



1.0 General

Utility construction is comprised of many different components. Smaller items are detailed in section 1. More specific items are detailed in sections 2-5.

1.1 Permit at the Job Site

Always possess a complete copy of the WisDOT issued utility permit when work is being performed within STH right-of-way (ROW). When used, it also includes a copy of WisDOT's approval for a service connection under an expedited service connection permit (see [HMM 09-15-20](#)). Copies of permits or approvals may be electronic.

1.2 Use of Highway Median

Highway median use is prohibited unless specifically authorized by a permit. See [HMM 09-15-25, 7.1](#) for specific conditions that shall be met if median work is permitted.

1.3 Use of Temporary Guard Poles

Do not set temporary guard poles (TGPs) within the ROW unless specifically authorized by a permit. By definition, TGPs are used to prevent aerial lines from falling onto the traveled way during construction. Comply with [HMM 09-15-25, 3.1](#) when TGPs are permitted in the clear zone.

1.4 Unexpected Field Conditions

Obtain prior approval from WisDOT prior to **any** modification of the approved permit to meet changed or unexpected field conditions.

1.5 Blasting

Blasting on the ROW is prohibited unless specifically authorized by a permit.

1.6 Traffic Signs

Do not remove any traffic sign (Figure 1) unless approved in a permit. This includes guide signs, warning signs, route markers, street names, etc. If needed, erect temporary traffic signs to guide motorists while the utility work is occurring. Verify traffic sign removal with the region [work zone engineer](#) prior to submitting a utility permit application.



Figure 1: Improper Sign Removal

1.7 Work Site Cleanup

Remove all debris, refuse and waste resulting from the utility's activities from the site and the motorists' view unless otherwise provided by the permit. Do not burn cuttings, brush, or other debris within the ROW limits. Trees and other vegetation may be chipped and used as mulch if approved in a utility's permit.

1.8 Work Start and Completion Notices

If checked at the bottom of a utility's approved permit, contact the WisDOT utility permit coordinator listed on the permit form at least three days prior to starting the work. Submit written notice of permitted work completion including all restorations within **15 calendar days** with the same person via email. Use the sample form in [Attachment 1](#) to assist with these notices.

2.0 Tree/Vegetation Control

Chemically treating, removing, trimming or damaging trees/vegetation on WisDOT ROW to aid with utility installation is prohibited unless specifically authorized by permit or except as provided under maintenance type activities [HMM 09-15-15, 3.0](#). At WisDOT's discretion, trees/vegetation proposed to be damaged or destroyed may have to be replaced (e.g., living snow fence). Remove each stump and properly backfill the hole when tree removal is permitted. Cutting the stump flush with the ground may also be allowed upon prior WisDOT approval. Follow section [2.2](#) for reestablishing or replacing trees/vegetation identified as living snow fence that are removed, destroyed, or damaged as part of a utility construction or maintenance project.

Compensate WisDOT \$200 for each tree ≥ 2 " DBH (diameter at breast height) damaged or destroyed on electric transmission line projects unless specified in a utility's permit. Compensation is **not** required for trees that are dead, diseased, dying, located in the clear zone, or an invasive species as defined in Wis. Admin. Code [Ch. NR 40](#). Upon WisDOT approval, a utility may plant prairie and/or pollinator seed mixtures in lieu of payment to restore ROW where trees have been removed provided restoration and compensation values are comparable.

Be aware of rare or endangered plant species, animal and insect species that feed off native vegetation, and invasive species that must be protected or avoided by law. Contact a local Department of Natural Resources (DNR) office or a region utility permit coordinator to receive assistance in identifying these areas in the ROW. The [Karner Blue Butterfly](#), for example, is an endangered species that feeds off the wild lupine plant. In addition, exercise special care when handling ash trees due to the [Emerald Ash Borer](#).

