

# Highway Design Manual

## Chapter 12 - Field Work

*To navigate to a specific appendix, click on the list below.*

[Appendix 12-01: Existing Data](#)

[Appendix 12-02: Survey Request Slip Sample](#)

[Appendix 12-03: Sample COGO Report](#)

[Appendix 12-04: Field Book](#)

[Appendix 12-05: M&R Org Chart](#)

[Appendix 12-06: BOE Org Chart](#)

[Appendix 12-07: Field Review Guidelines](#)

## EXISTING DATA LOCATIONS

The Department maintains plan records in multiple locations. The following is intended to provide general assistance in locating these resources but should not be considered all encompassing.

### Past & Current Project Links:

NHDOT Intranet Home Page: Engineering Tools > GIS Interactive Maps – NH Roads

Browse to project location, use the ‘NHDOT Maps’ pull down to select ‘NHDOT Projects’, select blue circled ‘I’ information to pull up information window, hit on the blue circle then hit on the map to pull up available project plans for the selected locations. Scroll down to completed projects and hit on plan icon to view plans.

### Past & Current Project Numbers & Plans:

NHDOT Intranet Home Page: Engineering Tools > GIS Interactive Maps – Project Viewer

### As-Built Scanned Plans:

Home Page: Engineering Tools > Project Record Plans (by Town)

Home Page: Engineering Tools > GIS Interactive Maps – Project Viewer

V:\Projects\ProjectArchives\12322

### Existing ROW Plans:

V:\Bureaus\B14-FinanceContracts\Archive

V:\Bureaus\B50-ROW\Scanned ROW Record Plans

### Records Room & Archives:

Not all plans have been scanned so additional project information may be available from Records or Archives. Contact Records personnel for assistance. If located plans may be of assistance to future designers, you may want to have them scanned and arrange to have them added to the Project Record Plans (by Town) which is maintained by Audit.

District Offices: Check with the District Office to determine if they have old plans or cross sections.

Bridge & Large Culvert Plans: To begin, the Route number, Town, and Bridge Number must be known.

### Locating a Bridge number:

Home Page: Divisions/Bureaus > Bureau of Planning & Community Assistance (Document Library) > Bridges > Document Library > Maps > Town Bridge Maps or NH Bridges

### Locating Bridge Plans:

1. Determine if plans were already scanned:  
Home page > Engineering Tools > GIS Interactive Maps – NH Roads or Project Viewer
2. If not, look in  
V:\Bureaus\B14-FinanceContracts\Archive Bridge), scan for bridge number and plans
3. If not, walk into Bridge Design Bureau, turn right, go past Tub files on right and stop at small green index files organized by Route Number, or District. Find the route number, scan for town and bridge index card. Near the mid-top of the card there is a file number (e.g. 2-5-1-7); write number down. Go to basement records room and locate TUB 2, Folder 5-1, and look for the 7<sup>th</sup> project back from the front of the file. (\*Contact Bridge Design before pulling plans)
4. If plans would be useful for future reference, have plans scanned at print shop so they can put them on the V: drive in Step 2 above.

**DEPARTMENT OF TRANSPORTATION  
SURVEY REQUEST SLIP**

Rev. 10/19/12

PROJECT NAME: \_\_\_\_\_

STATE PROJECT NUMBER: \_\_\_\_\_

METRIC  IMPERIAL  SCALE: \_\_\_\_\_

DESCRIPTION OF SURVEY REQUEST: \_\_\_\_\_

REQUESTING BUREAU/SECTION: \_\_\_\_\_

SURVEY REQUEST BY: \_\_\_\_\_ DATE: \_\_\_\_\_

SURVEY COMPLETION DATE REQUESTED: \_\_\_\_\_

SURVEY REQUEST TO BE RETURNED TO: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

REMARKS: \_\_\_\_\_

PLAN PREP ESTIMATED PROCESSING TIME: \_\_\_\_\_ NOTED BY: \_\_\_\_\_  
(COORDINATE WITH PLAN PREP UPON SURVEY COMPLETION)

