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9.0 WORKPAD DESIGN

9.1 INTRODUCTION

The workpad is the area within the construction zone from which the construction equipment operates for excavation of the pipeline ditch, stringing and laying the mainline pipe in the ditch, backfilling of the ditch and other ROW completion operations. There will be various workpad “modes” employed during construction which are primarily dependent on seasonal constraints and the geotechnical/geothermal analysis of the underlying soil conditions. The primary workpad “modes” will be a graded ROW, an ice/snow workpad, or a gravel workpad. Specialty workpad modes, such as a gravel workpad employing geotextiles, may be required in some areas. This section describes the workpad modes, and the criteria for use of the modes.

9.2 CODES AND CRITERIA

9.2.1 Codes

- Alaska Statutes, Title 11 – Natural Resources
- Alaska Statutes, Title 16 – Fish and Game
- Alaska Statutes, Title 38 – Public Land
- Alaska Statutes, Title 46 – Alaska Coastal Management Program
- Code of Federal Regulations, Title 18 – Conservation of Power and Water Resources
- Code of Federal Regulations, Title 33 – Navigation and Navigable Waters
- Code of Federal Regulations, Title 43 – Public Lands: Interior
- Federal Right-of-Way Grant for the Alaska Natural Gas Transportation System Alaska Segment Serial No. F-24538 (December 1, 1980), as such may be updated and/or amended from time to time.
- Federal Energy Regulatory Commission conditional certificate of public convenience and necessity, issued on December 16, 1977, as such is finalized

9.2.2 Criteria

9.2.2.1 General Criteria

- Existing Trans Alaska Pipeline System (TAPS) facilities will be protected from adverse effects of construction zone grading and workpad or other embankment construction (See Figure 9-1) by design provisions which will:

- Prevent thaw settlement of soils surrounding TAPS and its vertical support members, the fuel gas line, drainage structures and access roads.
- Maintain terrain stability and provide erosion control measures.
- Protect existing State of Alaska facilities by:
 - Limiting thaw penetration into thaw-unstable subgrades of adjacent highways and highway facilities (See Figure 9-2).
 - Providing for safe maintenance operating conditions and safe highway traffic conditions when locating ramps connecting the State facility to the workpad.
- Minimize impacts on environmentally sensitive areas during construction zone grading and workpad construction by design provisions which will:
 - Limit the extent of construction to the dimensions required for safe and efficient working conditions.
 - Allow for reduced construction zone and workpad widths in site-specific areas. Examples of such areas are specified wetlands, some areas of riparian vegetation and some areas with sensitive visual conditions.
 - Include erosion and sedimentation controls in the design of cut and fill slopes.
- Prevent the burial of slash within 25 feet of a fish bearing stream. Normally slash will be chipped and used for erosion control and/or insulation.
- Stipulate that stripped organic material will be stockpiled for restoration of the site or hauled to spoil storage where it will be stockpiled and used for spoil storage restoration. (See Section 12)
- Provide for timing constraints in environmentally sensitive areas.
- Minimize requirements for borrow materials by consideration of alternate designs that may be economical because they maximize the requirements for insitu material. Alternate designs for consideration include:
 - Through-cuts in areas where suitable embankment materials are found along the route (See Figure 9-3).
 - Geotextiles where subgrade conditions are such that embankment thickness can be reduced by one-foot or more.
 - Stepped-workpad configurations where terrain conditions will require additional materials for a uniform surfaced workpad.
 - Embankment designs that use lower strength or ice-rich materials in the lower portions of fills, providing material properties permit placing to required densities.
 - Thermal designs in permafrost areas where synthetically insulated embankments may require less borrow materials than structural embankment.
 - Site specific designs where unique field conditions allow a reduction of borrow materials from the normal design requirements.

- Designs requiring reuse of materials such as using workpad material for pipeline ditch backfill or reuse of gravel from the workpad to be placed adjacent to and/or over the pipe ditch to maintain a disturbed surface for frost heave design. (See Section 13)
- Designs requiring specified restrictions on construction schedules and methods such as: restricting the season for workpad construction, requiring staged construction of workpad, and restricting heavy traffic loads to certain zones or seasons to reduce the normal design requirements.

