Governor's Upper Yellowstone River Task Force
Meeting Summary
January 17, 2002
Yellowstone Inn
Meeting began at 7:10 p.m.

I. Introduction

Members Present:

John Bailey, Chair
Jerry O'Hair
Brant Oswald
Rod Siring
Bob Wiltshire

Others Present:

Ken Britton, USFS Ex-Officio
Tom Olliff, YNP Ex-Officio
Terri Marceron, USFS Ex-Officio
Laurence Siroky, DNRC Ex-Officio
Ron Steg, DEQ Ex-Officio
Allan Steinle, Corps Ex-Officio
Stan Sternberg, MDT Ex-Officio
Joel Tohtz, FWP Ex-Officio
Liz Galli-Noble, Coordinator
Amy Miller, Administrative Secretary
Duncan Patten, TAC Chair
Jeanne Souvigney
Jon Axline
Bryan Miller
Mandy Drysdale
Lionel Dicharry
Lesly Tribelhorn
Mark Goodman
Daryl Stutterheim
Paula Clawson
Karl Biastoch
Stan Todd
Karin Boyd
Richard Bondy
Karl Christians
Mike Rotar
John Dwight Hines
Gary Hoyem
Steve Holnbeck
Tom Pick
Jim Robinson
Rich Moy
John Stillman

II. Prior Meeting Minutes

Because there was not a quorum of voting Task Force members present, the November 13, 2001 minutes were not approved.

III. Upper Yellowstone River Bridges presentation

One of the most common issues brought before the Task Force to date has been the affect of bridges on the Upper Yellowstone River system. Given the tremendous concern about bridges in the community, the Task Force hosted a special monthly meeting and invited the Montana Department of Transportation (MDT) to address the impacts of bridges on the Yellowstone River, and the process by which the MDT establishes bridges.

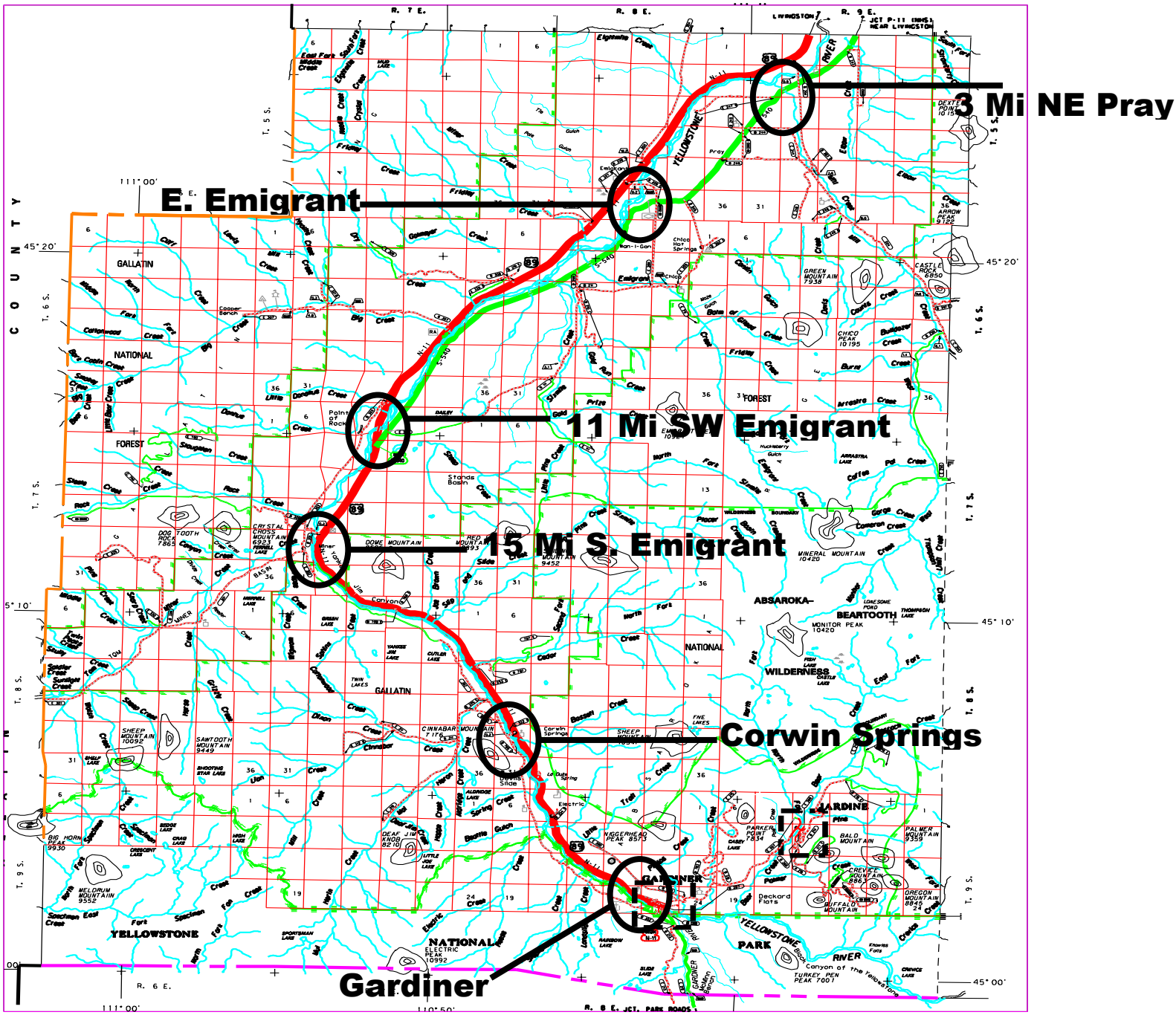
The meeting was moderated by Stan Sternberg (MDT Ex-Officio Task Force member). Stan began the presentation by identifying the 14 bridges located on the Upper Yellowstone River (from Gardiner to Springdale), see *Table 1* and *Maps 1* and *2* below. He then introduced four MDT staff, who made up a panel that would address major issues related to bridges on the Yellowstone, and who would answer questions from the audience. The panel included:

Jon Axline	Historical Review of Yellowstone River Bridges
Lesly Tribelhorn	Project Development, Public Participation, and Environmental Review
Mark Goodman	Hydraulic Aspects of Bridge Design
Bryan Miller	Bridge Design

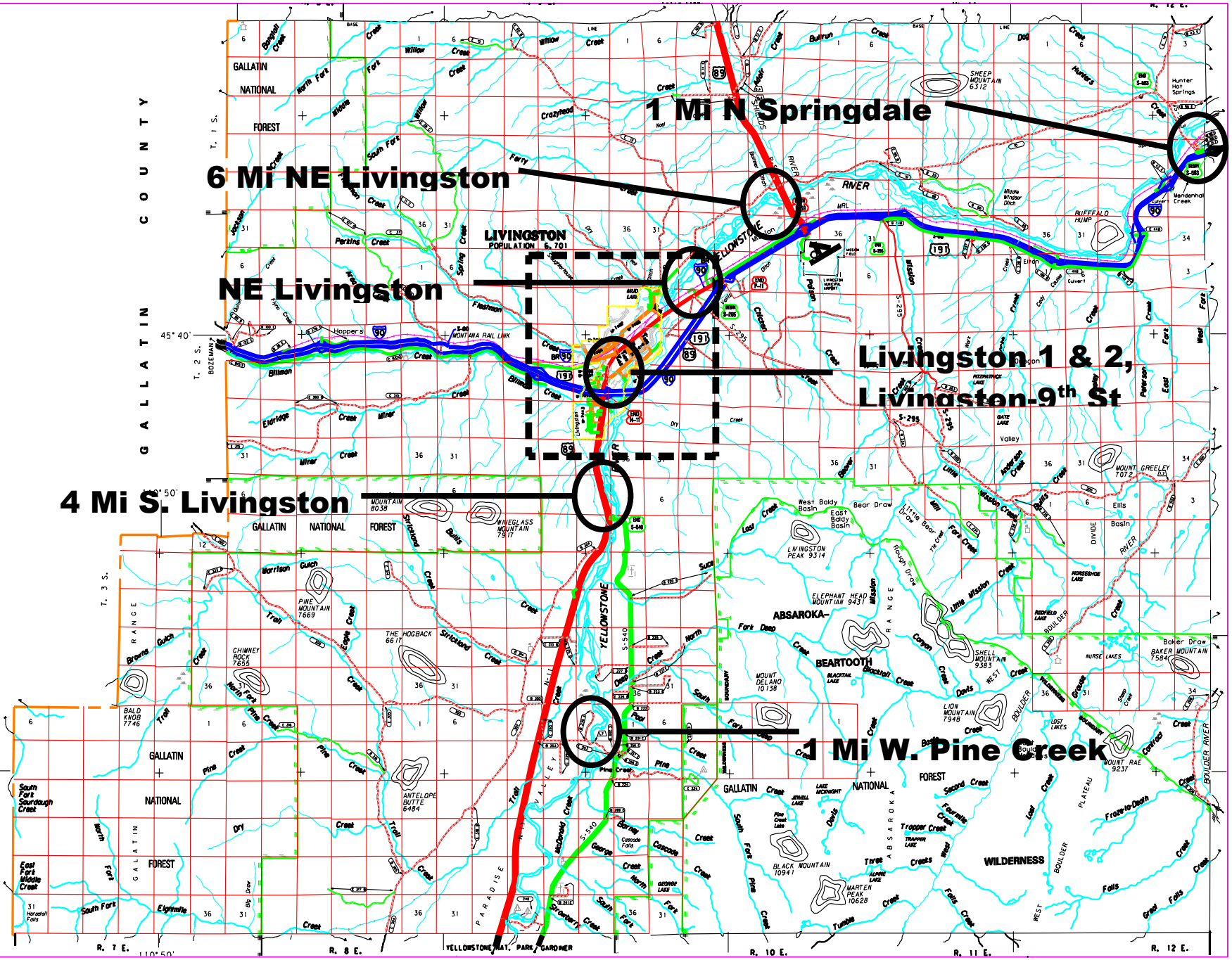
Table 1. BRIDGES CROSSING THE UPPER YELLOWSTONE RIVER

BRIDGE	SYSTEM / MILEPOST	LOCATION	COUNTY	BUILT	RECON	STATUS
1	P00011000+01651	GARDINER	PARK	1930	1975	SS
2	L34322000+02001	CORWIN SPRINGS	PARK	1908		FOERepl
3	L34301000+03001	15M S EMMIGRANT	PARK	1918		FOERepl
4	P00011020+04171	11M SW EMIGRANT	PARK	1958		SS
5	L34206000+04001	E EMMIGRANT	PARK	1949		SS
6	L34204000+05001	3M NE PRAY	PARK	1960		SS
7	L34203001+07001	1MW PINE CREEK	PARK	1990		SS
8	S00540031+06621	4M S LIVINGSTON	PARK	1921	1958	SS
9	I00090333+05521	LIVINGSTON	PARK	1962		FOERehab
10	I00090333+05522	LIVINGSTON	PARK	1962		FOERehab
11	L34391000+01001	LIVINGSTON-9TH ST	PARK	1964		FOERehab
12	P00011055+09401	NE LIVINGSTON	PARK	1934		FOERehab
13	P00059001+05131	6M NE LIVINGSTON	PARK	1955		SS