**REQUESTER: PLEASE INCLUDE INFO NEEDED BY GROUPS LISTED BELOW**

ADDITIONAL INFORMATION REQUEST (PLEASE INITIAL)

PRELIMINARY DESIGN _____	BRIDGE DESIGN _____
FINAL DESIGN _____	ENVIRONMENT _____
CONSULTANT DESIGN _____	UTILITIES _____
MATERIALS & RESEARCH _____	ROW _____

DESCRIPTION OF PROJECT: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_ TELEPHONE: \_\_\_\_\_

**TWO COPIES TO SURVEY & ONE COPY TO PLAN PREP**

**FOR SURVEY USE ONLY**

REQUEST APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

ESTIMATED COMPLETION DATE: \_\_\_\_\_

ESTIMATED CREW DAYS: \_\_\_\_\_

SURVEY SUPERVISOR: \_\_\_\_\_

PRIMARY CREW CHIEF: \_\_\_\_\_

TOTAL STATION       CONVENTIONAL       GEODETIC

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ACTUAL START DATE: \_\_\_\_\_

ACTUAL COMPLETION DATE: \_\_\_\_\_

## SAMPLE COGO REPORT

COGO REPORT FOR NH RTE 987

COMPILED BY J. DOE 04/011/13

DAB FOR MC5M

PBT 1 5200+44.3450 1103698.7566 331232.2796

N 48° - 56' - 10.5" E 730.8031'

PC 32 5207+75.1481 1104249.7669 331712.3429

PI = 5212+30.4272

D = 1° - 05' - 38.6"

I = 9° - 56' - 13.5" RT

R = 5236.9830

L = 908.2748

T = 455.2792

E = 19.7527

LC = N 53° - 54' - 17.2" E 907.1368'

PI COORD.= 1104593.0379 332011.4150

CP COORD.= 1107689.9322 327763.7667

PT 71 5216+83.4228 1104982.7690 332246.7633

N 58° - 52' - 24.0" E 657.6975'

PC 99 5223+41.1203 1105545.7755 332586.7480

PI = 5225+01.4817

D = 3° - 00' - 00.0"

I = 9° - 35' - 57.0" RT

R = 1909.8600

L = 319.9723

T = 160.3614

E = 6.7206

LC = N 63° - 40' - 22.5" E 319.5982'

PI COORD.= 1105683.0492 332669.6440

CP COORD.= 1106533.0429 330951.8571

PT 113 5226+61.0926 1105832.2240 332728.4882

N 68° - 28' - 21.0" E 567.5118'