9.2.2.2 Construction Zone Criteria

Construction zone grading, workpad and pipeline construction will be designed to support heavy pipeline construction operations during a two-year period and will be in accordance with the Construction Plan.

- Climatic and ground conditions control the construction seasons which generally are:
 - Spring (shoulder months): March through April
 - Summer: May through September
 - Fall (shoulder months): October through November
 - Winter: December through February
- The workpad and access road surfaces will be maintained during periods of heavy construction by removing snow or surface rutting and facilitating surface drainage.
- Drainage structures will be maintained to perform the designed functions.
- Workspace off the workpad will be provided for ditch excavation operations, including space for temporary ditch spoil storage.
- Ditch width will be variable depending upon soil conditions and required depth of burial.
- Additional width may be required at some bends, pipeline crossings, road crossings, stream crossings, mainline valves, gas delivery points, or side-hill cuts and will be determined on a site-specific basis.
- The toe of slope of workpad fill will not encroach on the ditch excavation area, except in certain site-specific areas where very narrow construction zones are required.
- The width provided for temporary storage of excavated ditch material will be based on excavation volume, material properties, and season of excavation.
- Workpad space will be provided for pipeline stringing, bending, welding and lowering-in operations along with a passing lane.
- The workpad width may be reduced to resolve site specific geotechnical or environmental concerns such as specified wetlands, riparian vegetation, unstable or steep slopes and stream crossings.

- The workpad will be graded to allow for surface drainage.

9.2.2.3 Terrain Stability and Thermal Criteria

The following criteria apply to workpad design:

- The geometry of cut and fill slopes associated with construction zone grading and embankment construction will be based on soil properties.
- Construction zone grading and embankment construction will be designed on slopes exceeding design criteria by including a site specific stability analysis.
- Benching may be used under embankments on unfrozen soils where the cross-slope component exceeds 20 percent. Note: Side slopes greater than 10 percent will be avoided as much as possible
- Benching of slopes is not desirable in frozen soils but may be used when it will increase the stability of the slope as determined by a site-specific analysis of stability, environmental, and constructional issues.
- Ice-rich frozen soils will not be cut without design provisions to control thaw degradation and siltation.
- Thaw stable soils may be cut in summer or winter.
- With the exception of clearing, snow removal and leveling of tussocks, surface disturbance will be minimized for locations with thermally designed embankments
- Winter and Spring are the preferred time of construction for thermally designed construction zones and embankments.

9.2.2.4 Embankment Criteria

Embankments are required on side slopes greater than ten percent (>10%) to protect low strength subgrade materials from traffic induced damage which may result in erosion or loss of supporting strength. Embankments will be designed for traffic areas as required, with the following exceptions:

- Areas without significant cross slopes where the natural materials can support the anticipated traffic without significant damage.
- Environmentally sensitive areas where traffic can be avoided or minimized.
- Areas without significant cross slopes where traffic can be limited to seasons when the ground is frozen or surface damage is permissible.
- For embankments not designed primarily for traffic such as storage yards, compressor stations, containment dikes, or river training structures, site specific designs will be provided

9.2.2.5 Thermal Workpad Criteria

Thermal workpads restrict thaw penetration into subgrade soils while supporting traffic. The following design criteria will be used:

- Where protection of the Dalton Highway or other facilities is required, synthetically insulated embankments may be used to prevent thaw during construction, and to limit long-term thaw to the original active layer.
- Where terrain stability is to be maintained by a thermal workpad, synthetically insulated embankments will be used to limit the short and long-term thaw depths to allowable limits.

9.2.2.6 Structural Workpad Criteria

- Geotechnical/geothermal soil parameters will be developed for workpad design and will be utilized to establish embankment thickness requirements.
- When the organic mat is left in place, a minimum embankment thickness is required to overcome instability of the mat when consolidation occurs. If the mat is thawed when the embankment is constructed, the earth moving traffic will enhance consolidation of the mat and less material will be required.
- The use of synthetic fabrics (geotextiles) will be considered as a means to minimize gravel thickness and eliminate certain embankment problem areas.

