

CHAPTER 9

**TRENCH BACKFILL, COMPACTION,
AND RESURFACING**

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CHAPTER 9 TRENCH BACKFILL, COMPACTION, AND RESURFACING

9.1 GENERAL

- 9.1.1 Refer to Figure 9.1 for general backfill requirements.
- 9.1.2 Safety standards relating to the shoring and stabilization of trench sidewalls should be maintained as prescribed by appropriate safety regulatory agencies (OSHA, State of Colorado).
- 9.1.3 No trench should be left in an open condition overnight, except for the portion necessary to commence work the following morning. Warning signs, barricades, and lights, all in conformance with the *Manual on Uniform Traffic Control Devices* (MUTCD Part VI), shall be used in areas where trenching operations are in public roadways. Any trenching remaining open overnight shall have flashing lights with warning signs and barricades. All such barricades, signs, and warning devices shall be installed in accordance with a Construction Traffic Control Plan that has been reviewed by the Town Engineer.
- 9.1.4 In trenching across the road, no more than one-half of the traveled way is to be closed to traffic at one time. The trenched roadway shall be completely backfilled and a suitable driving surface restored before trenching the other half of the road. Final pavement restoration can be accomplished at one time when the utility installation or repair work is complete.
- 9.1.5 Closure of any street, road approaches or other access points will not be permitted without prior approval of the Town Engineer. Upon trenching across such facilities, steel running plates, planks or other safe methods shall be used to provide for traffic to enter or leave the road or adjacent property.
- 9.1.6 The Contractor shall take precautions to limit the removal of or damage to existing pavements, sidewalks, curbs, lawns, shrubbery, trees, hedges, walls, fences, buildings or other existing improvements to the least practicable amounts and shall replace or restore such improvements to their original location and condition after the excavation has been backfilled and compacted.

9.2 SUBBASE

The term "subbase," for the purpose of trench backfill discussion, shall refer to the CDOT Class 1 or Class 2 material that is part of a structural pavement design. There may or may not be a base course in the pavement section. If there is none, the base course is all CDOT Class C aggregate base course.

- 9.2.1 Subbase material shall be well mixed, free of organic matter and lumps or balls of clay, and shall consist of sound aggregate particles and suitable filler or binding materials which, when placed and compacted, will result in a firm, dense, unyielding foundation. Subbase material need not be crushed but may be of the pit run variety providing it is graded within the following limits:

TABLE 9.1
GRADATION OF SUBBASE MATERIAL

| Standard Size of Sieve | Percentage by Weight Passing Sieve |
|------------------------|------------------------------------|
| 2 ½ inch | 100% |
| 2 inch | 95-100% |
| No. 4 | 30-60% |
| No. 200 | 5-15% |
| Liquid Limit | 35 Maximum |
| Plastic Limit | 6 Maximum |

- 9.2.2 After the backfill has been placed and compacted as specified, it shall be cut and trimmed to the required depth and cross section. Trench cover subgrade shall be free of all rock over 2 ½ inches in size. It shall have a compaction of 95 percent or more by Standard Proctor methods.
- 9.2.3 Deviations from the gradation limits above may be permitted on unpaved roads where it can be adequately demonstrated that the proposed subbase material can fulfill the intent of these specifications. Approval of the Town Engineer shall be obtained.

9.3 BASE COURSE

- 9.3.1 Base material shall consist of hard, durable particles or fragments of stone or gravel crushed to the required size and an AP-filler of sand or other finely divided mineral matter (**CDOT CLASS C**). When produced from gravel, not less than 60% by weight of the aggregate retained on a No. 4 sieve shall consist of particles having at least one fractured face. Base material shall be free from vegetable matter and lumps or balls of clay and which, when placed and compacted, will result in a firm, dense, unyielding foundation. Base material shall meet the following grading requirements:

TABLE 9.2
GRADATION OF BASE COURSE MATERIAL

| Standard Size of Sieve | Percentage by Weight Passing Sieve |
|------------------------|------------------------------------|
| ¾ inch | 100% |
| No. 4 | 30-60% |
| No. 10 | 25-55% |
| No. 200 | 3-12% |
| Other Characteristics | |
| Liquid Limit | 25 Maximum |
| Plastic Limit | 6 Maximum |

- 9.3.2 Deviation from the gradation limits may be permitted on unpaved roads provided it can be unequivocally demonstrated that the subbase material is not conducive to rutting, raveling or forming a soft yielding surface in the presence of moisture. Compaction equipment must be on the job site before excavation is started. Compaction equipment must be capable of compacting within the trench width limits to prevent bridging caused by straddling the ditch.

