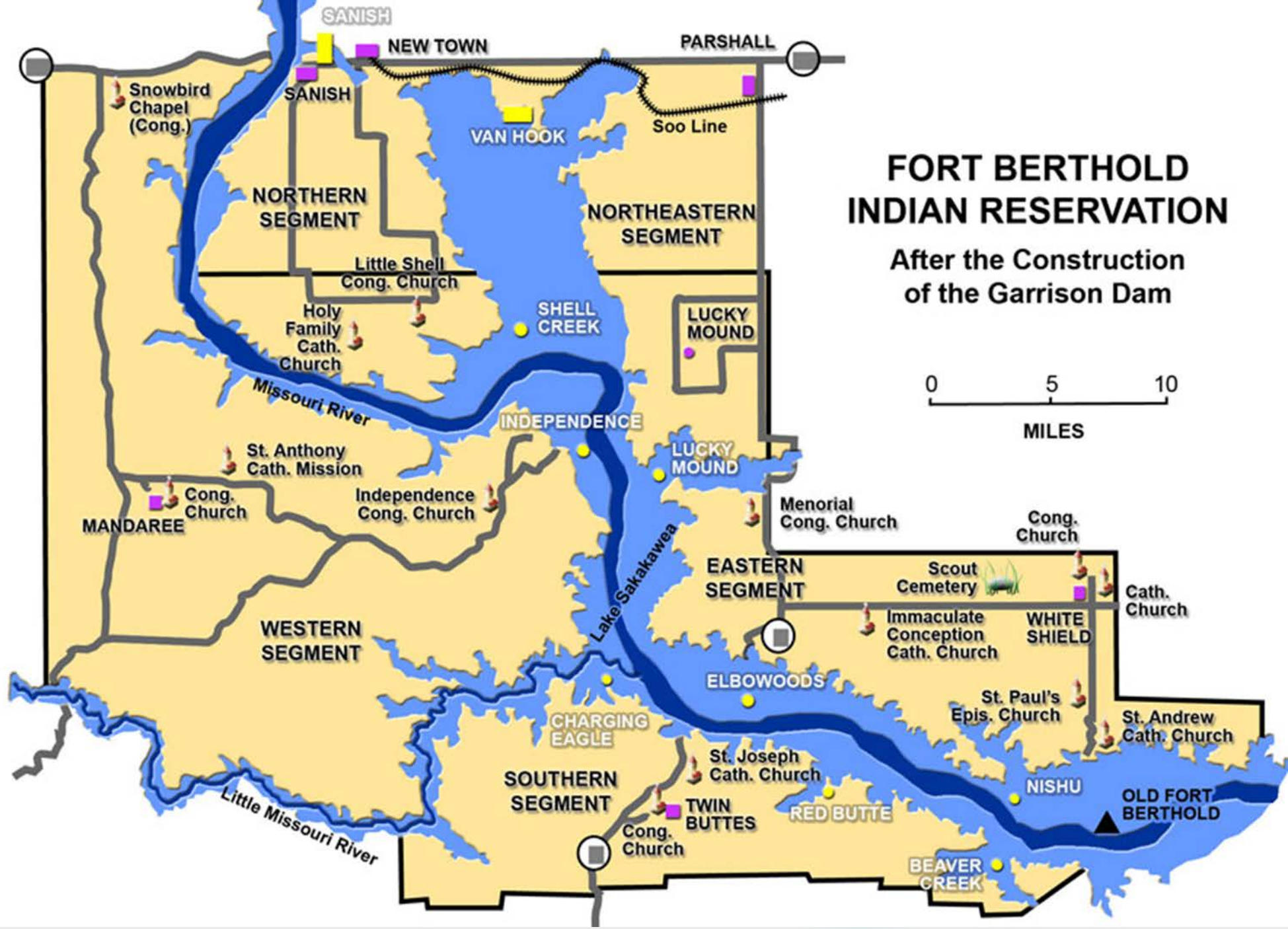

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Project Management Team

- The Project Management Team (PMT) is made up of Tribal Leadership and is responsible for contract compliance and financial performance

- The PMT is responsible for project decision making

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Technical Advisory Committee

- The Technical Advisory Council (TAC) is made up of Tribal and non-Tribal key stakeholders

- The TAC is responsible for assisting in the development of the technical analysis of the Feasibility Study

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Introduce FIGG/CH2M Alliance

- RUSS CALL, PE, SE: CO-PROJECT MANAGER (FIGG)
- KURT WALD: CO-PROJECT MANAGER (CH2M)
- DAN PITZLER: PRINCIPAL ECONOMIST, STRATEGIC DECISIONS AND RISK MANAGEMENT (CH2M)
- HERB FRICKE, PE ROADWAY AND CIVIL LEAD (AKANA)
- STUART FRICKE, SURVEYING AND MAPPING LEAD (WHITE SHIELD, INC)

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Meeting Schedule

October – Kickoff Meeting

- Draft Technical Memorandum #1: draft PMP, PCP, PIP

November - TAC Meeting #1

- PMP, PCP, PIP, Goals and objectives
- Roadway design criteria
- Bridge Design criteria
- 8 alignments - mapping
- Infrastructure needs and impacts
- Traffic
- Social and economic considerations
- Environmental and land use
- Project costs

December

- Final PMP, PCP, PIP, goals, design criteria, 8 alignments
- Publish newsletter #1 and web site post
- Develop segment meeting announcements and post

May - TAC Meeting #2

- Final 2 alignments
- Draft Working Paper #1– Road/Bridge Site Assessment
- Segment meetings preparation

May - Segment Meetings

- Presentation, boards, brochures, feedback

June

- Final Working Paper #1 – Road/Bridge Site Assessment
- Publish newsletter #2 and web site post

July - TAC Meeting #3

- Draft Summary Report#1 – Public Participation Process
- Draft Working Paper #2 - Draft Bridge Feasibility Report

August – Tribal Council Presentation

- Submit Draft Bridge Feasibility Report
- Present summary of report, conclusions and recommendations

September

- Submit final Bridge Feasibility Report
- Publish newsletter #3 and web site post

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Fort Berthold Bridge Feasibility Study

Objective:

Execute a feasibility study process that informs the Tribal leadership and community members about the feasibility of constructing either or both of the proposed bridges crossings. Its critical to document the social, cultural, environmental, and economic trade-offs and impacts.