2.1 Cutting/Spraying Guidelines

All permit applications for spraying/cutting require Central Office review but initially submit them to the Region office, and include a description of or the specific items listed below:

- 1) Highway side(s) the activity will be occurring along each corridor. A highlighted map is acceptable if work is on both sides. Include town, range, and section information on the map.
- 2) Chemicals that will be sprayed, their active ingredients (provide ingredient list upon request), and how they will be applied (wand broadcast)
- 3) Person(s) who will be applying the chemicals and their Wisconsin applicators license number(s)
- 4) Method(s) adjacent property owners will be notified prior to spraying (mail, door card, phone, in-person)
- 5) Locations, if any, spraying will occur near wetlands or waterways. If yes, has DNR been notified?
- 6) Types of cutting performed (trimming, selective cutting, whole tree removal)
- 7) Methods for cut wood disposal (removed from site, given to nearby property owner, chipped/mulched)
- 8) Methods for handling Oak Wilt and Emerald Ash Borer requirements, if applicable
- 9) Types of equipment that will be used (bucket trucks, brushhogs, ATVs)
- 10) Names and cell phone numbers for the lead workers or supervisors on each crew or contractor working in the ROW. If it is not available now, provide when giving WisDOT the 3-day advance start notice.
- 11) Appropriate work zone traffic control diagram(s). Use WisDOT's [Work Zone Field Manual](#) as needed.
- 12) Pictures to clarify what vegetation will be targeted
- 13) Google Earth .kmz files to match cutting/spraying locations with WisDOT's living snow fence database

2.2 Living Snow Fence

Living snow fence (LSF) is strategically placed vegetation along state highways and within the ROW that creates a natural buffer to help control blowing and drifting snow from accumulating on the highway. See Figure 2.

Reestablish LSF damaged, destroyed, or removed in conjunction with a utility construction or maintenance project at a utility's sole cost.



Figure 2: LSF along WIS 82 east of Oxford

Plant new LSF within one year of removing existing LSF plantings or vegetation serving as LSF. WisDOT will provide drawings and specifications for allowable plantings for the affected area(s). Maintain all transplanted or newly planted trees and vegetation for a period of two years. If any trees or vegetation die within the two-year period, replace, and maintain them for another two-year period.

2.3 Temporary Snow Fence

A time factor is involved for LSF to establish maturity and work effectively. Until this occurs, highways are left exposed to increased safety risks and winter maintenance costs from blowing and drifting snow.

Install wood or plastic temporary snow fence (TSF) in locations where utility construction or maintenance activities remove, damage, or destroy existing LSF. Install TSF prior to November 1 in the same calendar year existing LSF vegetation is removed and maintain it until the new LSF vegetation is mature and working effectively (typically no less than three years from the installation date). WisDOT will periodically inspect TSF installation until the new LSF reaches maturity and will contact the utility to maintain/repair TSF as required. Remove TSF upon reestablishment of LSF plantings and approval from WisDOT, or at three years from installation, whichever occurs first.

3.0 Construction Methods

Section 3 details construction methods that a utility may use in the ROW. This and other utility work shall follow WisDOT's applicable [Standard Specifications for Highway and Structure Construction](#), current edition.

3.1 Trenched Construction

Trenched construction and backfill shall:

- 1) Restore the structural integrity of the highway facility (see [Attachment 2](#)),
- 2) Secure the utility facility against deformation that may cause leakage,
- 3) Ensure against the trench entrapping excessive moisture or becoming a drainage channel, and
- 4) Ensure against any backfill blocking highway drainage.

When necessary, backfill trenches for underground utility facilities with pervious material and provide the necessary outlets to prevent water entrapment. This may also include the construction of underdrains. If needed, WisDOT may direct contracted county maintenance staff to backfill and repave at the utility's expense.

3.2 Untrenched Construction

Use untrenched construction for all underground utility crossings of all highways that have a paved surface and are open to traffic unless specifically authorized in the permit. Special restoration methods are required if open cutting of pavement is allowed. See [5.1](#).

Accomplish untrenched installation of utility facilities by tunneling, driving, coring, directional boring and/or dry boring (augering). Water boring under a highway is prohibited unless specifically authorized in a permit. Specify the boring method on a utility permit application (see question 12). Using a manually tracked bore head is prohibited when crossing a major highway such as an Interstate or other high-speed multi-lane highway.

Boring shall result in a close fit to the facility being installed. As a minimum, extend untrenched construction beneath the entire highway prism (from toe of inslope to toe of inslope or from back of curb to back of curb). Locate ground openings or pits for such work outside the clear zone and do not interfere with highway drainage.

When specifically authorized by WisDOT, the extent of the untrenched crossing may be reduced or eliminated where such construction methods are impractical or physically restricted by the terrain.

3.3 Nonmetallic Lines

Any nonmetallic pipe, cable or other kind of utility line that lacks a continuous and integral metallic component capable of detection by locating instruments shall be accompanied in its location by a continuous detectable metallic tracer wire or metallic tape.