PAT 139 5232+28.6044 1106360.1470 332936.7354

**SCANNED FIELD BOOK LOCATION & SAMPLE**

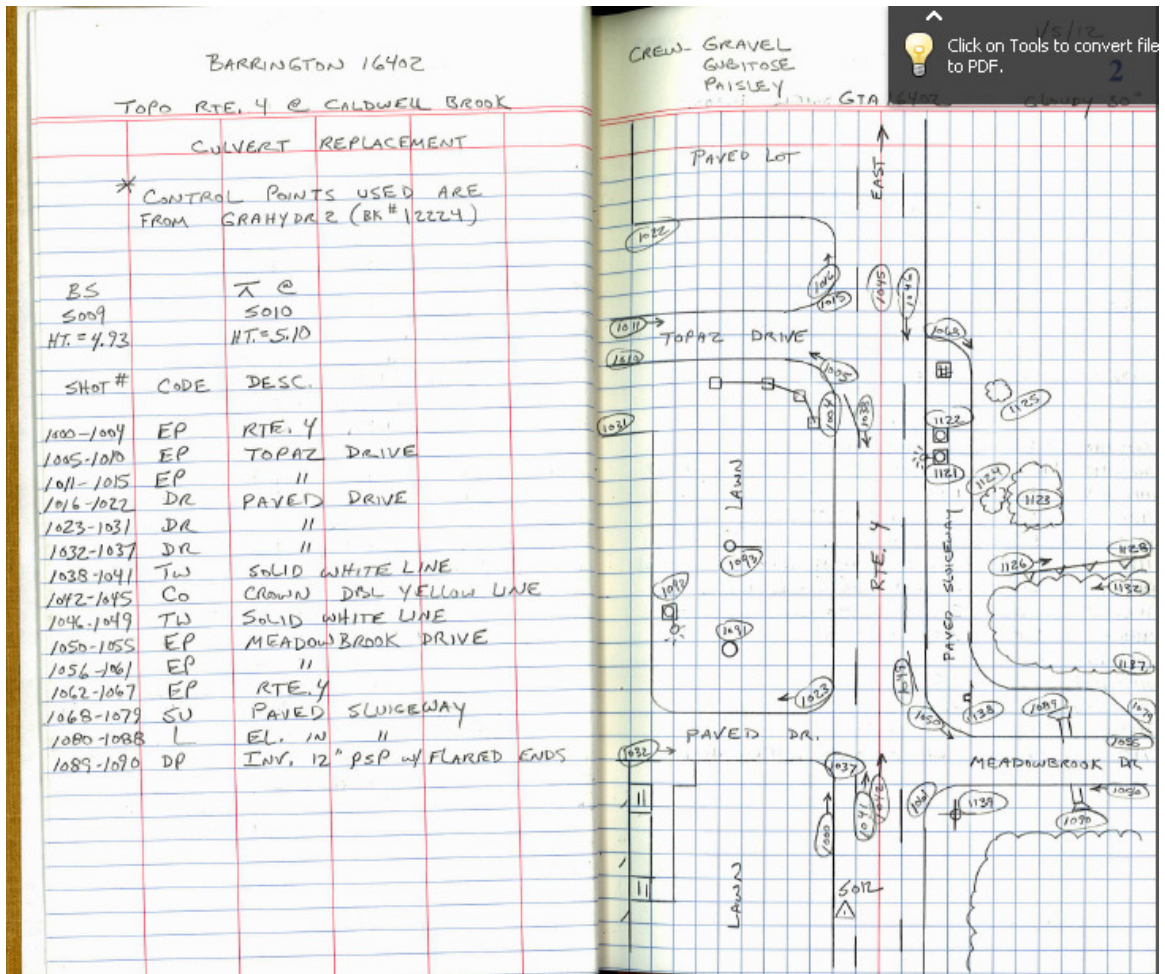
Records tracks the location of field survey books. Some field books for newer projects are being scanned and stored in an 'SDR Files' folder under the \Prj directory of the specific project.

E.g. N:\CADD\PBT\BARRINGTON\16402\Cadd\Prj\SDR Files\FieldBookNotes

There is also an Access database for searching/locating field books:  
G:\DATABASE\BUR34\Fieldbooks.mdb

Original Field books are produced by the survey crew, turned over to Preliminary Design for CADD plan production, then passed on to the Highway Design team who stores them until the project is archived to Records. A "Survey Field Book Routing Slip" should be used to keep track of field book locations.

A sample of a field book page follows:



## BUREAU OF MATERIALS & RESEARCH ORGANIZATION CHART

Material & Research consists of 5 sections, under the Bureau Administrator:

- Administration Section
- Geotechnical Section
- Materials Technology Section
- Pavement Management Section
- Research Section

Refer to *Bureau Contacts* under the Bureau of Materials and Research website for names of individual contacts.

<http://www.nh.gov/dot/org/projectdevelopment/materials/index.htm>

**Administration Section** is supervised by the Bureau Administrator and staffed by an Administrative Secretary and Program Specialist. This section coordinates personnel, bureau safety programs and administrative functions of the Bureau.

**Geotechnical Section** is supervised and managed by a Civil Engineer 6 and consists of 3 work units. The section maintains on-call agreements for geotechnical engineering services and subsurface exploration services to supplement in-house capabilities.