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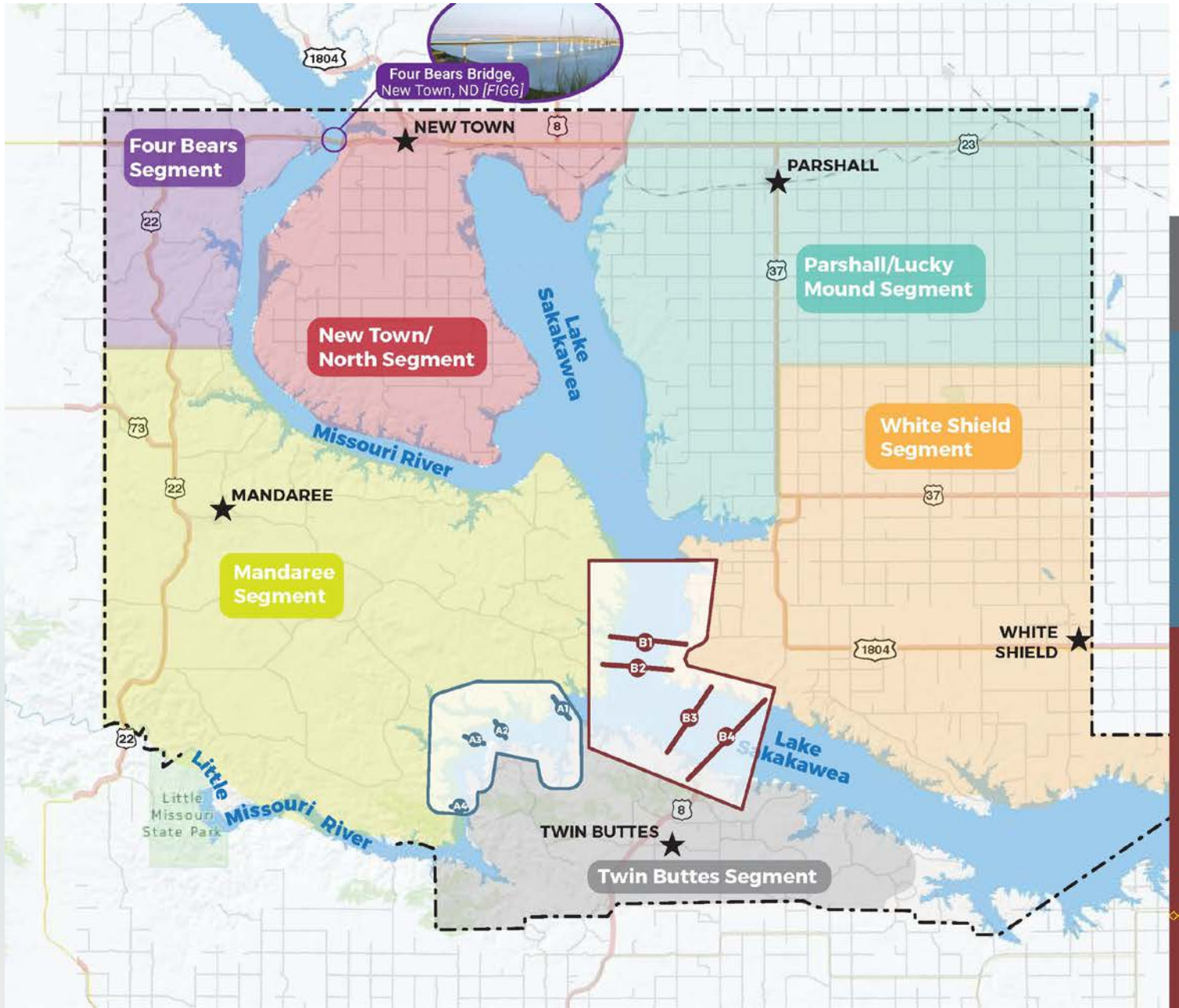

Fort Berthold Bridge **Feasibility Study**

Crossings studied, in the Elbowoods and Charging Eagle Bay sites, will optimize use of existing roadway infrastructure while providing important regional and local connectivity

Charging Eagle Bay Bridge Site

Soil Conditions may effect bridge and connecting roadway geometry

Lake Depths here require deep structures that increase in depth from A4 to A1 heading northeast

Locations A1-A4 connect Twin Buttes and Mandaree Segments

Elbowoods Bridge Site

Soil Conditions may effect bridge and connecting roadway geometry.