3.4 Casing

WisDOT does not require casing. WisDOT recommends casing for facility protection, to aid in future expansion, and to eliminate future boring costs. When underground lines are cased, extend the casing at least two feet beyond the toe of slope, three feet beyond the ditch line, or two feet beyond the outer curbs in a curbed section.

3.5 Potholing

Use potholing as a necessary means for the accurate vertical location of utilities. WisDOT allows air (vacuum) and water (jetting) methods. Within the pavement structure (lanes, shoulders, curb & gutter), use **air** only. Water may be allowed if the air method cannot penetrate frozen or densely compacted soil. Air or water may be used in other ROW areas beyond the pavement structure. Table 1 outlines the basic steps for potholing work.

Consult WisDOT prior to using water methods. If WisDOT agrees to its use, check the water jetting box on the permit application and show pothole locations on a drawing. Submit **before** pavement condition pictures at each pothole with a permit application and provide pictures of the fully restored potholes **after** the job is completed. This provides documentation that the restoration was finished. Monitor the potholes over the next few years, until WisDOT is satisfied that no additional settling is occurring, or until a new resurfacing or pavement replacement project is done. A utility must repair any pothole settlement (Figure 3).

Numerous pictures are not needed. Pictures should be taken from the same angle and distance for the before and after conditions and be far enough away to provide perspective for the location (i.e., not right next to the pothole). Send pictures to WisDOT in a .jpg or .pdf format. Pictures are not required for air potholing.

Use round cores for potholes within the pavement structure. Round cores are preferred since they prevent stress cracks due to elimination of corners. The maximum size of a pothole is 12" in diameter in the wheel paths and 16" in diameter outside the wheel paths. Beyond the pavement structure, the pothole size may be larger (18"-24") and square upon WisDOT approval.

Table 1: Basic Potholing Steps

- | |
|--|
| <ol style="list-style-type: none"> 1) Saw cut pavement full-depth with a bit 12" to 16" in diameter resulting in a "core". 2) Remove core and save for reuse if structurally sound. 3) Place a protective steel ring to protect the edge of the opening from damage. 4) Use vacuum equipment to excavate compacted material from the bottom of base course to beneath the utility facility. 5) Perform utility work (e.g., watch bore head, leak repair, service connection). 6) Protect utility facility with fine material. 7) Place self-mixing flowable fill material from the top of the fine material to bottom of the base course (fill is designed to be traffic-bearing in ~90 minutes). 8) Place non-shrink grout (grout is designed to be traffic-bearing in ~90 minutes). 9) Place the removed core (or a generic equivalent replacement core) in the remaining opening (original alignment and orientation is maintained if removed core is used) forcing the grout to the surface to fill the annular space and core extraction hole. 10) Seal the restored opening. |
|--|



Figure 3: Improper pothole restoration

4.0 Work Site Safety

Always secure the work site from any hazard to the public until all permitted utility work is completed. Monitor vehicles, equipment, and materials in active use at the work site to ensure consistently safe conditions.

WisDOT may require sheeting, shoring, bulkheads, temporary/permanent concrete barrier, etc. if considered necessary to protect the highway and the traveling public.

4.1 Equipment/Materials Storage

Store utility equipment and materials located at the work site but not in immediate (same day) use in a safe location off the ROW. If this not practical, then the equipment or materials may be stored beyond the clear zone and as close to the fence or ROW line as possible.

4.2 Vehicle/Equipment Visibility

Operate vehicles and equipment with their high intensity flashing (strobe or revolving) and hazard warning lights on when they are within the clear zone during work operations.

4.3 Safety Garments

Always wear Type 2 or 3 retro-reflective safety garments when working outside of vehicles or equipment (e.g., backhoe) and within the ROW. This applies to all WisDOT, county, utility, consultant, and contractor personnel.

5.0 ROW Restoration

Restore the highway and the adjacent ROW to its original (as close as possible) condition within **two weeks** after completing utility facility construction or maintenance operations. Exceptions may be allowed (e.g., for inclement weather) with WisDOT prior approval. Failure to make prompt and satisfactory restorations of the highway or adjacent ROW may cause WisDOT to arrange for restoration by others at the utility's expense.

Restore any curb, gutter, pavement, shoulder, sidewalk, driveway, gravel base, ballast, or other highway element disturbed to the qualities, grades, compactions, conditions, etc., in accordance with WisDOT's [Standard Specifications for Highway and Structure Construction](#), current edition. See [5.1](#) for additional requirements for pavement restoration. Any subsequent heavings, settlings, or other faultings attributable to the permitted work shall be repaired in a manner satisfactory to WisDOT at the utility's expense. Use [Attachment 2](#) as a guide for backfilling excavations. Avoid situations as shown in Figure 4.