9.2.2.7 Ice/snow Workpad

Ice/snow workpad (See Figure 9-4) design and construction procedures will be developed for utilization in continuous permafrost and swampy areas. The consideration for ice/snow workpads will depend upon:

- Availability of sufficient snow and water for construction
- Environmental restrictions preventing the use of a gravel embankment or grading.
- Whether or not the terrain supports construction with considerations such as:
 - Uniform terrain with no grading required
 - Side slopes less than 8 percent
 - Incline slopes less than 10 percent unless assisted with tow/winch equipment

9.3 DESIGN PROCEDURES

9.3.1 Workpad Grading

9.3.1.1 Grading Type Selection

- The four types of workpads being considered are:
 - Graded ROW working on virgin earth (See Figure 9-3)
 - Ice/snow workpad (See Figure 9-4)
 - New gravel embankment (See Figure 9-5 and 9-6)
 - Wood mat workpad for short sensitive areas (See Figure 9-7)
- Slope limitations will be established based on terrain type, geotechnical/geothermal analysis, and site-specific limitations in sensitive areas.
- Benching may be used in accordance with the design criteria developed.
- The four types of workpads listed above are represented in Figures 9-3 through 9-7. All figures are depicted with the sidebooms facing front and the pipe being laid toward the viewer

9.3.2 Embankment Design

Embankment will be designed to support pipeline construction traffic loads. The structural design thickness will be determined on a site-specific basis.

9.3.3 Thermal Embankment Design

- Where a thermal embankment is required, design considerations will include:
 - Location (north or south of Atigun Pass)
 - Soil type
 - Purpose of thermal embankment (pipe settlement, workpad settlement, etc.,)
 - Availability of gravel

9.3.4 Minimization of Gravel Quantities

During the gravel embankment design and construction, every effort will be made to minimize the gravel quantity required to build the embankment. Ice/snow workpads will be utilized either as a supplement or as the primary workpad.

9.4 LIST OF FIGURES

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9-4	Ice / Snow Road (Winter Construction)
9-5	New Gravel Workpad (Summer / Winter Construction)
9-6	Gravel Workpad in Sensitive Area that Cannot be Graded (Summer / Winter Construction)
9-7	Co-Use Wood Mat Workpad (Summer Construction)

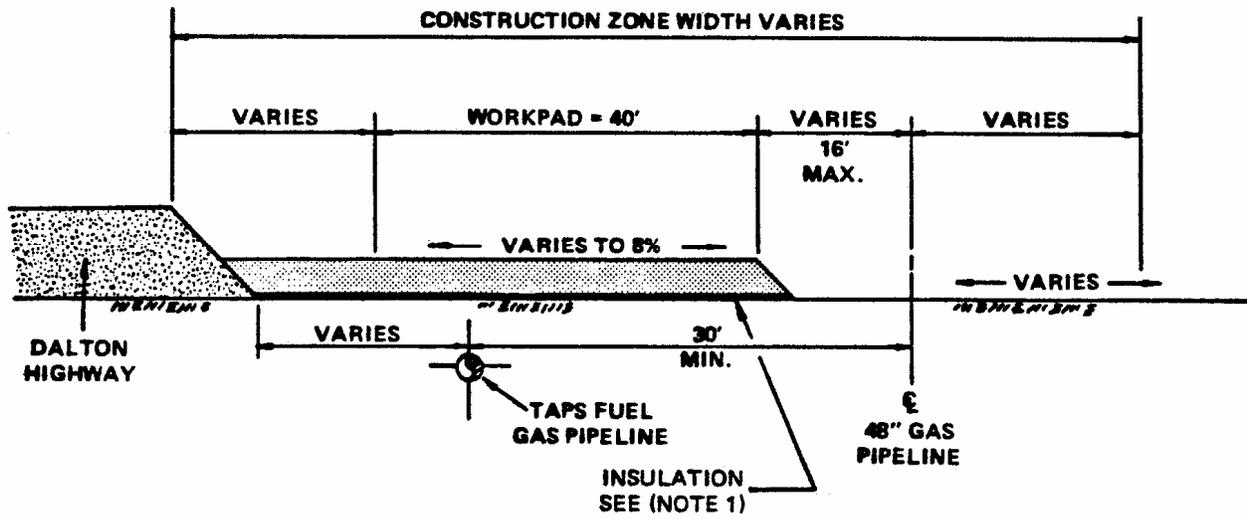


Figure 9-1 Typical Section at TAPS Fuel Gas Pipeline

Notes:

1. Thermal design as required.
2. No stripping within construction zone.

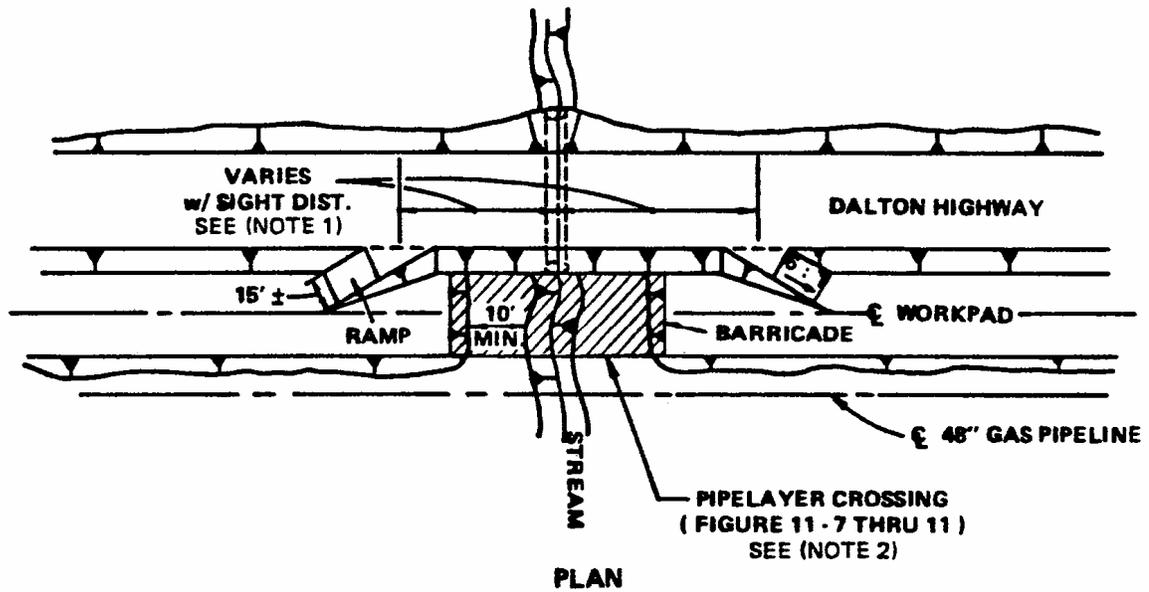
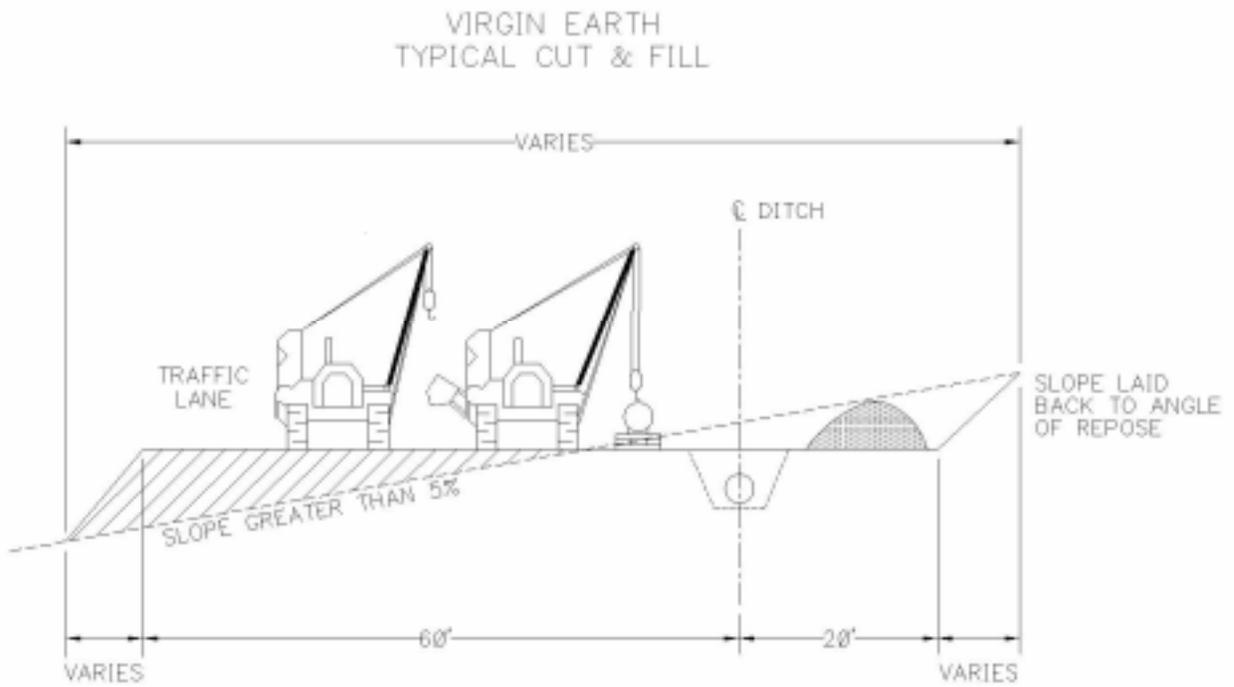