Lake Sakakawea is anticipated to be the deepest at these locations

Locations B1 & B2 connect Mandaree and White Shield Segments

Locations B3 & B4 connect Twin Buttes and White Shield Segments

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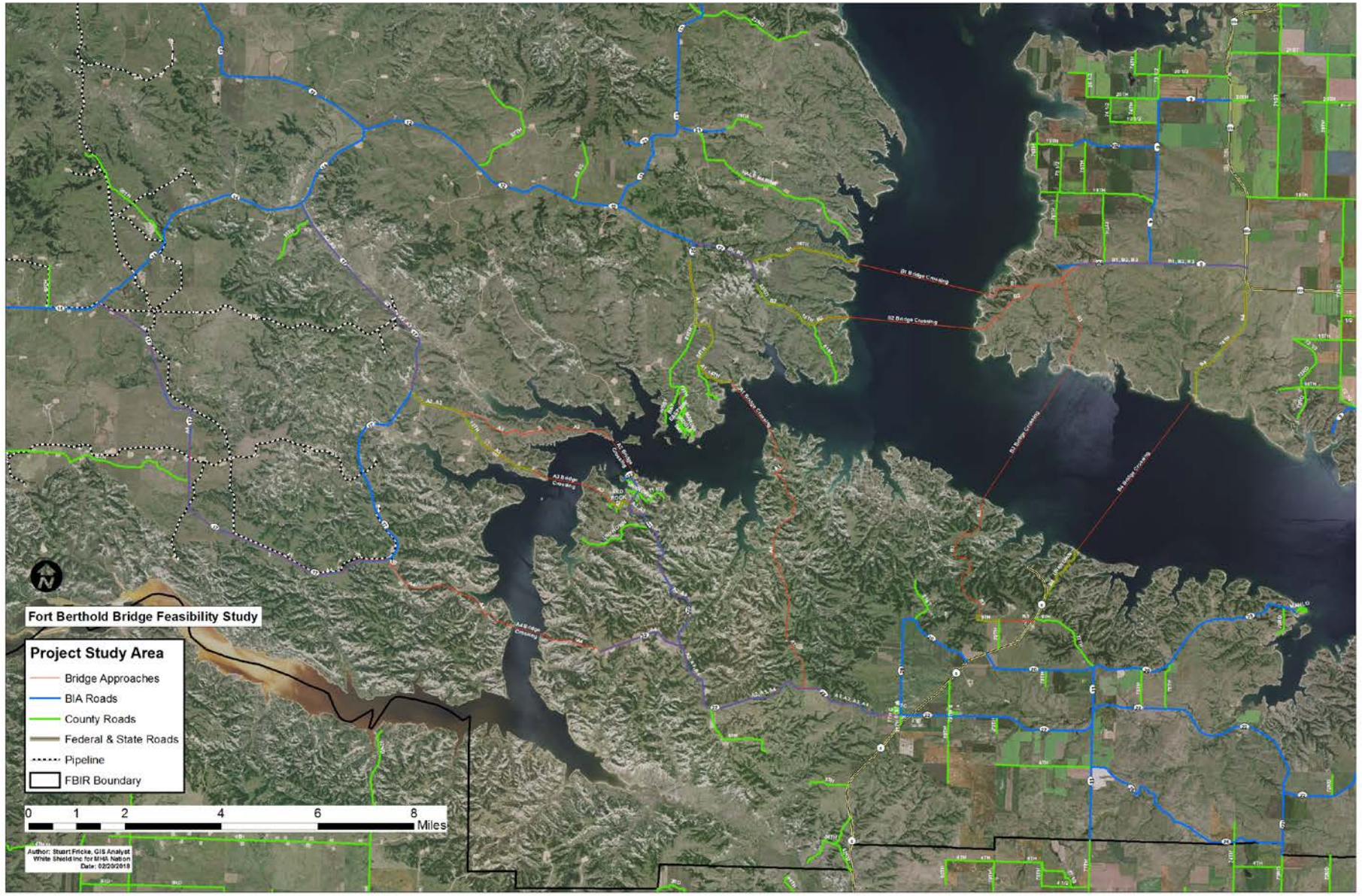
Conceptual Routes and Crossing Locations



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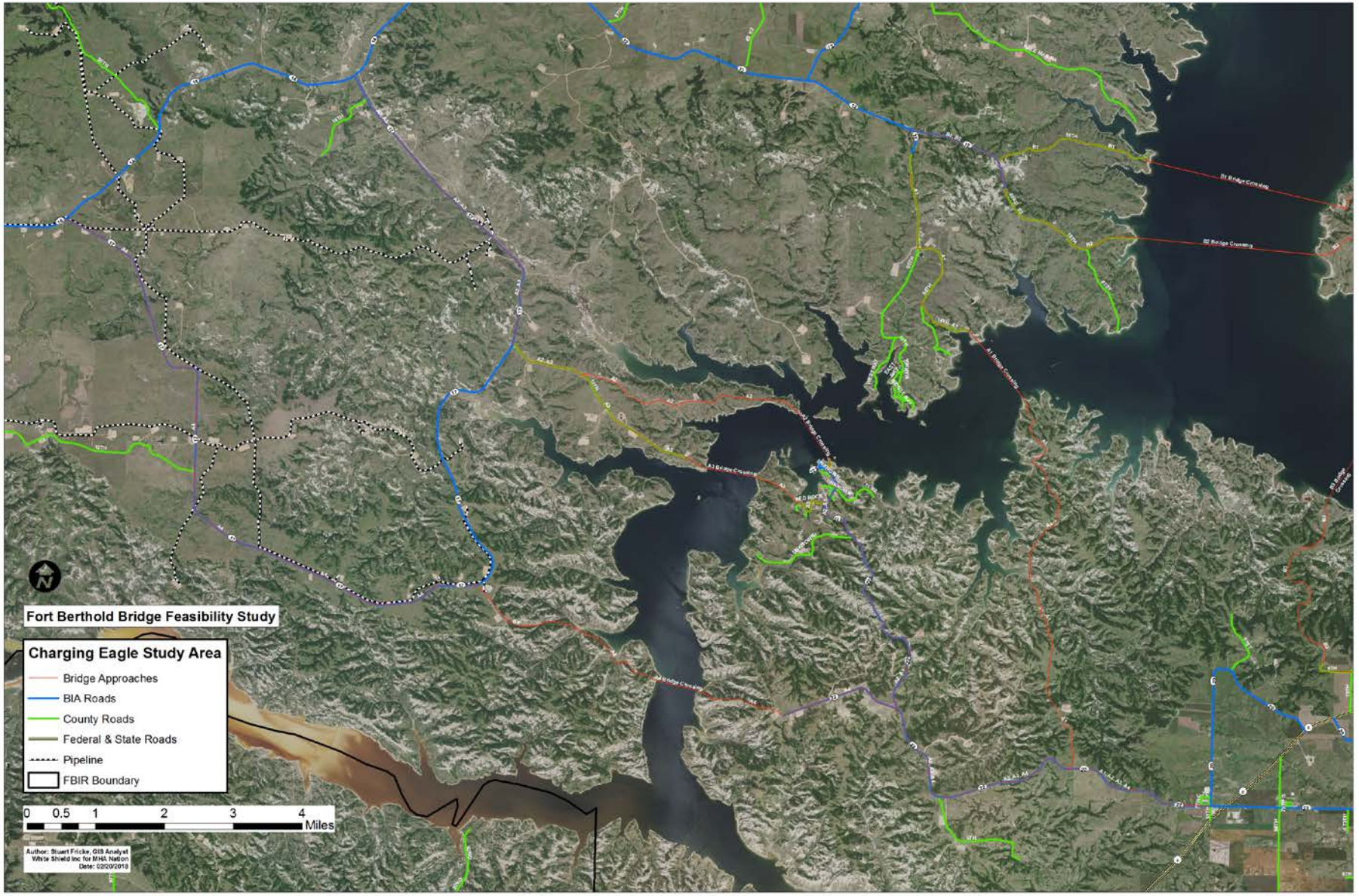