Figure 4: Examples of Improper ROW Restoration

Restore any disturbed turfed ROW area with at least **four inches** of topsoil and reseed with perennial grass or sod to the satisfaction of WisDOT. See section [2.0](#) for details on trees or vegetation restoration. Once restored, the utility shall maintain turfed areas, trees, and vegetation until they achieve sustained growth.

If, in WisDOT's opinion, the permitted works or facilities are found to obstruct highway drainage, unduly increase the difficulty of highway maintenance, or in any other manner adversely affect a highway interest, the utility shall, upon notice, cure the fault as directed and restore the highway facility to the satisfaction of WisDOT.

5.1 Pavement Restoration Requirements

Sawcut all pavement full-depth when open cutting. [Attachment 3](#) has examples when pavement is not sawcut.

Restore concrete pavement in conjunction with WisDOT standard detail drawing [13C9](#). Avoid creating additional joints when possible. The minimum dimension for a patch will be **six feet** by the full lane or shoulder width. High early strength concrete may be specified when needed. Additional guidance on concrete pavement repair can be found in [FDM 14-25-10, Exhibit 10.1](#).

The minimum dimension for an asphaltic concrete patch will be **six feet** by the distance to the nearest joint or seam. Use hot mix asphalt whenever possible. If cold patch is needed in an emergency, replace with hot mix as soon as possible. Figure 5 below shows improper asphaltic pavement restoration.

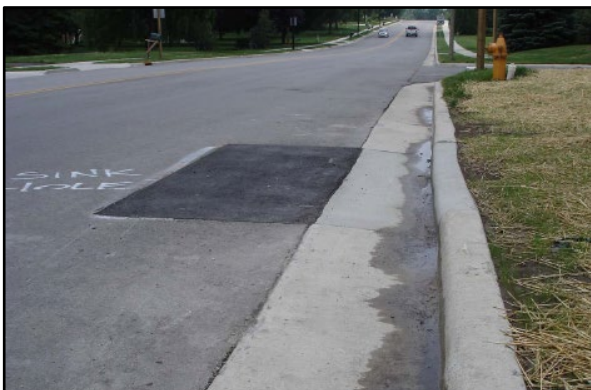


Figure 5:
Both patches improperly backfilled/compacted, and not patched to nearest joint or seam

5.2 Poles and Anchor Rods

Completely remove replaced poles from the highway. No replaced pole shall be allowed to remain, in whole or in part, nor shall it be sawed off. The pole's hole shall be properly backfilled and compacted. All anchor rods shall be removed or cut off **one foot** below ground level.

6.0 Temporary Driveways for Utility Construction

Do not build temporary driveways for utility construction unless WisDOT has granted prior approval. If a temporary driveway is needed, submit a separate STH connection permit application [dt1504](#) for WisDOT review along with the utility permit application. Include the reason(s) for needing the temporary driveway on both applications. A temporary driveway may not be approved, so the utility is advised to have a back-up access plan. Do not locate a temporary driveway within the functional area of an intersection. See Figure 6.

Existing driveways may be used for utility construction as long as permission is obtained from the property owner. A STH connection permit is not required unless there will be a significant change in use, e.g., an agricultural driveway will experience heavy truck traffic or a major increase in the number of vehicle trips per day. In this situation, submit a STH connection permit to make temporary modifications to the driveway.

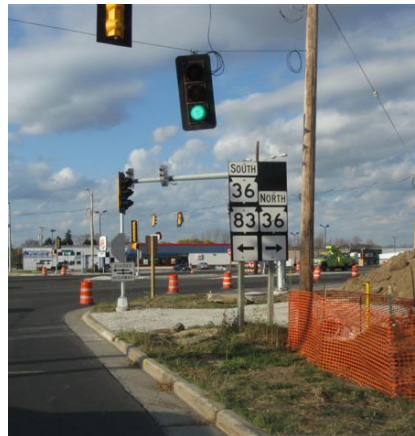


Figure 6: Temporary driveway within the functional area of an intersection

7.0 As-Built Location Data

Provide X (easting), Y (northing), and Z (elevation) as-built coordinate data for all open cut, trenched and other utility projects in which a facility is exposed to facilitate a survey. This includes buried handholes, valves, etc. Provide boring logs if such equipment can produce X, Y and Z data. The purpose for this data is to minimize future utility conflicts with WisDOT improvement/maintenance projects and utility project permits.