14	S00563000+09061	1M N SPRINGDALE	PARK	1980		SS

SS = structurally sufficient
FOERehab = functionally obsolete and eligible for rehabilitation
FOERepl = functionally obsolete and eligible for replacement


3 Mi NE Pray
E. Emigrant
11 Mi SW Emigrant
15 Mi S. Emigrant
Corwin Springs
Gardiner

Map 1


1 Mi N Springdale
6 Mi NE Livingston
NE Livingston
Livingston 1 & 2,
Livingston-9th St
4 Mi S. Livingston
1 Mi W. Pine Creek
LIVINGSTON
POPULATION 6,701
GALLATIN COUNTY
GALLATIN NATIONAL FOREST
ABSAROKA-BEARTOOTH WILDERNESS
YELLOWSTONE NAT. PARK / GARDINER
R. 7 E.
R. 8 E.
R. 10 E.
R. 11 E.
R. 12 E.
T. 1 S.
T. 2 S.
T. 3 S.
45° 40'
110° 50'

Map 2

Outlines of the MDT staff presentations are as follows:

1. BRIDGE-BUILDING ON THE UPPER YELLOWSTONE: A CHRONOLOGY PRESENTER: JON AXLINE

1872 Yankee Jim Road established in upper Paradise Valley by Bart Henderson and Horn Miller.

1880s Tom Carter constructs a log bridge across the Yellowstone River about four miles south of Livingston.