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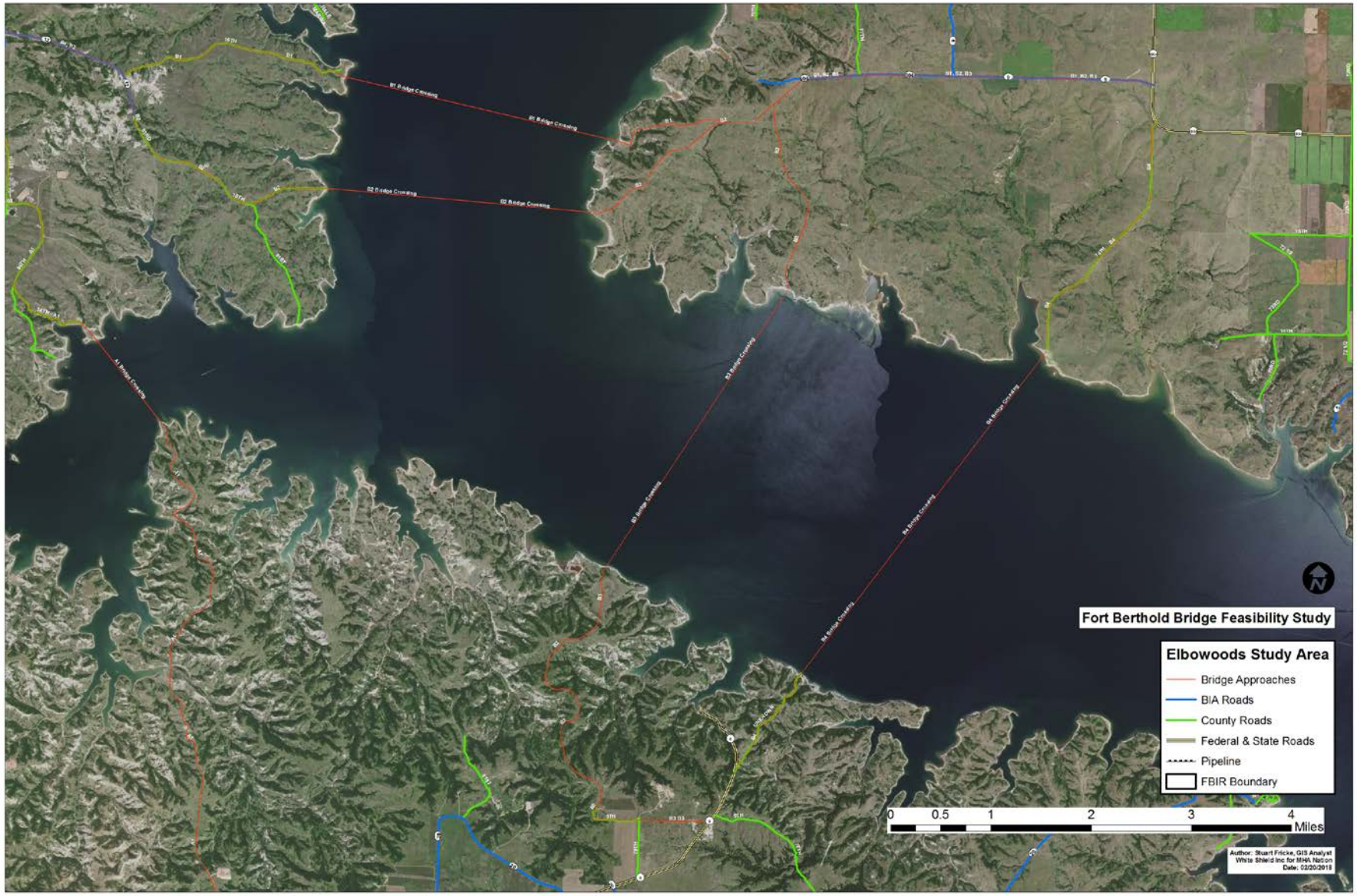
Conceptual Routes and Crossing Locations