7.1 Data Collection

Collect data every 50 feet and at all angle points/changes of direction along the facility centerline. Survey the top-center of each utility facility. For multiple facilities (e.g., multiple conduit packages or pipelines), measure the total width (outside-to-outside) of the facilities. Facility depths may be determined using permit information.

7.2 Data Accuracy

Use [FDM 9-30-15](#) Real Time Kinematic (RTK) Surveys to obtain the most accurate data possible. The appropriate RTK application is General (Topo) Positioning, which requires using a RTK survey instrument. Mapping/GIS grade equipment does not provide as accurate positional data.

Improve accuracy when surveying in less-than-ideal situations such as urban canyons or heavily wooded areas where satellite signals may be blocked or impeded. For example, use longer observation times, survey more data points along a line, perform multiple/redundant measurements and average the results, etc. When needed, use established benchmarks that have published X, Y and Z data as part of the survey, which provides greater confidence in the data accuracy.

7.3 Format, Storage and Submittal of Data

Submit data on as-built plans to WisDOT using the Wisconsin Coordinate Reference System (WISCRS) a/k/a "County Coordinates." In WISCRS, grid and ground coordinates are the same value, so there is no need to convert from grid to ground values using a combination factor.¹ Data post-processing is generally not required for a RTK survey procedure, but processing methods and strategies vary with equipment manufacturer/model.

7.4 Data Retrieval

To be determined

¹ Combination factors were needed when WisDOT mapped projects in State Plane Coordinates.

Attachment 1: Start/Completion Work Notice



Utility Permit Start/Completion Work Notice

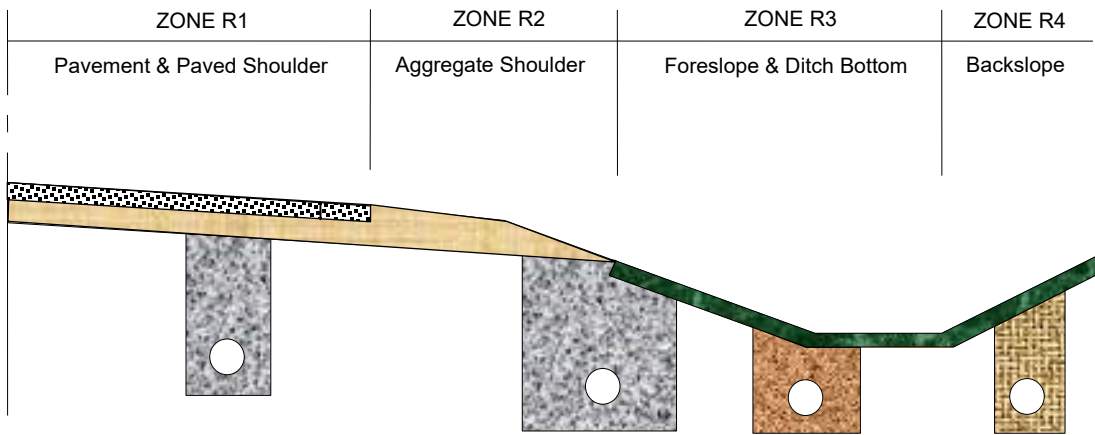
Provide all information below and email this form to the applicable region utility permit office **at least three working days prior to starting work**. When restoration is complete and ready for inspection, email the same contact. For all date boxes, click in the middle of the box to highlight a drop-down calendar.