- ***Geotechnical Engineering Unit:*** Supervised by a Civil Engineer 5 and staffed with Civil Engineer 4's. This unit plans subsurface exploration programs, analyses subsurface data, performs engineering analyses, provides geotechnical recommendations, and prepares reports.
- ***Engineering Geology Unit:*** Supervised by an Engineering Geologist and staffed with Earth Scientist 2's. This unit implements exploration programs, prepares exploration logs, provides rock cut designs, oversees vibration monitoring and blasting operations, and manages the rock cut database.
- ***Field Explorations Unit:*** Supervised by a Drilling Superintendent and staffed by a Drilling Supervisor and Geological Exploration Technician (1 through 3 level). This unit operates exploration equipment and performs subsurface explorations including test borings, test pits, and asphalt coring.

**Materials Technology Section** is supervised and managed by a Civil Engineer 6 and consists of 3 work units. Each unit maintains a CCRL accredited lab. The section maintains on-call agreements for material testing, precast plant and asphalt plant inspection to supplement in-house capabilities.

- ***Soils/Portland Cement Concrete Unit:*** Supervised by an Engineering Technician 5 and staffed with Engineering Technicians (3 and 4 level). This unit performs independent assurance testing of soil, concrete and related materials, performing various laboratory and field tests. Performs concrete plant certifications and precast placement inspections. Maintains the Laboratory Information Management System (LIMS).
- ***Bituminous Concrete Unit:*** Supervised by an Engineering Technician 5 and staffed with Engineering Technicians (3 and 4 level). This unit performs asphalt mix design acceptance, certifies asphalt plants and materials acceptance testing during production. The unit also provides its own independent assurance testing.
- ***Chemical Testing Unit:*** Supervised by a Supervising Lab Scientist and staffed with a Laboratory Scientist and an Engineering Technician 3. This unit performs acceptance testing of asphalt binders, traffic paint, and other products.

**Pavement Management Section** is supervised and managed by a Civil Engineer 6 and consists of 2 work units.

- ***Pavement Design and Contracts Unit:*** Supervised by a Civil Engineer 4 and staffed with Civil Engineers 3. This unit determines pavement section treatments and recommendations, including both base courses and asphalt pavement structures, and provides reports. This unit administers Turnpike and District resurfacing contracts.
- ***Asset and Pavement Management Unit:*** Supervised by a Civil Engineer 4 and staffed with a Civil Engineer 3 and a Data Collection subunit led by an Engineering Technician 5 and staffed with Engineering Technician 3's. This unit maintains the Pavement Management System (PMS) for all state maintained roadways. This unit operates the ride quality van collecting road condition data and performs quality assurance testing of ride smoothness traffic paint retro-reflectivity on new construction.

**Research Section** is supervised and managed by a Civil Engineer 6 and is staffed with a Civil Engineer 4 and Engineering Technicians (4 and 5 level). The section coordinates various research efforts for the Department including administration of the Federal-Aid research program. It evaluates new products and performance of in-place materials. It maintains the Qualified Products List (QPL). It provides bridge deck condition assessments to assist in determining appropriate rehabilitation options for existing structures.



## BUREAU OF ENVIRONMENT ORGANIZATION CHART

The Bureau of Environment is divided into 2 sections, organized under the:

### BUREAU ADMINISTRATOR

#### PROJECT Management Section

- Project Management Section Chief

- Senior Environmental Managers (3)

Each project is assigned to an Environmental Manager. These individuals serve as a designer's primary Environmental contact on the project. The Environmental Manager will identify and assess the environmental impacts of a project. They help ensure that all environmental documents and reviews are completed for the project. Environmental Managers will also coordinate with the Bureau of Environment's Program Managers to assess impacts relating to specific program requirements. In addition, they coordinate project reviews with the cultural and natural resource agencies outside the DOT.

- Environmental Coordinators (2)

Coordinators split time between the field and office. They work with the Designer, Contract Administrator & Contractor to ensure that projects are constructed in compliance with environmental commitments as well as conditions specified in wetland permits and all other applicable environmental regulations. Environmental Coordinators should be consulted to review and provide feedback on the preliminary wetland impact and erosion control plans. The Environmental Coordinator, Environmental Manager and DCE will evaluate the plans to ensure the project can be realistically constructed within the right-of-way and easement constraints depicted on the plans, while meeting environmental treatment needs and conditions.