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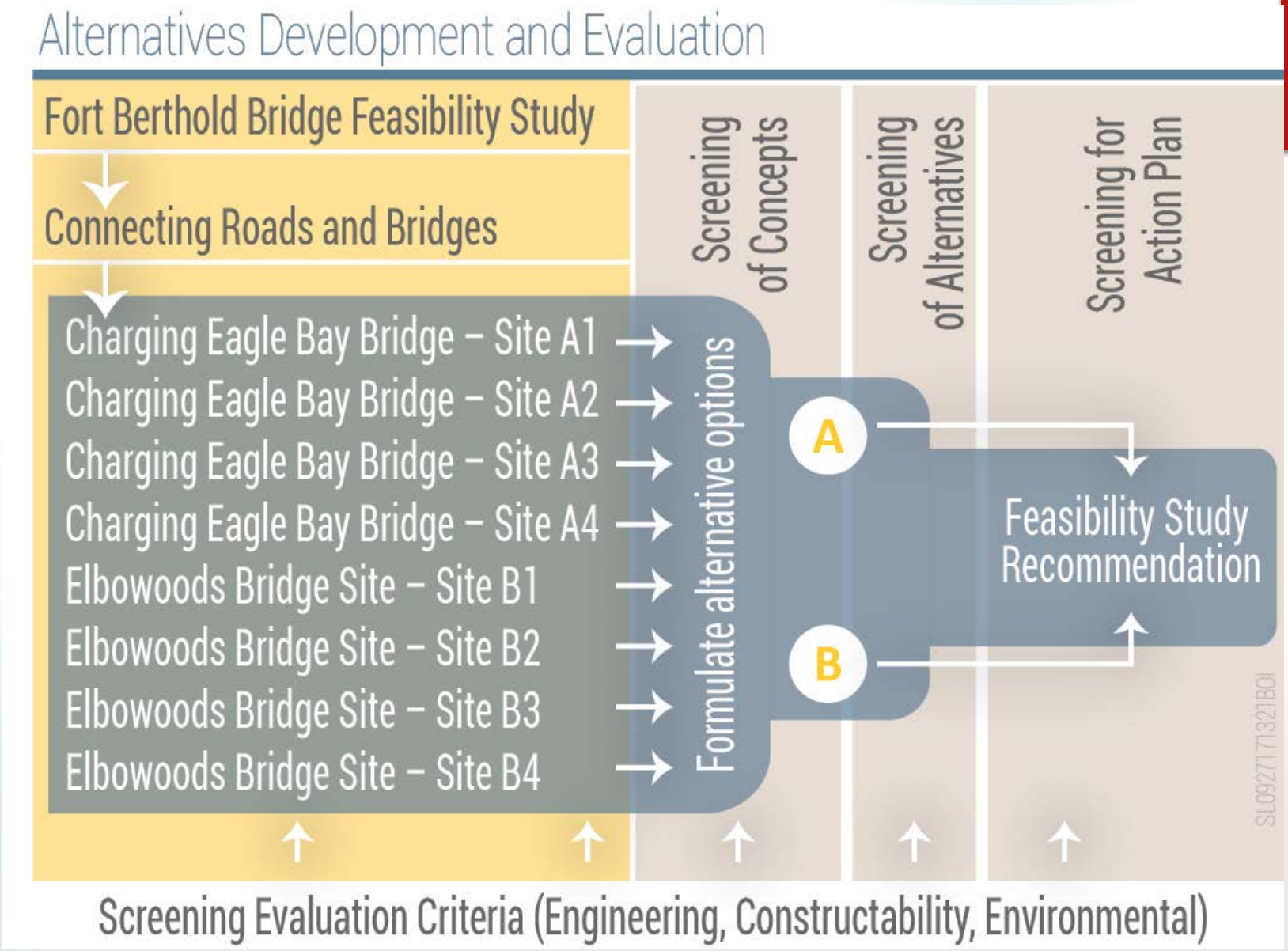

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Fort Berthold Bridge Feasibility Study

Feasibility Elements

1. **Design Criteria**
   - Bridge Criteria
   - Roadway Criteria

2. **Analyze Bridge Sites**
   - Geographic Location
   - Bridge/Road Length

3. **Infrastructure Needs and Impacts**
   - Available Infrastructure
   - Impacts on Existing

4. **Impacts of Bridges on Traffic Patterns**
   - Traffic Flow
   - Travel Time
   - Change in Patters
   - Roadway Safety
   - Construction and Maintenance Costs

5. **Social and Economic Analysis**
   - Regional Socioeconomic Conditions
   - Economics Impact of Bridge Construction
   - Benefit-Cost Analysis
   - Non-Monetary Impacts
   - Bridge Financing Analysis

6. **Environmental and Land Use Evaluation**
   - Define Corridor Boundary
   - Identify Valued Ecosystem Components and Analysis Areas
   - Identify Land Use
   - Cultural Resources and Socio-Cultural Research
   - Environmental Impact Assessment Identification
   - Least Harm Path Analysis
   - Environmental, Land Use, and Socio-Cultural Comparative Matrix

7. **Bridge Crossing and Roadway Corridor Evaluation**
   - Draft Fort Berthold Bridge Feasibility Study
   - Final Fort Berthold Bridge Feasibility Study

*** **Ongoing Tribal, Stakeholder, and Public Involvement**

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Fort Berthold Bridge Feasibility Study

Process

Step One: Project Initiation

Step Two: Study Area(s) Assessment

Step Three: Purpose and Need

Step Four: Develop and Evaluate Concepts

Step Five: Develop Draft Feasibility Study

Step Six: Prepare Final Feasibility Study

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TAC Engagement Opportunities

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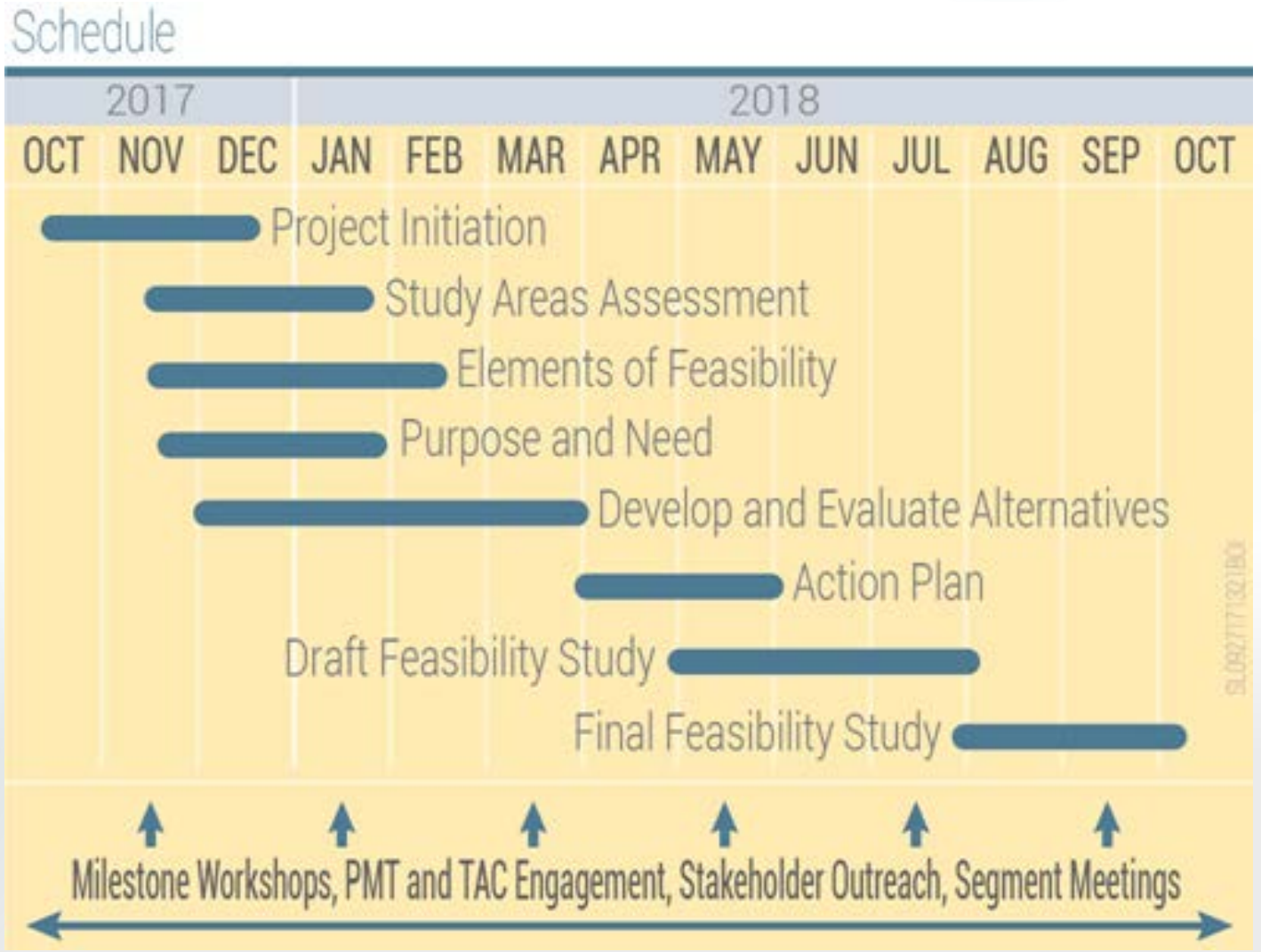