Select Region Office (Click for map if needed)		Region Email Address (Auto-populates once Region Office is selected)	
WisDOT Utility Permit Number (Enter number)		Utility Work Order or Project ID Number (if any) (Enter number from question 5 on WisDOT DT1553 permit form)	
Utility Company Name (Enter name from question 1 on WisDOT permit form)		County	Highway(s)
Utility or Utility Contractor Contact Name & 24-Hour # (Provide information if utility hires a separate contractor to perform the work. If not, provide utility company contact information.)		Traffic Control Contractor and 24-Hour # (Provide information if utility hires a separate work zone traffic control contractor for the work.)	
Utility Subcontractor #1 Contact Name & 24-Hour # (Provide information if contractor hires a separate subcontractor to perform the work.)		Lane Closure System (LCS) Notification (Enter date if LCS notification is required otherwise leave blank. <i>Utility is required to submit all LCS information prior to starting work.</i>) Date Submitted: _____ LCS Number: _____	
Utility Subcontractor #2 Contact Name & 24-Hour # (Provide information if contractor hires a separate subcontractor to perform the work.)		Proposed Work Start Date (Enter proposed work start date. <i>Failure to provide the work start notice may result in permit suspension or revocation.</i>)	
Work Suspension Date (Enter date that utility decides to suspend work due to material shortages, other priority work, etc.)		Work Resumption Date (Enter date that utility decides to resume work.)	
Work Completion Date (All work is finished <i>including restoration</i> and site is ready for inspection. Enter date and resubmit form to the region office using same email address above within 15 calendar days of completion.		3D (X-Y-Z) As-Built Utility Data (Follow section 7 in HMM 09-15-45. Click yes if required to submit 3D as-built utility data and provide it within 30 calendar days of the completion date.) <input type="checkbox"/> Yes <input type="checkbox"/> Not Required	

Attachment 2: Excavation Backfilling Detail Drawings, Page 1 of 2



LONGITUDINAL EXCAVATION: RURAL CROSS-SECTION

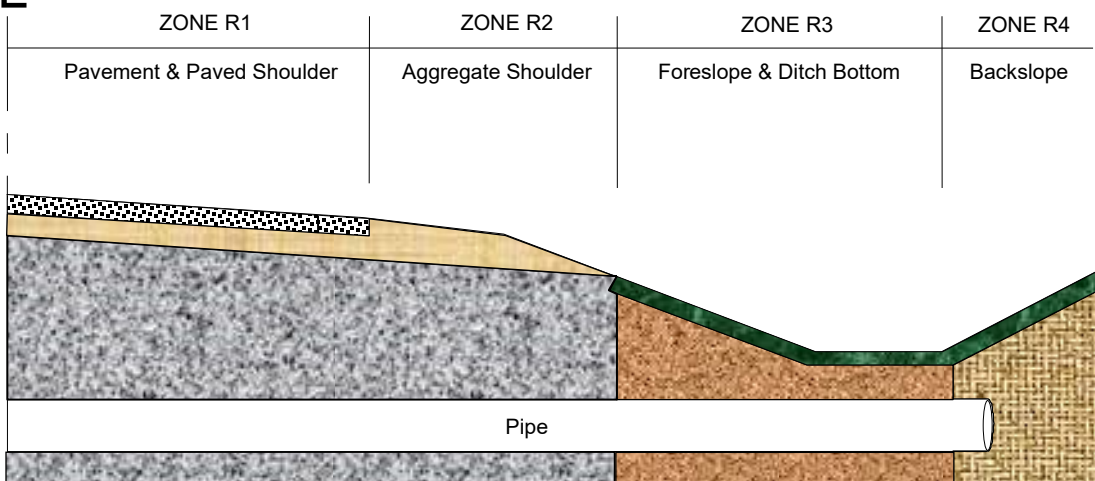


KEY

	Slurry Backfill
	Granular Backfill
	4" Topsoil
	Spoil backfill



TRANSVERSE EXCAVATION: RURAL CROSS-SECTION



NOTES

- 1) Use slurry backfill to replace the excavated material in ZONES R1 and R2. Drain slurry water either naturally (e.g., through soil) or mechanically (e.g., using temporary standpipe and pump) at lowest excavation elevation.
- 2) If the work area covers BOTH ZONES R2 & R3, use slurry backfill to replace the excavated material.
- 3) Use granular backfill to replace the excavated material in ZONE R3..
- 4) Place backfill in ZONES R3 & R4 to within 4" of the finished grade to allow for topsoil placement.
- 5) Suitable spoil backfill may be used in ZONE R4 at WisDOT's discretion.
- 6) Conform to the current edition of WisDOT's [Standard Specifications for Road and Bridge Construction](#) for granular backfill placement and gradation, and for slurry fine and coarse aggregate gradation requirements (use concrete aggregate 501 standard specification).