1883 Northern Pacific Railroad constructs a branch line to Cinnabar. The line is extended to the northern entrance of Yellowstone National Park at Gardiner in 1903.

1890s County constructs a multi-span steel through truss bridge across the Yellowstone at site of Tom Carter's bridge.

1898 Carter's Bridge destroyed and replaced by a new steel through truss bridge.

1904 First Yellowstone River Bridge at Emigrant constructed. It, too, was a multi-span steel through truss structure.

1908 Corwin Springs Bridge built by the Minneapolis Steel & Machinery Company for $16,100. The cost of the bridge was split between the County and Electric Hot Springs Company.

1910 Carbella Bridge built across the Yellowstone River by an as yet unknown contractor, but probably the Montana Bridge & Iron Company of Livingston.

1910 Yellowstone River Bridge near Pine Creek constructed by the Livingston-based Montana Bridge & Iron Company.

1913 County road on west side of river designated a component of the Yellowstone Trail, an interstate highway that ran between Plymouth Rock, Massachusetts and Puget Sound.

1914 County Road on west side of Yellowstone River designated a State Highway by the Montana State Highway Commission. The designation, at least theoretically at the time, made the road eligible for federal funding for construction.

1919 Second steel truss bridge at Carter's crossing destroyed.

1920 Construction begins on existing Carter's Bridge (completed in 1921).

1921 State Highway Commission decides to move state highway to east side of the Yellowstone River. Designated Route #11, it is eligible for Federal Aid highway funds. The last highway construction project along the east side of the river is completed in 1941.

1926 Route #11 christened U.S. Highway 89 while the old Yellowstone Trail through the Yellowstone valley through Bozeman is designated U.S. Highway 10.

1930 Gardiner Bridge constructed by Stevens Brothers for $57,000

1934 Construction of Yellowstone River Bridge one mile east of Livingston completed. The bridge was constructed by the McLaughlin Construction Company of Livingston for $68,628.65.

1949 Emigrant Bridge constructed by the McLaughlin Construction Company. It replaced an earlier steel truss bridge.

1955 Montana State Highway Commission relocates U.S. Highway 89 to the west side of the Yellowstone River.

1956 President Eisenhower signs Interstate Highway Act into law.

1962 Interstate 90 constructed around Livingston. Twin interstate bridges across the Yellowstone River built concurrently with project.

1990 Existing Yellowstone River Bridge at Pine Creek constructed.

2. PROJECT DEVELOPMENT, PUBLIC PARTICIPATION, ENVIRONMENTAL REVIEW & PERMITS
PRESENTER: LESLY TRIBELHORN

I. Project Development

Project Development Steps

* National Bridge Inspection program (NBIS)
* Solicit priorities from counties
* MDT bridge rating process
* Nomination process
* Tentative Construction Program (TCP)
* Project design

Bridge Inspection

* MDT uses the NBIS program to keep track of all the bridges in Montana
* NBIS is a standard inspection program
* Trained inspectors rate each bridge on a regular cycle to rate everything from structural soundness to safety to scour.
* Over 4,400 public bridges in Montana
* 2,500 are on the state road system
* 1,800 are on county and local roads
* Most bridges are inspected every two years
* Some bridges are on a yearly cycle, others on a four-year cycle

* Bridges are assigned a "sufficiency rating" following the inspection
* Sufficiency ratings represent:
    - Overall physical condition
    - Structural adequacy
    - Operational conditions (width, vertical clearance, approach alignment)
* Low sufficiency rating = eligible bridge

County Priorities

* Every few years, MDT requests the County Commissioners to review the eligible bridges and prioritize for replacement or rehabilitation
* MDT sent request December 18, 2001
* Counties are asked to consider the following criteria in setting priorities:
    - Sufficiency rating, structural condition, load capacity and posting requirements, overall importance of bridge to county, traffic volumes and types, public sentiment to replace or rehabilitate bridge. Does bridge serve the needs of the area? Does county have other sources of

funding to fix bridge?