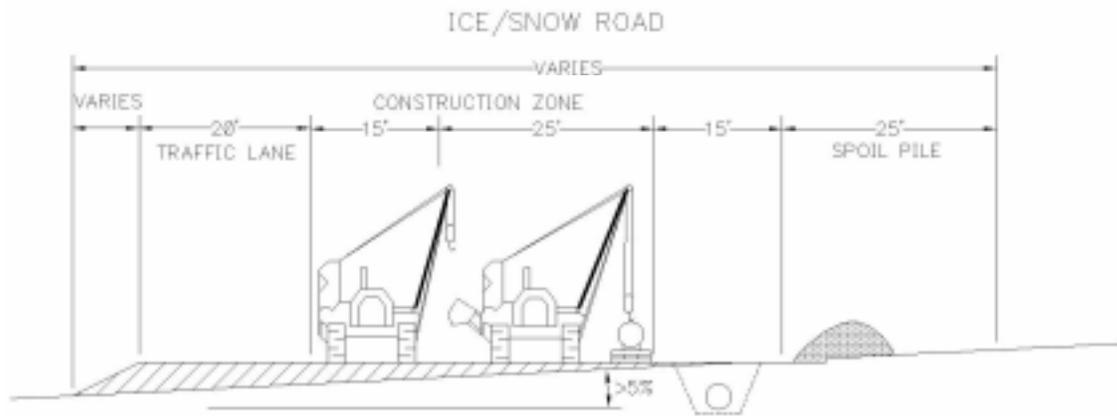
Figure 9-2 Typical Raming Detail

Notes:

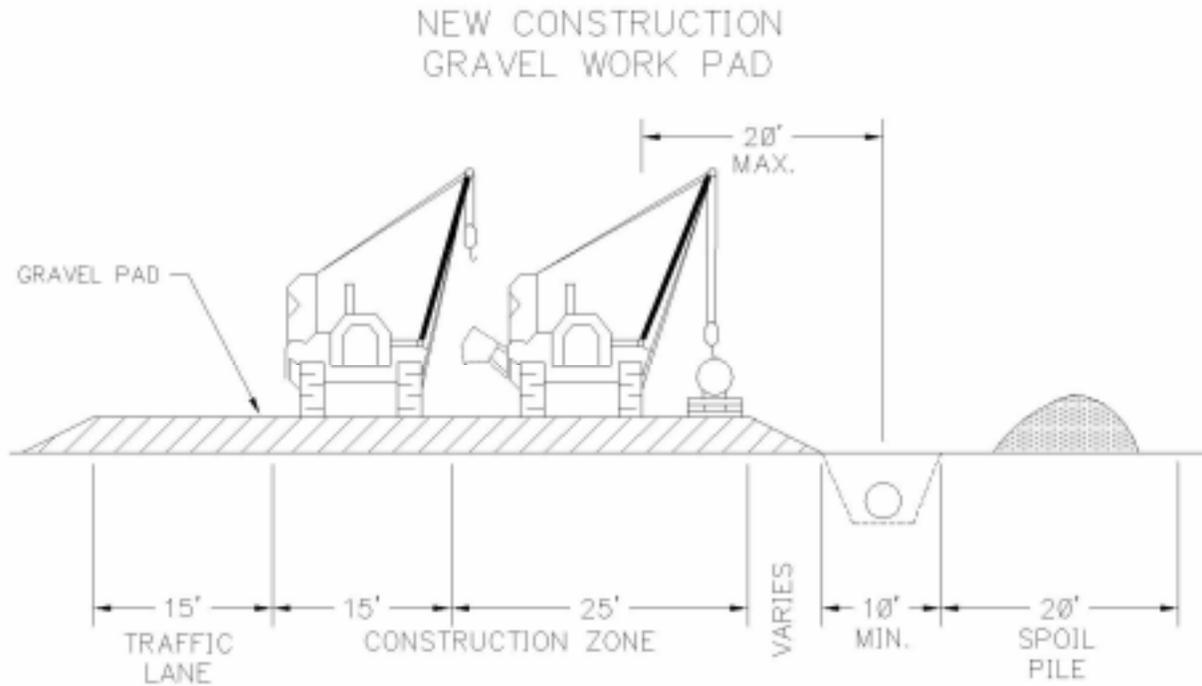
1. Sight Distance will be in accordance with Alaska traffic manual
2. Flexible mats or other protective devices will be used to protect steambanks, bed and vegetation. Construction will be done during shoulder months or flexible mat type bridging will be used according to Section 11.



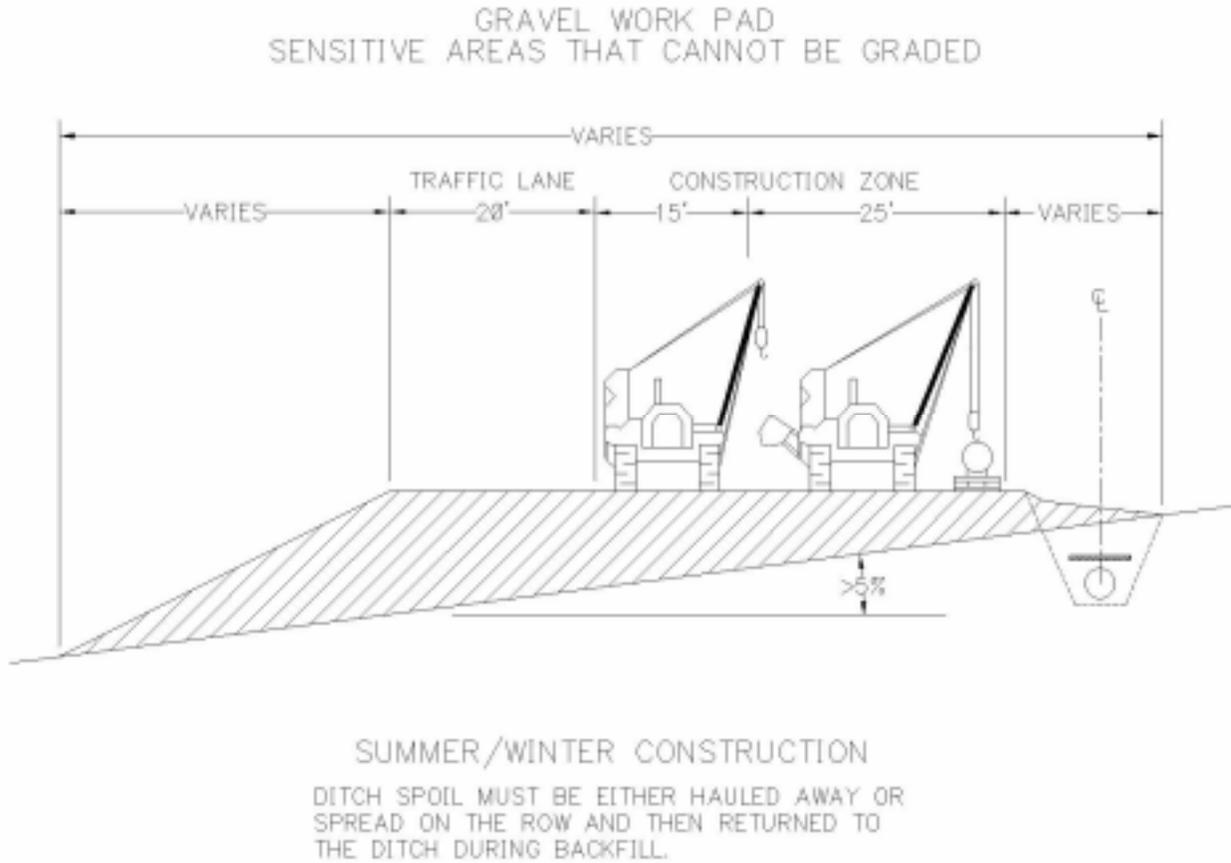
**Figure 9-3 Typical Sidehill Cut
(Summer/Winter Construction)**