WisDOT BACKFILL SLURRY FORMULA

Place the materials in a clean concrete mixer truck and thoroughly mixed in the following quantities FOR EACH CUBIC YARD REQUIRED:

More Flowable

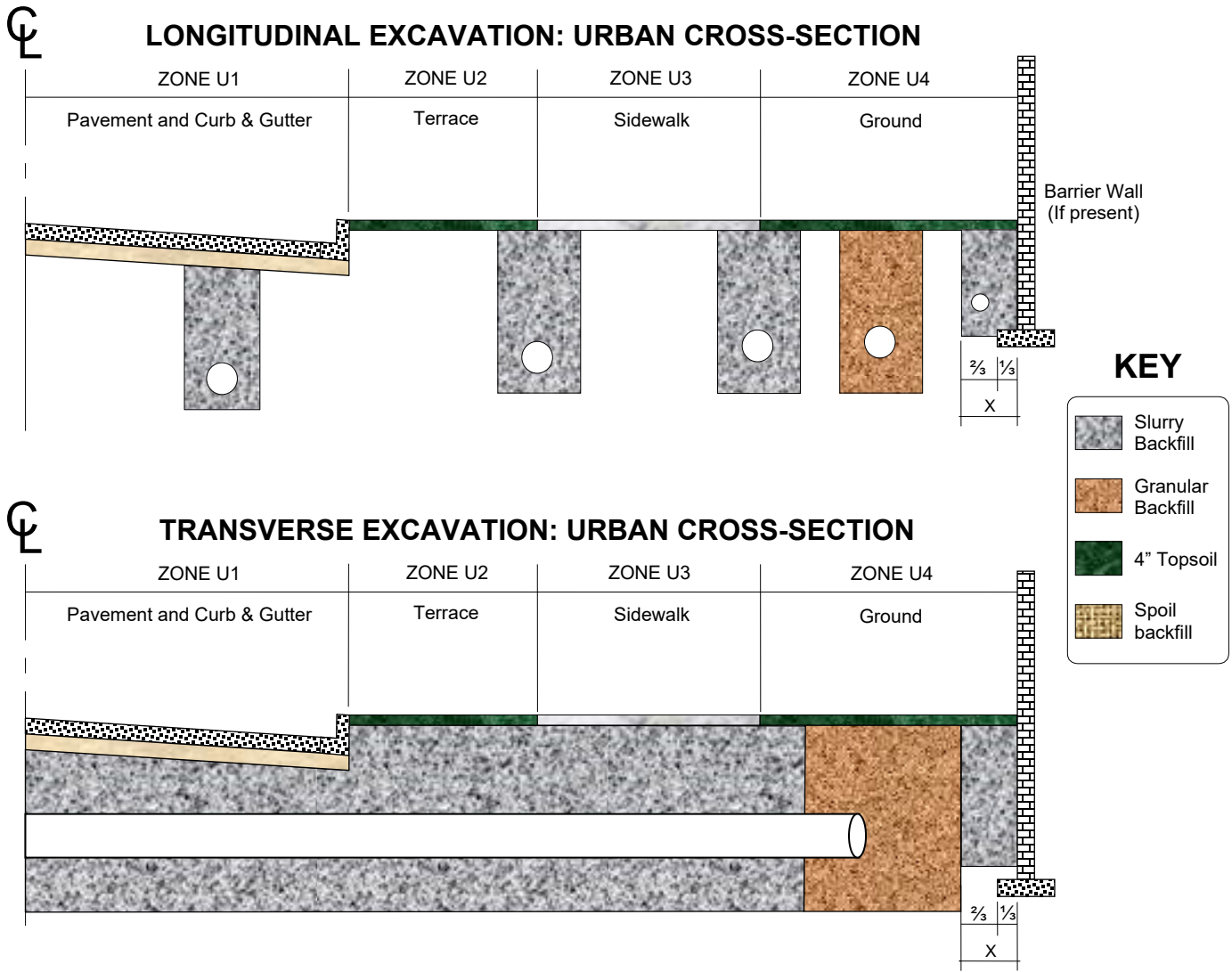
- SAND 1,600 lbs
- #1 STONE 1,400 lbs
- #2 STONE 1,000 lbs
- WATER 25 gals

More Rigid

- SAND 1,600 lbs
- #1 STONE 1,000 lbs
- #2 STONE 1,400 lbs
- WATER 25 gals

No additional water is allowed. The above weights are **damp** weights. Just prior to placing the slurry backfill, run the truck at mixing speed for one full minute to ensure an even mixture. The coarse aggregate (#1/#2 STONE) combined weight is 2,400 lbs with #1 STONE between 35-65% and remaining #2 STONE for workability. No other formulas are allowed.