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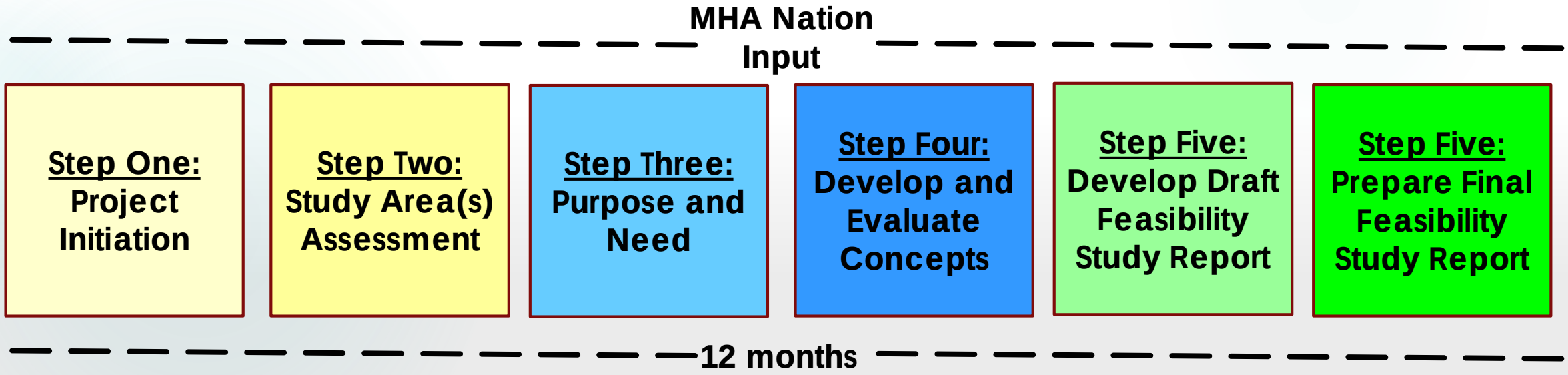
Fort Berthold Bridge Feasibility Study

Summary



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WORKING LUNCH BREAK

20 Minute Break to get a lunch and then we will continue the second half of todays workshop.

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TAC Input – Project Framing

- Critical success factors
- Project goals and screening criteria
- TAC member preferences
- Key assumptions and boundaries
- Project issues and challenges

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Fort Berthold Bridge Feasibility Study

Alternatives Evaluation Criteria

Evaluation Criteria	Important Measurement Concepts
1. Enhance Safety	
1A. Safe intersections and road connections	Number of non-separated intersections
1B. Safe bicycle and pedestrian travel	Constraints to providing safe bike/ped travel
1C. Improved lighting and other safety enhancements	Improved safety on tribal road network
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10. Estimated Construction and Long-Term Maintenance Cost	Cost will be compared to the non-monetary aspects of alternatives