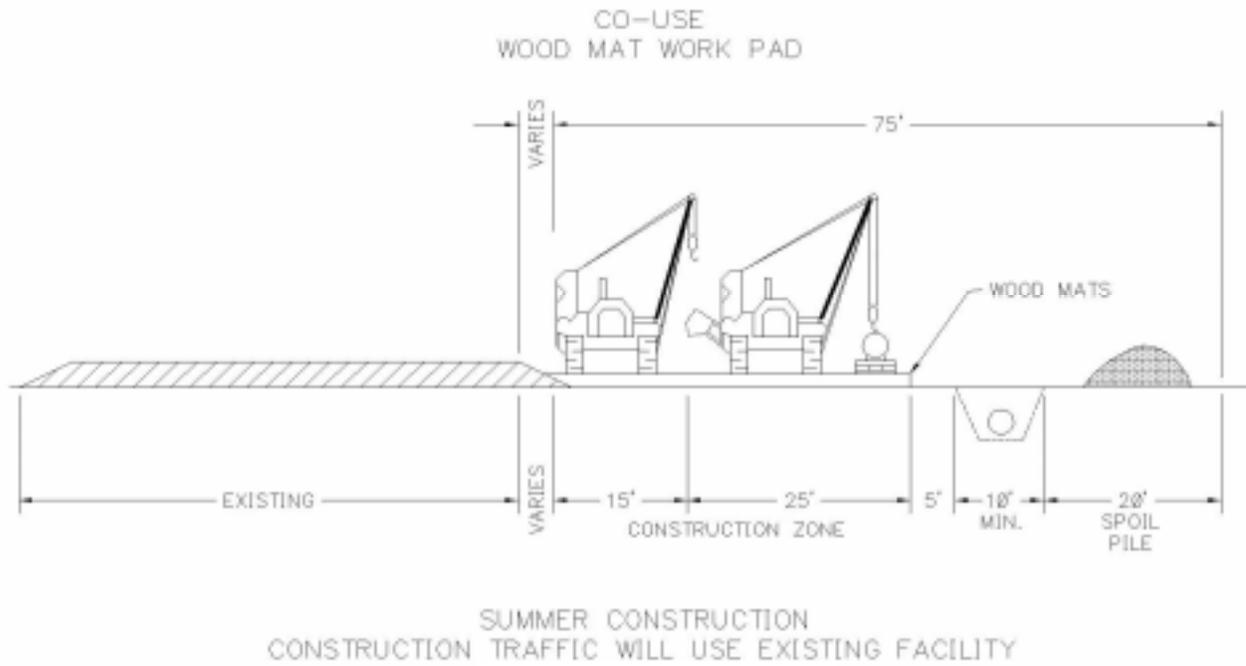
**Figure 9-4 Ice/Snow Road
(Winter Construction)**



**Figure 9-5 New Gravel Workpad
(Summer/Winter Construction)**



**Figure 9-6 Gravel Workpad in Sensitive Areas that Cannot be Graded
(Summer/Winter Construction)**



**Figure 9-7 Co-Use Wood Mat Workpad
(Summer Construction)**