9.4 WEARING SURFACE

9.4.1 Temporary Trench Cover

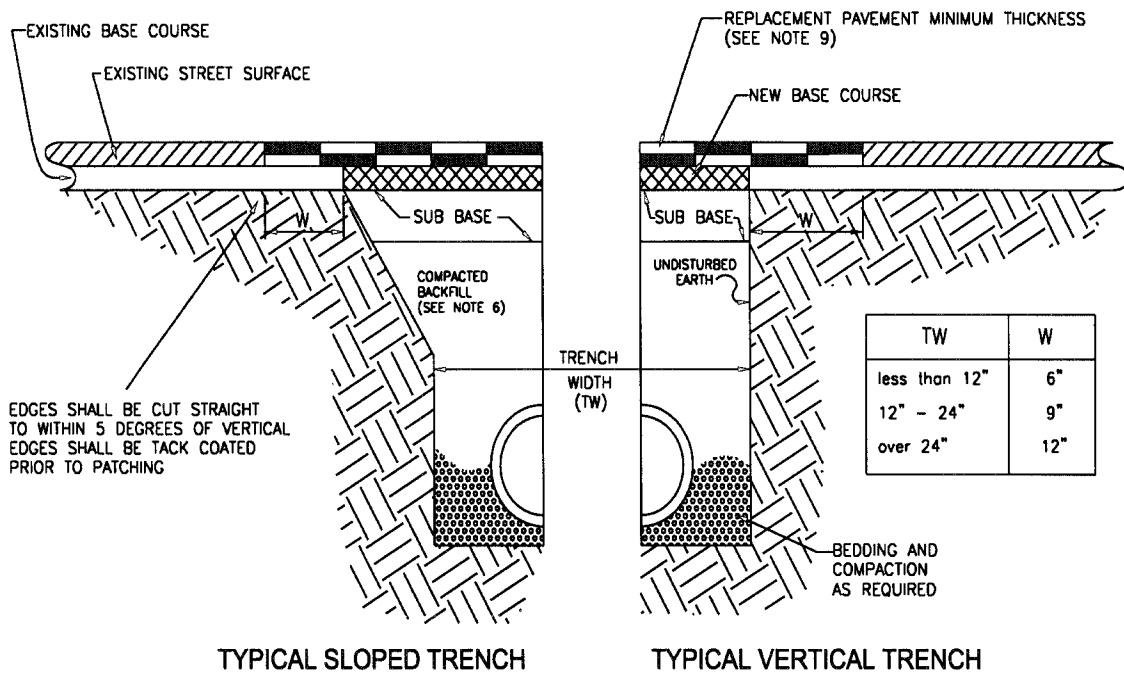
All trenches across traffic lanes shall be provided with temporary trench cover in accordance with CDOT standards and specifications. See Figure 9.1 for cold-mix asphalt depth.

9.4.2 Permanent Trench Cover

All permanent pavement shall be placed in accordance with CDOT standards and requirements. See Figure 9.1 for additional requirements.

9.4.3 Gravel Roads and Shoulders

Existing gravel roads and shoulders will be replaced with eight inches of Class C aggregate base course meeting CDOT standards.



NOTES:

1. This trench patching detail specifies requirements in addition to those specified in the latest edition of the C.D.O.T. Standard Specifications for Road and Bridge construction.
2. A construction traffic control plan shall be submitted to and approved prior to issuance of construction permits in the Town right-of-way.
3. Trench shall be braced or sheeted as necessary for the safety of the workmen and protection of other utilities or structures in accordance with applicable local, state, and federal safety regulations.
4. The trench width shall be confined to those minimum dimensions, which will permit proper installation and acceptable pipe loading, as established by current acceptable engineering practices.
5. Existing asphalt or pavement shall be cut back to minimum of W (see above) beyond the trench limits or to sound pavement, whichever is greater.
6. Backfill Compaction Requirements: Minimum density will be determined in accordance with AASHTO designation T99 or T180 as defined by the C.D.O.T. Standard Specifications for Road and Bridge construction.
7. Full depth asphalt can be used as an alternative to base course. A ratio of 3 inches base course to 1 inch of asphalt shall be used in the substitution.
8. A temporary cold-mix asphalt patch, 4" in depth, will be required for all streets cuts if a permanent hot-mix asphalt patch cannot be applied for any reason, after construction is completed.
9. Hot Mix Asphalt Concrete: Exist. thickness of asphalt concrete + base course + 1" or 4" whichever is greater
Portland Cement Concrete: Exist. thickness of concrete pavement or 6" whichever is greater.
Gravel Road Surface: A minimum of 8" Class C aggregate base course meeting C.D.O.T. standards.

FIGURE 9.1
TYPICAL UTILITY TRENCH AND SURFACE PATCHING