MDT Bridge Rating Process

* Bridge Bureau rating process:

Sufficiency rating, structural condition, load capacity, detour length, county priority, total deficiency of individual bridge deck compared to others in county.

Nomination Process

* MDT districts prioritize the Bridge Bureau's bridge list
* 2002 Butte District projects (Park County is in Butte District):
  a. Four new "off system" bridge replacements
  b. One new "on system" bridge rehabilitation
  c. Two new "on system" bridge replacement, including Yellowstone River bridge NE of Livingston [BR 11-1(44)56]
* Project data entered and processed in Statewide Transportation Improvement Program (STIP), which is posted on the Internet for public review and input
* Transportation Commission approves STIP
* Funding levels determine and estimate construction dates set
* Federal Highway Admin approve project program
* Project enters MDT project development system

On system = roads that are federally funded

Tentative Construction Program (TCP)

* Proposed construction projects from the STIP are listed by financial district in specific funding categories
* Each district prioritizes projects; meetings are held to set the TCP

See the MDT web page: http://mdt.state.mt.us/planning/

Project Design

Step 1.

* District and MDT bridge personnel receive the partial preliminary engineering (PE) program document from MDT Planning Division
* Projects are assigned to design crew
* Preliminary field review is held on site

Step 2. Preliminary Field Review

MDT design team (specialized disciplines): Bridge Bureau, hydraulics, road design, environmental, geotechnical, right-of-way, district representative.

Local representatives: City/county officials, local road/bridge supervisors

* Confirm that replacement or rehabilitation is appropriate; addressing:
  One or two lanes, traffic restrictions, structural damage, width/height considerations, scour, environmental considerations
* Assess alignment and bridge location
* Determine survey needs
* Discuss design issues as a team
* Preliminary reports written and distributed throughout MDT
* Individual design areas determine level of involvement
* Project enters into Preconstruction Management System (PMS), which is a critical path project management system
* Design activity hours and durations set
* Start and end dates determined for design activities for all disciplines

Project Design Phases

1. **Survey Phase**

   Includes: survey, data gathering, public involvement meeting/news release, environmental studies, preliminary road alignment/grade, hydrologic analysis, size bridge opening.

2. **Design Phase**

   Technical design work: Geotechnical analysis of bridge site
   Irrigation/drainage feature designs
   Address road safety concerns (geometrics, width, side slopes, guardrail needs)
   Preliminary bridge design (size, type, location)

   Plan-in-Hand Review: Design team and local officials meet on site

3. **Right-of-Way Phase**

   Bridge design (structural), final design reviews to check plans, final environmental reviews, mitigation plans finalized, utility moves initialized, "right-of-way" agents meet with landowners and begin negotiations, permits acquired, contract plan package completed.

Schedule

Typical bridge project development takes three to four years:
Survey phase = 18 months
Design phase = 12 months
Right-of-way phase = 18 months

II. Public Participation Process

* Level of public participation will vary depending on the potential impacts of the project
  Minor projects: News release in local papers
  Major projects: Start with public informational meeting
  Public hearings held for projects with major environmental impacts

* PUBLIC PARTICIPATION IS IMPORTANT TO MDT
  - Please participate EARLY
  - Attend informational meeting and provide input
  - Call or email the District Office
  - Talk to your local city and county officials
  - Don't wait until the project design process is completed, because it is hard to change the plans at the last minute

* Public Participation Meetings
  Presentation of pre-design conceptions for the proposed bridge work
  Questions and answers are recorded
  Time is given for informal discussions between individuals and design personnel
  Design personnel are looking for input to aid in design
  Design personnel are looking for potential impacts and areas to avoid
  REMEMBER:
  Your input is very important!!
  The best time for input is early in the design process!!