- Environmentalist Analyst (1)

The Environmentalist Analyst serves as an Environmental Manager for programmatic type projects. This position helps ensure that all environmental documents and reviews are completed for the project, and that the project is appropriately reviewed by cultural and natural resource agencies. The Environmental Analyst also serves as an Environmental Coordinator on smaller projects.

#### PROGRAM Management Section

- Contamination Manager (1)

The purpose of the Contamination Program is to assess contamination material constraints, guiding the Department relative to contamination issues, recommending and administering remedial activities, and assuring compliance with all rules and regulations relative to contamination issues and the handling of hazardous or regulated materials associated with NHDOT actions.

- Cultural Resources Manager & Assistant (2)
- Air & Noise Manager (1)
- Water Quality Manager (1)
- Wetlands Program Specialist (1)
- Environmental Specialist (1)

These individuals are specialists in the areas noted and can answer more in-depth questions in regard to those concerns. Coordination with these individuals should be through the project's Environmental Manager. Refer to *Bureau Contacts* under the Bureau of Environment website for names of individual contacts.

<http://www.nh.gov/dot/org/projectdevelopment/environment/contactus.htm>

- Invasive Species: Information on Invasive Species management is also located on the Bureau of Environment website.

## FIELD & EMERGENCY REVIEW GUIDELINES

The following is intended as a very general outline of suggested field protocol. As a general rule of thumb, team up with more experienced personnel, bring as-built plans, maps, field equipment, and utilize safety equipment and procedures. The project scope, availability or in-availability of surveyed information, and time to process a project, will dictate the extent of review required.

**Emergency Response Program:** Recent special circumstances involving intense rainfall and storm runoff, such as the Alstead Flood (October 2005), Hurricane Irene (August 2011), and severe rainfall of June 2013, resulting in catastrophic, wide spread infrastructure damage, have prompted the Department to assemble guidance on Emergency Response Procedures. It should be noted that specific guidelines must be followed to qualify for Federal reimbursement and expedited repair.

Guidance on the field documentation and notification process for major storm events can be located under the **Storm Events** section of the Highway Maintenance Operations website at the following location:

<http://dotweb/organization/operations/highwaymaintenance/index.asp>

Review the documents under the '*Storm Guides & Presentations*' section prior to heading into the field.

Additional guidance on the recommended process of field documenting damage, though only 'draft' in nature, can be located on the G:\ drive at:

<\\HZNDOTFILE1\Global\BUR34\AKing\Emergency Engineering Manual>

The key to emergency field reconnaissance is to team lesser experienced personnel with ***experienced*** personnel. Contact the Highway Design Administrator, or Section Heads of the Final or Consultant section, for names of individuals with emergency field review experience. Time to obtain, document, and process field information will be extremely limited, and must adhere to certain specific guidelines to qualify for reimbursement, so excellent coordination and communication among bureaus (District, Environment, M&R, Construction, ROW, Utilities, Survey, Bridge) and outside agencies (NHDES, FHWA) is of paramount importance.

### **GENERAL FIELD TRIP EQUIPMENT & PROCEDURES:**

- Field duffle with flashlight, cloth tape, pop level, as-built plans or maps, clip board, GPS camera, bug spray, writing utensil, GPS camera, measuring wheel, spray paint, etc.;
- Team up - 2 person minimum (for safety and documentation of conversations with persons encountered);
- Department-compliant steel toe boots & safety vests;
- Write cell phone contact number on white board with project location;
- Sign packages as required (in 1<sup>st</sup> floor records);

- Vehicle (project number, fuel card, fueling instructions, begin & end mileage);
- Contact District in advance to meet on-site and discuss issues of concern;
- Understand intended project scope and critical areas of field changes as this influences the focus of a field review.

