

APPENDIX

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APPENDIX: A

Definitions and Acronyms

APPENDIX A-- Definitions and Acronyms

ATTACHMENT 4	Attachment 4 of Water Quality Order#-2003-0005-DWQ. Provisions for high growth areas, providing additional requirements for design standards and receiving water limitations.
BMP	Best Management Practice, used to describe an activity or requirement that is intended to improve storm water quality.
CAC	Citizen's Advisory Committee
CC+R	Codes, Covenants, and Restrictions
CRMP	Coordinated Resource Management and Planning, consensus-based watershed planning groups
CWA	Clean Water Act, the Federal legislation from which this program stems.
DRE	California Department of Real Estate
EC	Electrical Conductivity
EPA	Environmental Protection Agency
GENERAL PERMIT	A general permit issued by the State that defines the program requirements for most jurisdictions subject to the NPDES storm water Phase II. A jurisdiction may also choose to apply for an individual permit with the State, however this is generally recognized as being more time and effort consuming than adhering to the general permit.
GIS	Geographical Information System
GPS	Global Positioning System
HILLSIDE	Means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater.
IOD	Irrevocable offer of easement dedication
LID	Low Impact Development
RWQCB	Regional Water Quality Control Board, our first-line State regulatory agency for this program. Lahontan is the RWQCB for Truckee.
MCM	Minimum Control Measure, used to describe the six general activities of this program that are required by the federal legislation
MEP	Maximum Extent Practicable. MEP is the technology-based standard established by Congress. In choosing BMPs to meet the MEP, the major focus is on technical feasibility, but cost, effectiveness, and public acceptance are also relevant. Generally, in order to meet MEP, communities that have greater water quality impacts must put forth a greater level of effort.

MS4	Municipal Separate Storm Sewer System, term used to describe generally those entities subject to this program.
NOI	Notice of Intent. A two page form to be filed with the State on or before March 10, 2003 stating the intent of the jurisdiction to comply with the State's general permit for this program, rather than create its own unique permit.
NPDES	National Pollutant Discharge Elimination System, term used in the Clean Water Act to describe a series of different types of permits issued by the Federal Government (or designated States such as California), all intended to improve water quality.
OUTFALL	<i>Outfall</i> means a <i>point source</i> as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.
PHASE II	The second phase of the municipal storm water NPDES program, i.e. this program
POINT SOURCE	Point source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.
RFP	Request For Proposal
SIE	Separate Implementing Entity, a term defined by the State in the general permit for one jurisdiction that assimilates responsibility for all or part of another jurisdiction's program.
SUSMP	Standard Urban Storm Water Management Plan, used to describe the standard set of design requirements for water quality protection in new development and substantial redevelopment as Attachment 4 to the State's general permit.
SWMP	Storm Water Management Program, i.e. this Program
WDID	Waste Discharge Identification Number, permit number issued by the CVRWQCB when a waste discharge permit is issued.

APPENDIX: B

Contact information for Responsible Departments

Contact information for Responsible Departments

Town of Truckee Phone: (530) 582-7700
10183 Truckee Airport Road Fax: (530) 582-7710
Truckee, CA 96161-3306 www.townoftruckee.com

Name	Department	Phone Number	Email
Jessica Thompson	Engineering	(530) 582-2938	jthompson@townoftruckee.com
Dave Jacobsen	Public Works	(530) 582-2933	djacobsen@townoftruckee.com
Alex Terrazas	Facilities Maintenance	(530) 582-2914	aterrazas@townoftruckee.com
Michael Lavalley	Building and Safety	(530) 582-2905	mlavalley@townoftruckee.com
Debbie DeVenzio	Code Enforcment	(530) 582-2918	ddevenzio@townoftruckee.com
Duane Hall	Planning	(530) 582-2934	dhall@townoftruckee.com
Nichole Dorr	Solid Waste and Recycling	(530) 582-2909	ndorr@townoftruckee.com
Shanna Kuhlemier	Town Clerk	(530) 582-7700 ext.3144	skuhlemier@townoftruckee.com
Rosemary O'Gorman	Police	(530) 550-2340	rogorman@townoftruckee.com

APPENDIX: C

Sections of the General Plan

General Plan Sections

P4.5 Require new infrastructure and development to be designed and built to manage stormwater runoff and to minimize or eliminate harmful impacts to property prone to flooding, water quality, and riparian, wetland, and meadow habitats. When infrastructure is replaced or retrofitted, require the upgrading of stormwater management systems to minimize or eliminate these impacts.

Goal COS-2

Preserve and enhance the Truckee River and Donner Lake and the exceptional natural, scenic, economic, and recreational values they provide.