III. Environmental Process

* Level of environmental review depends on the project
  Minor involvement: Requires MDT's lowest level of documentation (Categorical Exclusion)
  Example: Bridge deck work on Carter's Bridge, summer 2001
  Major involvement: May lead to an Environmental Assessment (EA) or Environmental Impact

Statement (EIS)

* Studies included in environmental review:
  Air and water quality assessment, hazardous waste and water quality assessment, traffic noise assessment, wetland findings, biological assessment, cultural resource assessment and Section 106 clearance
* Reports on various assessments are compiled and information is included in the environmental document
* The environmental document is sent to FHWA for approval and signatures
* Mitigation plans are developed as necessary for the identified impacts
* Erosion control plans are developed
* Seeding plans and noxious weed control are included in the plan package
* Permits are acquired in last phase of design (including: storm water permit, water quality permit, Stream Preservation Act permit, Corps Section 404 permit, Floodplain permit, clearance for hazardous materials/substances, utility and railroad agreements, construction permits from landowners)
* Historic Bridges
  a. Have been identified throughout the state
  b. Most are documented under statewide programmatic document and are eligible for replacement
  c. They are available for adoption under MDT's "Adopt a Bridge" program
  d. Demolition money is available to new owner to offset moving costs

3. HYDRAULIC ASPECTS OF BRIDGE DESIGN
MDT HYDRAULIC DESIGN CRITERIA FOR BRIDGE OPENINGS
PRESENTER: MARK GOODMAN

Introduction
Following is a brief introduction to the MDT's engineering approach to the Hydraulic Design of Bridge Waterways.

Field Review
- After the project is programmed the design team including the Hydraulic Engineer will visit the project site.
- Prior to the site visit as much office review as possible is done including drainage area determination, preliminary hydrology, aerial photo review if available, determination if FEMA floodplains will be involved, review of As-Built plans, review of old project files, and design plans.
- During the F.R. representatives from Maintenance are present and information regarding overtopping conditions, ice, debris, flooding, etc. are determined.
- Possible alignments are discussed including those that minimize impacts to the stream with respect to longitudinal and transverse crossings and proposed skew of new crossing.
- Evaluation of risks to property, the traveling public, buildings, etc.
- Upon return to the office a Location Hydraulic Study Report is written documenting our findings and requesting the necessary survey to begin design.

Design Floods
- Selection of design flood frequency is dependent on route classification and ADT of the road
- FEMA floodplains require evaluation of Q100 and regulations will have specific requirements regarding increases in water surface elevations.
- Rule of thumb (off-system Q10, secondary Q25, NHS and Interstate Q50). This initial flood evaluation is referred to as trial design flood. Special consideration given to evacuation routes, mail routes, school bus routes, site risk, etc.
- Check flood Q100 in all cases to determine impacts during this event.
- Q500 analyzed in when overtopping not practicable (all flow goes through the structure.

Hydrology
- USGS stream gage data. We rely heavily on this data and work with the USGS as needed.

- Discharge Frequency data available on major rivers such as Yellowstone River
- Regressions equations available on un-gaged streams
- Published FEMA studies available in some areas, which include published discharges. Depending on age of study this discharge may be independently verified.

Hydraulic Modeling Tools

- Early 1900's bridge lengths were determined based on shortest river crossings (spittoon method) and available bridge spans.
- In the 1960's single section bridge models were "state of the art" (required much judgment in determining slope, typical cross-section, very manpower intensive, all hand-calculations, usually only a couple of openings were evaluated, if that.)
- Early to mid-1970 advent of water-surface profile modeling- one dimensional flow analysis (allowed multiple river cross-section data to be utilized, models could be started far enough d/s to eliminate errors in water-surface elevations at point of interest, allowed for sensitivity checks, and many more alternatives could be evaluated.)
- Today two-dimensional models are available but are very data intensive and require much time, experience and judgment to apply. Physical modeling at places such as CSU are available but are usually used on a limited basis due to costs and nature of projects.

Geomorphology Or Plan Forms

- Evaluation of aerial photo history of river systems is done. The MDT has a pretty good inventory of these photos for on-system bridges.
- Classification of stream types and their tendencies (meandering rivers, braided systems, straight river systems)
- Evaluation of outside influences such as river gravel mining, watershed development and possible change in hydrology, forestry, fires, and road construction,)
- Stable versus unstable
- Stream bottom materials are classified and d50 determined for use in scour calculations.