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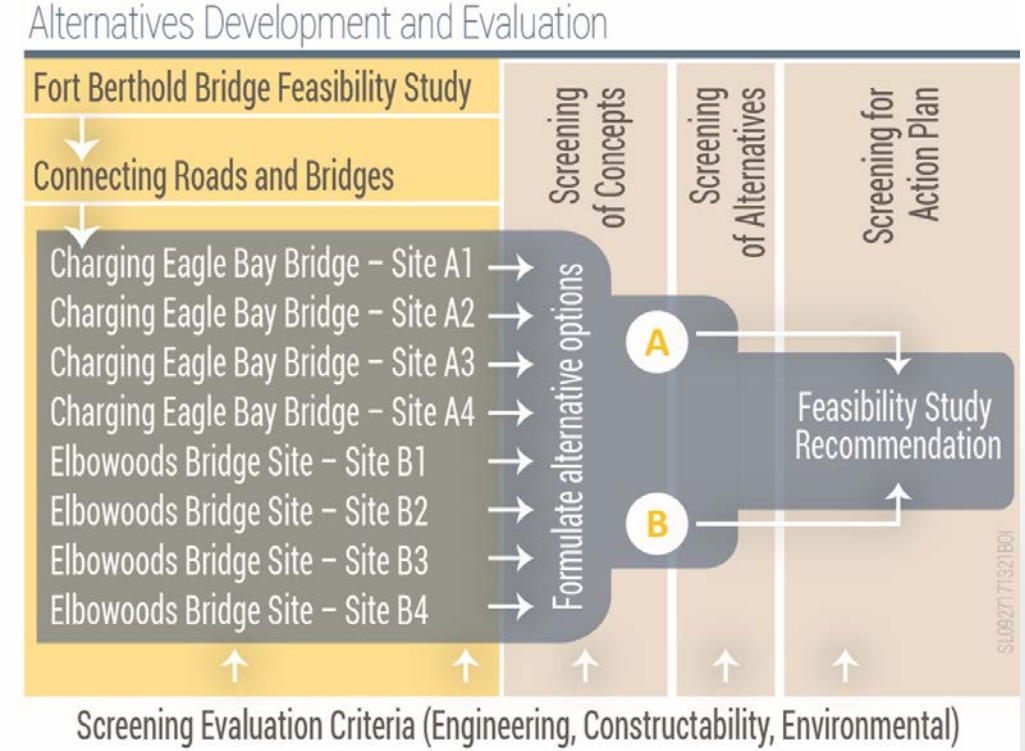
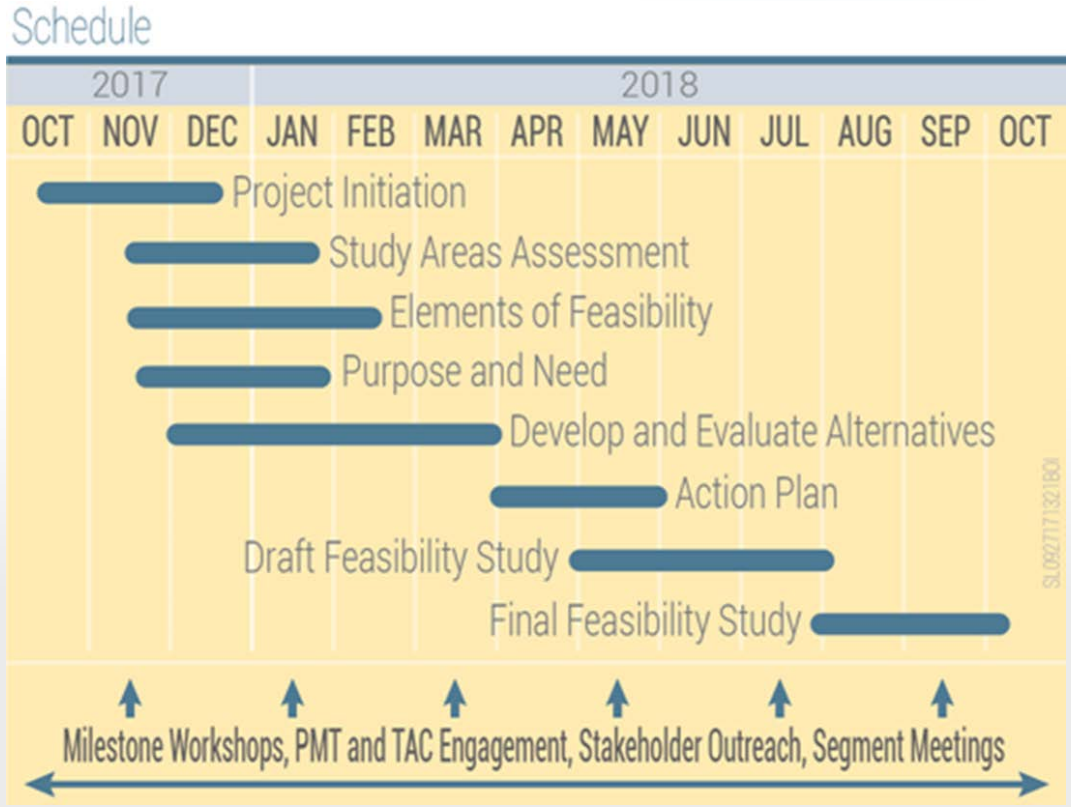
FORT BERTHOLD COMPREHENSIVE REGIONAL TRANSPORTATION PLAN

Project Schedule and Engagement





Fort Berthold Bridge Feasibility Study is an iterative and collaborative process with the MHA Nation

FIGG/ch2m: ALLIANCE
in assoc. with Akana | White Shield | KLJ | Braun | Ayres

MHA NATION
FORT BERTHOLD COMPREHENSIVE REGIONAL TRANSPORTATION PLAN

Fort Berthold Bridge Feasibility Study

Questions/Comments?

What do you want or need in terms of information, outreach, and coordination so that you can champion this effort?

We need to hear your concerns and suggestions to make this successful.

This is an exciting MHA Nation Project and we are here to facilitate successful delivery of this important project.

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Design Criteria Memo

TECHNICAL MEMORANDUM

Fort Berthold Bridge Feasibility Study

Design Criteria

PREPARED FOR: Ron Hall/MHA Nation

COPY TO: Technical Advisory Committee

PREPARED BY: AKANA
FIGG Bridge Engineers
CH2M

DATE: January 12, 2018

REVISION NO.: DRAFT

Introduction

The Fort Berthold Bridge Feasibility Study will comprise two separate bridge feasibility studies, and require a connectivity element with existing roadway systems. The roadways leading up to the potential bridge locations comprise county major collectors with gravel surfacing, paved county major collectors, and state rural highways. Some of these roadways may need to be upgraded or fully reconstructed as a part of the project. The criteria for each road classification is described below.

Roadway Design Criteria

The following list of roadway criteria was derived from the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets, 6th Edition* (commonly referred to as the Green Book) (2011):

- Rural collector target design speed of 40 miles per hour.
- Sight distance.
- Horizontal curve design.
- Vertical curve design, stopping sight distance for crest curve design and comfort curve design for sag curves.

The following manuals were used to supplement the Green Book in defining roadway design criteria:

- North Dakota Department of Transportation *Design Manual*, Current Edition.
- AASHTO *Roadside Design Guide*, Fourth Edition (2011).
- *Traffic Engineering Handbook*, Institute of Transportation Engineers, 2009.
- *Manual on Uniform Traffic Control Devices*, 2009 Edition, Federal Highway Administration.
- AASHTO *Guide for Development of Bicycle Facilities*, Fourth Edition (2012).

The following criteria is the horizontal and vertical roadway criteria:

2. Roadway Typical Section Requirements:
    - Maximum Allowable Grade: 10%
    - Minimum Allowable Grade: 0.5%
    - Maximum Cross-Slopes: 2.1%
    - Minimum Cross-Slopes: 1.5%
    - Minimum shoulder cross-slope: 2.0%
    - Maximum shoulder cross-slope: 4.0%

The following is the trail criteria:

1. Width of Trail on Bridge: 3’
2. Width of Connecting Trails: 3’

Table 1 shows the criteria for county major collector gravel, county major collector paved, and state rural highway.