SAFETY: Safety is an important facet of the field investigation. Utilize appropriate signage and warning devices (amber vehicle warning light) to alert motorists of the presence of personnel in areas of traffic. Use sound judgment. If additional means are appropriate, such as shadow vehicles, lane closure, police vehicles, etc., have those present at the time of the review or postpone the review until such time as they are employed. Avoid having personnel within or near the roadway in periods of adverse visibility or traffic conditions. Communicate with one another on field related safety concerns.

LANE CLOSURES: If possible, avoid being in or close to the travelway especially during peak traffic hours. If access to the travelway is required on high speed and/or high volume roadways, coordinate with your supervisor, and contact District for assistance.

Features to Inspect: Start by driving the project length to evaluate & prioritize field work.

GPS CAMERAS: Take plenty of photos. Note or photograph landmarks (mile markers, utility pole numbers, plans with location marked) in the vicinity of drainage, guardrail runs, or other critical locations, to assist in identifying photo locations at later dates.

Instructions on operating the GPS camera features are on the Highway Maintenance Operations website as follows:

<http://dotweb/organization/operations/highwaymaintenance/documents/GPSStormCameraPresentation2013.pdf>

GUARDRAIL: To assist in field reviews, there is a Guardrail Field Review Sheet available on the G: drive at the following location:

<\\HZNDOTFILE1\Global\BUR34\Guardrail\Guardrail Calcs.xls>

- Height - Current guidance recommends 27.75" minimum after overlay measured from pavement surface to top of rail, otherwise consider resetting or replacement);
- Rail & post type, and conditions of both (photograph);
- End section type (photograph);
- Location of guardrail face relative to the edge of pavement; note shoulder width
- Curb locations, type & vertical reveal;
- Approx. slope grade behind, approaching and departing from rail;
- Note obstructions or controls driving need for rail (headwalls, fill slopes steeper than 4:1, waterways, ledge outcrops, utility poles, bridge piers, etc.); extent of work necessary to allow for rail removal & what would be impacted (ROW,

wetlands, etc.); Refer to separate guidelines for field review of guardrail condition and warrants.

- Note locations where extra posts have been placed to stiffen rail in front of utility poles or over culverts, or where posts may have been omitted

Hazmat/Contaminated Materials/Building Demolition/Solid Waste: Make note of any substantive amount of disposed material or conditions warranting special disposal issues or construction measures, such as barrels, discarded building materials, railroad ties, oil stained or malodorous soil or water, mechanical parts or devices, etc., note the apparent items and bring to the attention of appropriate Department personnel.

ROW: Use as-built plans to locate or confirm presence of bounds, especially at critical work areas (drainage or bridge work).

CURB:

- Note curb type (bituminous asphalt or granite: straight, slope face, curved, or radial);
- Note curb vertical reveal - (minimum reveal after overlay should not be less than 2.0", otherwise consider resetting or replacing);
- Note curb condition – if damaged beyond re-use (estimate a rough percentage in need of replacement); if pushed out of place or in good condition but too little reveal (estimate quantity requiring resetting)

DRAINAGE CULVERTS:

- Note pipe size, type, condition, offset (from tw or ep) (eg. 24" cmp rotted invert, no headwalls, pavement crack above pipe, possible stream or wetland, 1/3 filled with debris);
- Note shape deformations and pipe condition (eg. missing metal sections, headwall deterioration, deteriorated end sections, mis-alignment or inconsistent width in water flow line indicative of shifted sections, failed joints, etc.);
- Note approximate depth of cover over pipe;
- Use camera with flash to take interior photo noting any variations in the culvert's interior circumference that could indicate settlement or crushing (Note: Do not enter pipes or enclosed spaces without first checking with the Office of Compliance regarding policy and safety requirements);
- Note evidence of erosion or deposition issues in the stream inlet or outlet, indicative of an undersized culvert, mis-alignment with respect to the stream, or significant grade changes between the culvert and natural streambed profile;
- Note pavement cracks, ground surface depressions, or holes above the pipe, indicative of partial collapse or shifting at pipe joints;
- Note end treatments, material type & condition (eg. metal end section, mortar rubble masonry headwall, or no end treatment) and distance to TW;
- Note water source: wetland, stream, or ditch runoff; If stream, make note of approximate bank width at a 'natural' section;