Attachment 2: Excavation Backfilling Detail Drawings, Page 2 of 2



NOTES

- 1) Use slurry backfill to replace the excavated material in ZONES U1, U2 and U3. Drain slurry water either naturally (e.g., through soil) or mechanically (e.g., using temporary standpipe and pump) at lowest excavation elevation.
- 2) If the work area covers BOTH ZONES U3 & U4, use slurry backfill to replace the excavated material.
- 3) Use slurry backfill to replace the excavated material in ZONE U4 if it is adjacent to a barrier wall.
- 4) Place backfill in ZONES U2 & U4 to within 4" of the finished grade to allow for topsoil placement.
- 5) Use granular backfill in ZONE U4. Suitable spoil backfill may be used at WisDOT's discretion.
- 6) Conform to the current edition of WisDOT's [Standard Specifications for Road and Bridge Construction](#) for granular backfill placement and gradation, and for slurry fine and coarse aggregate gradation (use concrete aggregate 501 standard specification).

WisDOT BACKFILL SLURRY FORMULA

Place the materials in a clean concrete mixer truck and thoroughly mixed in the following quantities FOR EACH CUBIC YARD REQUIRED:

More Flowable

- SAND 1,600 lbs
- #1 STONE 1,400 lbs
- #2 STONE 1,000 lbs
- WATER 25 gals

More Rigid

- SAND 1,600 lbs
- #1 STONE 1,000 lbs
- #2 STONE 1,400 lbs
- WATER 25 gals

No additional water is allowed. The above weights are **damp** weights. Just prior to placing the slurry backfill, run the truck at mixing speed for one full minute to ensure an even mixture. The coarse aggregate (#1/#2 STONE) combined weight is 2,400 lbs with #1 STONE between 35-65% and remaining #2 STONE for workability. No other formulas are allowed.

Attachment 3: Pavement Restoration Examples

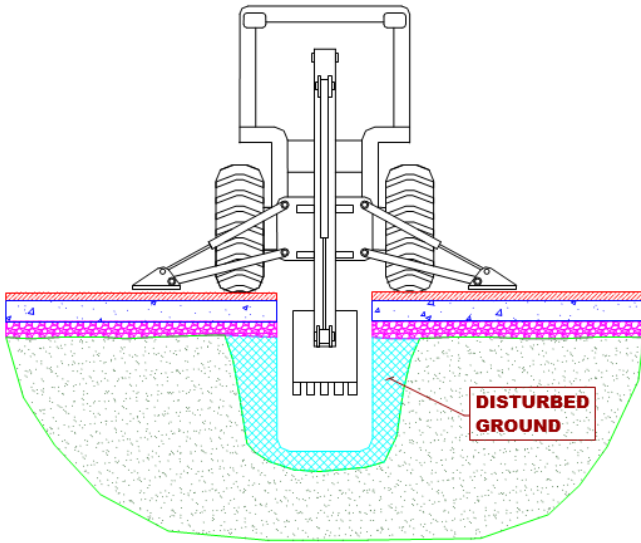


Figure 1a: Excavation with planned sawcut²

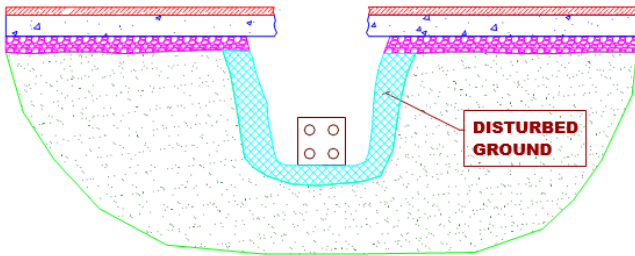


Figure 1b: Actual excavation without sawcut

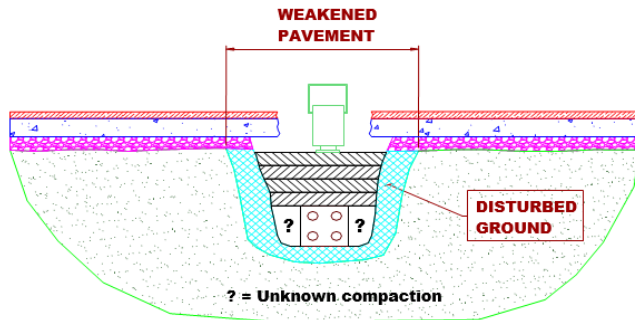


Figure 1c: Trench backfilling without slurry



Figure 2: Concrete pavement repair without sawcut. Note top of pavement edge and missing dowel bar. In lower picture, dowel bars in gutter are bent and not ready to accept slurry.



² Drawings courtesy of CNA Consulting Engineers