Table 1. Design Criteria Table

	County Major Collector Gravel	**County Major Collector Paved**	**State Rural Highway**
Lane Width	14 feet	12 feet	12 feet
Ultimate Surfaced Shoulder Width	N/A	4 feet	6 feet
Projected Surface Shoulder Width	N/A	4 feet	6 feet
Projected Total Surface Width	N/A	32 feet	36 feet
Shoulder Type	N/A	Gravel	Gravel or Paved
Cross Slope (Normal Crown)	2.1%	2.1%	2.0%
Shoulder Slopes	2.1%	2.1%	4%
Shoulder Slopes File	4:1	4:1	4:1
Inslopes	4:1	4:1	4:1
Ditch Bottoms Standard slopes	20:1	20:1	20:1
Ditch Width	10 feet	10 feet	20 feet
Backslopes Right Center Line (south and east side)	3:1	3:1	5:1
Backslopes Left Center Line (north & west sides)	3:1	3:1	7:1
Road Section (min)	6”	18”	16”
Gravel Base	6 inches	12 inches	12 inches
HMA	N/A	6 inches	4 inches
Target Design Speed	40	55	55

% = percent
HMA= Hot Mix Asphalt

Bridge Design Criteria

A. Design Specifications

1. *AASHTO LRFD Bridge Design Specifications*, Eighth Edition, 2017, unless modified or clarified in these criteria.

2. AASHTO *Manual for Bridge Evaluation*," Second Edition, with 2011, 2013. 2014, 2015, and 2016 Interim Revisions.
3. *CEB-FIP Model Code 90*, for concrete time dependent properties only.

B. Design Loading:

1. Permanent Loads (DC, DW, EV, EL):
    a. Unit weight of materials: *AASHTO LRFD Bridge Design Specifications*, Article 3.5.1.
    b. Bridge railings: 450 plf for traffic railing and 150 plf for pedestrian railing for concept design (to be modified for actual railings selected in final design.)
    c. Future wearing surface: 15 pounds per square foot.
    d. Utility allowance: 200 plf
2. Permanent Loads (EH, ES): EH based upon 40 pcf equivalent fluid pressure for concept design (to be modified based upon geotechnical recommendations for final design).
3. Live loads (LL, IM, PL, CE, BR, LS):
    a. HL-93 with Impact (Design Truck or Tandem and Design Lane Load).
    b. Design speed: Varies based on roadway geometry and road classification.
    c. Deflection limit: L/1000 for vehicular only bridges and L/800 for bridges with pedestrians.
    d. Fatigue truck.
4. Wind Loads (WS, WL):
    a. Per *AASHTO LRFD Bridge Design Specifications*.
5. Water Loads (WA):
    a. Per *AASHTO LRFD Bridge Design Specifications*.
    b. Design high water: Elevation 1856 above mean sea level (amsl).
    c. Design low water: Elevation 1817 for concept design (to be modified as required in final design).
    d. Velocity negligible.
6. Thermal Forces (TU, TG):
    a. Mean temperature: 40°F
    b. Thermal coefficient: 0.0000060/°F (Concrete)
    0.0000065/°F (Steel)
    c. Seasonal variation (Procedure A, cold climate):
    <u>Concrete Structure:</u>
        Temperature rise: 40°F
        Temperature fall: 40°F
    <u>Steel Structure:</u>
        Temperature rise: 80°F
        Temperature fall: 70°F
    d. Temperature gradient: Per *AASHTO LRFD Bridge Design Specifications*, Zone 2
7. Creep and Shrinkage (CR, SH):
Strains are calculated in accordance with *CEB-FIP Model Code 90* with a relative humidity of 70 percent.
8. Extreme Events (IC, EQ, CT):
    a. For concept design an ice pressure of 100 psi with a thickness of 36 inches (a site-specific ice loading study is recommended to confirm/refine forces for final design).
    b. Seismic design shall be in accordance with *AASHTO LRFD Bridge Design Specifications*, Seismic Zone 1.
    c. Vehicular collision forces shall be in accordance with *AASHTO LRFD Bridge Design Specifications*, and includes:
        i. Piers adjacent to roadways and railways.
        ii. Vehicle collision with bridge railing.

iii. No vessel collision is considered.

9. Load modifiers in accordance with *AASHTO LRFD Bridge Design Specifications*: $\eta_D = 1.0$, $\eta_R = 1.0$, $\eta_I = 1.0$
   (to be confirmed prior to final design).

C. Design Method:

1. The bridges shall be designed for applicable service, strength, fatigue, and extreme event limit states as defined by the load groups in *AASHTO LRFD Bridge Design Specifications*. Use Class 1 exposure condition with $\gamma_e = 1.00$ for crack control computations.
2. Bridges shall be designed for bearing replacement.

D. Foundation Elements:

1. Geotechnical capacity to be determined per geotechnical recommendations. Structural capacity per *AASHTO LRFD Bridge Design Specifications*.

E. Geometry:

1. Roadway Grades:
   a. Minimum grade is 0.2%.
   b. Maximum grade is 3.0%.
2. Cross-Slope:
   a. Minimum cross-slope is 2.08%.
   b. Maximum cross-slope is 4.00%.
3. Section Widths
   a. Lane Width is 12 feet.
   b. Shoulder width: 4’ to 8’
4. Clearances:
   a. Minimum vertical clearance is 16 feet, 6 inches over roadways and 23 feet, 6 inches over railroad tracks.
   b. Minimum horizontal clearance shall be the roadway clear zone for roadways and 25 feet, 0 inches for railroad tracks.
   c. 185 feet, 0 inches horizontal by 55 feet vertical for navigation clearance in one span over the Missouri River main stem (to be confirmed in final design).
   d. Clearances over Charging Eagle Bay to be determined.

F. Drainage:

1. Deck drainage design based on 10-year storm event.
   a. Maximum spread for design storm shall not exceed shoulder width.
   b. Deck Drains shall be 6-inch-diameter drains through deck.
   c. Deck runoff shall fall directly from deck drains. No collection piping is used.