P2.1 Prohibit development within established setback areas from the Truckee River, except as otherwise allowed in the Development Code. Outside of the Downtown Specific Plan Area, development shall be set back a minimum of 100 feet from the edge of the Truckee River 100-year floodplain. Within the Downtown Specific Plan Area, development shall be set back a minimum distance from the edge of the 100-year floodplain that is equivalent to one foot above the base flood elevation. Grading, landscaping and drainage uses within the established setback area shall also be subject to strict controls. Improvements for public access and use may be allowed within the established setbacks. P2.2 Enhance degraded areas within the Truckee River 100-year floodplain, possibly in association with a related project approval, or as off-site mitigation for development projects.

P2.3 Support efforts of local community and non-profit organizations to conduct ecological studies of the Truckee River and Donner Lake and their associated waterways, undertake water quality monitoring, and perform clean-up and restoration activities.

P2.6 Regulate development and land uses along the Truckee River corridor and Donner Lake to ensure compatibility with their scenic, recreational and habitat values.

P2.8 Prohibit development within the established setback areas from Donner Lake, except as otherwise allowed in the Development Code, and enhance degraded areas within the Donner Lake 100-year floodplain and setback, possibly in association with a related project approval, or as off-site mitigation for development projects.

A2.1 Work with the Truckee River Watershed Council, TDRPD and other agencies to develop comprehensive, long term management plans for the Truckee River corridor within the Town limits and Donner Lake. The plans should treat the Truckee River and Donner Lake and their associated riparian, wetland and meadow habitats as holistic systems, and should address the complete range of issues associated with the Truckee River and Donner Lake, including scenic and habitat values, opportunities for riparian restoration and enhancement, flood protection, water quality, and access and recreation opportunities.

A2.3 Develop a program to actively facilitate relocation of industrial uses along the Truckee Riverfront to other, more suitable locations in the town.

A2.4 Amend the Development Code to add incentives for development that would

increase and improve public access to the Truckee River and Donner Lake and restore degraded habitats along stream banks and the Lake.

Goal COS-11 Protect water quality and quantity in creeks, lakes, natural drainage and groundwater basins.

P11.1 Minimize excessive paving that negatively impacts surfacewater runoff and groundwater recharge rates. P11.2 Protect surface and groundwater resources from contamination from runoff containing pollutants and sediment, through implementation of the Regional Water Quality Control Board's (RWQCB) Lahontan Region's, Best Management Practices.

P11.3 Cooperate with State and local agencies in efforts to identify and eliminate all sources of existing and potential point and non-point sources of pollution to ground and surface waters, including leaking fuel tanks, discharges from storm drains, auto dismantling, dump sites, sanitary waste systems, parking lots, roadways, and logging and mining operations.

P11.4 Enforce guidelines set forth by the Regional Water Quality Control Board Lahontan Region (RWQCB) regarding waste discharge associated with domestic wastewater facilities such as septic tank leach field systems.

P11.5 Require new development projects that have the potential to impact local water quality through increased stormwater runoff or erosion to include analysis of water quality impacts as a component of project review, and to integrate mitigation measures that would reduce identified impacts to an acceptable level.

P11.6 Utilize Low Impact Development and Best Management Practices established in the Regional Water Quality Control Board's Truckee River Hydrologic Unit Project Guidelines for Erosion Control, and the State of California Stormwater Best Management Practices Handbooks, and other resources such as the Practice of Low Impact Development (US Department of Housing and Urban Development) and Water Quality Model Code and Guidebook (State of Oregon, Department of Land Conservation and Development) as guidelines for water quality and erosion control measures required by the Town.

P11.9 Recognize the importance of stormwater management in protecting all water resources in Truckee, for example, flood control, surface and ground water quality, and river, stream and lake health.

A11.1 Establish coverage limitations for impervious paved areas in new development, and encourage the use of permeable paving materials and other water quality management practices to minimize stormwater runoff and the loss of groundwater recharge from paving. Such limitations shall take into account .

A11.2 In coordination with the Truckee Citizens Waste Management Committee and Nevada County, develop and distribute an informational brochure to promote awareness of nonpoint source pollution and to educate local residents and business-owners about ways to reduce it. The brochure might address topics such as responsible use of pesticides, fertilizers, household chemicals, landscaping to control erosion, maintenance of septic systems, and proper

disposal of used motor oil and batteries.

A11.5 Work with the Truckee River Watershed Council and the Lahontan RWQCB to establish current condition water quality information and to monitor regulatory compliance regarding water quality in the Truckee River Basin.

A11.6 Form a citizens advisory committee that will serve as an advisory body during the preparation of the stormwater and/or water quality management plan. Upon adoption of the plan, consider other roles the committee may assume.