Hydraulic Performance Of Existing Bridges

- Develop baseline data for existing structures
- Water surface profiles
- Existing Backwater/overtopping frequency
- Current level of service
- Existing Velocities
- Scour estimates

Hydraulic Model Of Proposed Structures

- Remove existing structure from water surface model and introduction of various alternatives and options
- Clear spans, alternate beam depths, pier arrangements, pier types and widths
- Various road grade and overtopping scenarios
- Level of service evaluation
- Evaluate criteria such as backwater, velocities, scour
- Evaluate <u>site constraints</u> such as ice, debris, historic flooding conditions
- Evaluation of site risk (what's upstream homes, crops, outbuildings, available detour routes, allowable overtopping frequency)
- Evaluation of pier, contraction and pier scour

Model Calibration

- Calibration: How do we know our water surface elevation predictions are accurate? (match known flood elevations from historic accounts, USGS stream gage rating curves, flood photos)

- Over bank conveyance. Is flow really moving out in the over bank or is it just ponded. Again site reviews, discussion with locals or maintenance, or review of aerial photos during flood events.
- High-water marks on bridge piers, debris lines, estimates made by USGS during large floods events.

Overtopping Events

- This is a very important concept.
- Determines level of service for structure or road system
- Typically the event at which scour is most critical and backwater is highest

Structure Type

- Advent of truss allowed use of very shallow superstructure and limited number of piers in channel
- Perched structures allowed very large flood events to overtop road and wash out an approach but saved the structure itself
- Current design criteria for road grades, site distance, bridge types (pre-stressed concrete, steel, poured in place concrete have required grade raises which at times raise overtopping grades, increased opportunity for pressure flow, contraction and abutment scour)

Counter Measures (engineering decisions)

- Protection of our costly infrastructure, safety of the traveling public, and adjacent property.
- What do we have available to combat scour (contraction, pier, and abutment scour) and possibility of lateral and vertical channel instability
- Site selection: pick the most stable reach for our installation. This is mostly dictated by current location of road system, access to property, etc. Very rarely are we building new "virgin alignments".
- Riprap protection for abutment slopes
- Selection of structure type, span arrangement, pier location and type
- Tools: Guide banks, spurs, bend way weirs, …

Auxiliary Openings

- May be used in case of defined over bank channels
- May be used in documented case of blockage of main channel by ice or debris
- Have capacity to carry lower flows when main channel structure is unusable
- Adding overflow pipes to floodplains seldom do much to decrease water surface elevations of river system. Typically over bank flows are very shallow and velocities are low due to significant growth of trees, brush, hence conveyance in over banks can be very low. Hydraulic capacity of small diameter pipes is usually very small in comparison to discharge of entire system.

River Controls

- Controls downstream of bridges can control overall profile of river system independent of bridge opening size in question
- Levees, dams, irrigation check structures, lakes,
- Natural constriction of the river system (natural narrowing of the river corridor)
- Other bridges (the highway very often shares the same corridor as the railroad, frontage roads, local collectors, private roads and bridges, etc)
- Change in river flow regime (slope of channel), steep chutes

Final Output

- Hydraulic Report
- Recommended opening sent to Bridge Bureau for preliminary design
- Minimum road grades and overtopping sections requested of Road Design as necessary.
- Detail sketch of calculated pier, contraction, and abutment scour.
- Bridge will develop preliminary layout

- Road grades, bridge layout, and Hydraulic recommendations reviewed (Sometimes an iterative process)

4. BRIDGE DESIGN: BRIDGE SIZE, TYPE, & LOCATION (STL)
PRESENTER: BRYAN MILLER

Gather and evaluate information. Determine site constraints, design parameters, and issues that need to be resolved.

Hydraulic Requirements
Hydraulic recommendations include design flood elevation, minimum waterway opening, ice and debris passage, scour (erosion) predictions, and scour counter measures.