- Note invasive plants if known – purple loosestrife, Japanese knotweed, etc.
- Note catch basin type (block, concrete, etc.) & condition; Note grate type (reticulate, parallel, etc); take photos
- Note presence or absence of object marker;
- Note underdrain locations, outlet conditions, longitudinal pavement rutting or cracking, or embankment sinkholes above underdrain (indicating possible underdrain failure) or buried outlets;
- Get a rough idea of drainage area & terrain, pipe sizes above or below major drainage culverts; anecdotal flooding evidence from abutters, maintenance crews, town, etc. – what is the highest elevation, has it overtopped road, have nearby residences flooded, how frequently?
- Note high water and average water marks on streambanks and inside pipes;
- For channels with flowing water, estimate or measure average width and depth. Velocity can be estimated by timing the passage of a floating stick. These measurements are best done in dry conditions, in order to estimate the contribution of groundwater (base flow) to the total flow.

If field conditions prohibit field reviewers from assessing the condition of a drainage structure, discuss this with the appropriate supervisor to determine if a video inspection or another method of inspection should be arranged via a consultant.

PAVEMENT CONDITION: Note cracking (alligator, longitudinal, etc), wheel ruts, potholes, possible underdrain failure (depressions or longitudinal cracking); absence or errant superelevation; travel way & shoulder widths; number of lanes, if varying; presence of climbing or turning lanes; approx. depth of drop off from pavement to gravel – for estimating shoulder leveling or safety edge; note areas where vehicles are pulling onto gravel shoulder and apparent reason, etc.

ROCK OR LEDGE: Note locations of rock cuts, ledge outcrops, or large boulders, present in clear zone, road or ditchline.

BRIDGE: Note pavement/deck, curb and rail condition; travel way and shoulder widths, clear width for evaluation during any phased construction; streambed erosion/deposition; wingwall or embankment erosion issues; note availability of staging areas; proximity and potential of overhead lines to interfere with construction equipment or material placement.

VEGETATION: Note embankments, vegetation, or trees that inhibit sight distance or shade the roadway (which influences icing); large trees within clear zone

SIGNS: Note locations of posted speed signs, private and digital (electric feed) signs within right-of-way.

FENCES: Note fence height, type, condition, and location of any electric feeds.

UTILITIES: Note pole numbers for poles located closer than 8' to face of rail or to edge of pavement; locations of pull boxes, water/gas shutoffs, hydrants; overhead lines with respect to culvert constructability or paving equipment; presence of high transmission lines which have tighter restrictions for air space infringement.

SIGNALS & ITS: Note mast arm, traffic detector, counter loop, control cabinet locations, and respective lane layout & widths, note RWIS/camera installations, ITS signs

GEOMETRIC ISSUES: Note sight distance concerns, substandard superelevation, horizontal curves hidden by crests, intersecting roads or drives, etc., horizontal alignment locations relative to water features – what can be done to reduce maintenance needs, etc.

WETLAND, STREAMS & RIVERS: Note proximity of water feature relative to road work, evaluate potential for impact based on scope of work.

INVASIVE PLANTS: If identifiable, note presence & type; bring to Environmental Manager's attention.

DETOURS: If a detour may be required for construction reasons, drive routes to identify possible concerns.

DISTRICT COORDINATION: Highway Maintenance is most familiar with specific roadway issues and is an important source of information. Contact District personnel when scoping the work and continue to coordinate with them throughout the design process. Arrange to meet on site to discuss maintenance concerns. Identify the best individuals in District to coordinate with (District Engineer, Assistant, Civil Engineer 4, Superintendent, Patrolman, etc.) as contacts may vary depending on the District or maintenance personnel in the area.

DCE (District Construction Engineer): Contact and coordinate throughout the contract plan process to obtain input and resolve issues with construction related concerns, contract plan details, and POW/TCP documents.