A11.7 Prepare a stormwater and/or water quality management plan for the Town with the goal of the plan to improve the quality of our surface and ground waters. The Plan should include, but not be limited to, well-defined goals, policies and actions to:

- ◆ Create effective partnerships with special districts, County, State and federal agencies, as well as non-profit organizations such as the Truckee River Watershed Council, in all aspects of plan development and implementation.
- ◆ Ensure the long term financial viability of the plan through appropriate budgeting and allocation of financial and staff resources towards implementation of the plan.
- ◆ Identify clear criteria and an effective process to periodically review and evaluate the achievements of the plan, and make amendments to it as needed.

A11.8 Following completion and adoption of the plan, review and update the Development Code as necessary to reflect any relevant findings, policies, and action items identified in the plan.

P12.2 Require projects that require earthwork and grading, including cuts and fills for roads, to incorporate measures to minimize erosion and sedimentation. Typical measures include project design that conforms with natural contours and site topography, maximizing retention of natural vegetation, and implementing erosion control Best Management Practices.

P12.3 Require discretionary project review for all substantial grading activities not associated with an approved development project or timber harvesting plan.

A12.1 Work with the Truckee River Watershed Council and Lahontan RWQCB to identify existing critical erosion problems and to pursue funding to resolve these problems.

A12.2 Establish standards for temporary and permanent erosion control measures for grading associated with single family residences, duplexes, and second units on existing and future lots.

P2.3 Incorporate stormwater drainage systems in development projects to effectively control the rate and amount of runoff, so as to prevent increases in downstream flooding potential.

APPENDIX: D

Sections of the Development Code

18.30.050 - Drainage and Storm Water Runoff

All applications for Zoning Clearance, Development Permit, Minor Use Permit, or Use Permit, except single-family dwellings, secondary residential units, and duplexes, shall include drainage and erosion control plans and be designed and constructed to provide facilities for the proper conveyance, treatment, and disposal of storm water in compliance with this Section.

A. Drainage and erosion control plan requirements. Drainage and erosion control plans shall be submitted to the Department for review for compliance with the requirements of this Section. The plan may be incorporated within the project site plan.

1. A preliminary drainage and erosion control plan shall be submitted as part of an application for a land use permit, for new development, and the significant expansion or redevelopment of an existing use as determined by the Director.

2. Following approval of the land use permit, a final drainage and erosion control plan shall be submitted as part of the application for a Building Permit. Final plans shall be approved by the Director before the start of on-site construction or soil disturbance and before the issuance of a Building Permit. Projects requiring Commission approval due to their size or use shall require plans prepared by a licensed engineer.

3. Preliminary and final plans shall contain all information specified in the instructions for preparing drainage and erosion control plans provided by the Department.

4. After initial application review in compliance with Section 18.70.060 (Initial Application Review), the Director shall review each preliminary and final plan to verify its compliance with the provisions of this Section. The Director may approve the submittal in compliance with this Chapter, or may deny or require changes to a submittal that is not in compliance.

B. Runoff treatment. Surface runoff treatment measures consistent with the Regional Water Quality Control Board's Truckee River Hydrologic Unit Project Guidelines for Erosion Control and the "State of California Stormwater Best Management Practices Handbooks", prepared by the American Public Works Association Storm Water Task Force, shall be incorporated into the project. The following measures shall also be incorporated into the project:

1. Stormwater runoff:

a. Runoff from impervious surfaces shall be collected, treated, and contained on-site utilizing infiltration disposal facilities (e.g., infiltration basins and trenches) designed, installed, and maintained for, at a minimum, a twenty-year, one-hour storm event based on the Public Improvements and Engineering Standards. The Director may require a design to accommodate a larger storm event when topographic and/or drainage improvements;

b. Runoff shall be directed into any on-site retention/treatment basin using a slot drain, culvert, depressed swale, rock-lined trench, and/or other approved drainage facilities. Surface and subsurface water shall not drain over sidewalks or adjoining parcels;

c. Runoff from structures not directed into a retention/treatment basin shall utilize graveled dripline infiltration trenches under all eaves and decks designed, installed, and maintained for up to and including a twenty-year, one-hour event. Infiltration trenches shall include a minimum gravel depth of eight inches and a minimum width of two feet, unless a trench of different dimensions is approved by the Director based upon an engineered drainage analysis; and

d. Runoff from snow storage areas shall be collected, treated, and contained on-site in accordance with the requirements of Subsection B.

2. On-site drainage facilities:

a. Facilities shall be designed to direct stormwater runoff which exceeds the required capacity of the facility into a public storm drainage system contained within the nearest public right-of-way; and

b. Facilities shall not be used for snow storage. Snow shall not be placed within any required on-site drainage facility which conflicts with the intended function of the facility.

3. Wetlands:

a. Runoff into wetland areas shall not be increased above or decreased below pre-project levels unless the review authority finds that the increase or decrease of runoff will not adversely affect the health, function, and values of the wetland; and

b. Runoff into wetland areas shall be treated in accordance with Subsection B prior to release into the wetland.