Function of Route
Roadway design criteria are based on functional classification and traffic volumes. The MDT Planning Division determines the functional classification.

Roadway Geometrics / Alignment (Safety)
Is the existing roadway alignment (vertically and horizontally) safe or in need of improvement? What superstructure types will be accommodated by the proposed roadway alignment? Are there roadway approaches that need to be maintained at the ends of the bridge?

Existing Bridge
Evaluate the performance of the existing bridge to provide insight into the STL for the new bridge. Minimize conflicts of existing foundations with new foundations.

Utilities
Resolve utility conflicts with bridge replacement project. Includes gas, telephone, electric, and railroads.

Construction Considerations
Evaluate proposed bridge STL to minimize costs and environmental impacts due to construction.

Environmental Considerations
Wetland impacts, pier locations, and size to minimize impacts to channel, impacts to fisheries, birds and wildlife, match natural channel configuration upstream/downstream, minimize riprap, minimize effects to riparian zones and disturbance of hazardous materials.

Public Involvement
Public comments provide additional information to help determine site constraints, design parameters, and issues or concerns that need to be resolved.

Historic Bridges
Is the existing bridge historic? Will the old bridge remain in place? If so, flow characteristics through both bridges need to be evaluated. Or provide mitigation plan for historic bridges – advertise the bridge for adoption (try to find a new owner).

Pedestrian Considerations
Existing pedestrian facilities need to be perpetuated or added if needed.

Geotech / Foundation

Core samples are obtained in order to evaluate soils, groundwater conditions, seismic hazards, and anticipated settlements to determine foundation types.

Design Loads
Anticipated loads from traffic, stream flow, ice, wind, and seismic are evaluated to develop a bridge size and type sufficient to resist these loads.

Right-of-Way
Right-of-Way is expensive and sometimes difficult to obtain. A bridge STL is typically chosen that balances additional right-of-way requirements, safe highway geometrics, environmental impacts, etc.

Traffic Control
How will traffic be controlled?:

Close site for construction?
Is there an adequate detour available?
Construct temporary detour or build new bridge on new alignment?
Construct bridge in phases to maintain traffic?

Maintaining traffic can be a significant cost and may increase environmental impacts.

Cost (Alternate structure types)
Minimize construction and long-term maintenance costs by evaluating different structural element types. For example prestressed concrete beams versus steel beams. Steel beam have a higher initial costs and have higher maintenance costs. If the site allows for prestressed beams, that is the most economical choice.

Review
The proposed Bridge Size, Type, and Location are reviewed by other designers (Road Design, Hydraulics, Geotech, etc.), Environmental Specialists, the MDT District, and Resource Agencies (Fish Wildlife and Parks, Department of Environmental Quality, Corps of Engineers).

After the above site constraints, design parameters, and issues have been identified and resolved, with input from public involvement and resource agencies, the final bridge design is completed. Changes after final design are difficult, costly, and delay the completion of the project.

Question and answer sessions followed each presentation as well as at the end of the full presentation. For those who missed the meeting, this presentation was video taped. You may view that tape by contacting Liz Galli-Noble at #222-3701 and arranging a checkout time.

IV. Task Force Activities Update

Liz Galli-Noble reported that the new Task Force Partner Coordination Subcommittee met on January 14, 2002 and had nothing to convey at this time. She also reported that the *2001 Annual Report* was being printed, and that the final cost for 600 copies of the report was $1,716.00, $300.00 under the estimated budget.

Ron Steg (the new Ex-Officio member representing DEQ) was asked to quickly report on the Cooke City TMDL announcement. He reported that the Cooke City TMDL had recently been completed and the public was encouraged to review and comment on that report by visiting the DEQ web page at www.deq.state.mt.us and then click on "Cooke City TMDL Accepting Public Comment". The TMDL was conducted outside of the Task Force study area.

V. Schedule Next Task Force Meeting

The next Task Force meetings are scheduled for:

Socio-Economic Public Meeting: Monday, February 25, 2002 at 7:00 pm at the Yellowstone Inn.

Task Force Meeting: Tuesday, February 26, 2002 at 7:00 pm at the Yellowstone Inn.

VI. The meeting was adjourned at 10:30 p.m.