C. Erosion control. Erosion control measures consistent with the Regional Water Quality Control Board's Truckee River Hydrologic Unit Project Guidelines for Erosion Control and the "State of California Stormwater Best Management Practices Handbooks", prepared by the American Public Works Association Storm Water Task Force, shall be incorporated into the project. The following measures shall also be incorporated into the project:

1. Temporary measures. Temporary erosion control measures as required by the Director shall be installed and continuously maintained for the duration of construction and shall include: a. All non-construction areas shall be clearly marked and protected during construction by fencing or other identification approved by the Director;

b. The protection of loose piles of clay, debris, sand, silt, soil, or other earthen material during periods of precipitation or runoff with nonwoven filter fabric fence, hay bales, temporary gravel, and/or earthen or sand bag dikes; and

c. All soil disturbance activities shall cease if adverse weather conditions exist, unless operating under an exception granted by the Director. Adequate temporary erosion control measures shall be immediately installed during adverse weather conditions.

2. Permanent measures. Permanent erosion control measures as required by the Director shall be installed and continuously maintained for the life of the project and shall include:

a. All surplus or waste earthen materials shall be removed from the site and deposited in an approved location within 10 days from completion of construction;

b. Earthen materials shall not be placed in surface water drainage courses, permanent or temporary, or in a location to allow the discharge of earthen materials to any surface water drainage course; and

c. All disturbed areas shall be permanently stabilized or vegetated. Vegetated areas shall be continuously maintained to ensure adequate growth and root development. Vegetation shall consist of seeding, planting, mulching, and initial fertilizing and watering as needed.

3. Timing of operations. Ground disturbance including vegetation removal that disturbs the soil shall be prohibited between October 15 of any year and May 1 of the following year. Exceptions may be granted by the Director based upon the following:

a. Predicted dry weather conditions;

b. The construction activity is associated with existing disturbed conditions only and is not intended to allow for the commencement of new construction activity or new disturbance;

c. Specific dates and scope of work involved in the construction activity; and

d. The site shall be winterized and specific Best Management Practices implemented to control erosion and protect water quality within 48 hours of the Director's order to cease ground disturbance.

4. Stabilization. Before October 15 in any year, permanent or temporary stabilization of all disturbed or eroding areas shall be installed consistent with the requirements of this Section.

D. Limitation on runoff. The net rate release of runoff from a site onto adjoining parcels and rights-of-way after construction shall not be greater than pre-construction levels of the runoff release from the site based on a 20-year, one-hour storm event. The Town Engineer may require a design to accommodate a larger storm event when topographic and/or drainage conditions of the surrounding area or watershed warrant more stringent drainage improvements.

E. Maintenance. All required drainage and erosion control improvements shall be maintained for the life of the approved project, including routine maintenance, repair, and replacement of the improvements. Maintenance shall include:

1. Unclogging of basins, pipes, swales, and trenches by debris, ice, and sediment;

2. Repair of damaged basins, pipes, swales, and trenches;
3. Replacement of unhealthy, damaged, or non-productive vegetation; and
4. Restabilization of erosion on slopes.

F. Minor Use Permit required. Projects satisfying any of the following conditions will require the approval of a Minor Use Permit in compliance with Chapter 18.76:

1. Projects within the 100-year floodplain of waters under the jurisdiction of the State Regional Water Quality Control Board or projects required by the Regional Water Quality Control Board to obtain a waste discharge permit due to the potential for the discharge or threatened discharge of solid or liquid materials to surface waters, potential wetlands areas, or other sensitive lands. Docks, piers, ramps, and similar structures within the 100-year floodplain of Donner Lake shall not require the approval of a Minor Use Permit if constructed in compliance with Section 18.38.050(D);
2. Projects located on sites containing contaminated soils as identified by the Nevada County Health Department or the State Regional Water Quality Control Board; and
3. Projects resulting in the disturbance of land or located within 200 feet of any wetland area unless the Director finds that the topographic conditions of the surrounding area will clearly preclude any disturbance of wetland areas and will ensure that any runoff from the project will not result in any water quality impacts to a wetland area. A wetlands delineation report shall be required for all projects requiring a minor use permit under this condition. The disturbance of wetland areas shall comply with Section 18.46.040

18.30.080 - Grading and Vegetation Removal

A. Preservation of the natural vegetation. To prevent premature grading of the existing terrain and to ensure preservation of the natural vegetation within the Town, grading and/or removal of natural vegetation shall not occur before the issuance of a land use permit (e.g., Zoning Clearance, Use Permit, etc.) authorizing development on the subject parcel, except for the following:

1. Grading and/or the removal of vegetation for a single-family residence on an existing subdivision lot;
2. Timber removal done in accordance with a timber harvesting plan approved by the California Department of Forestry and Fire Safety;
3. Removal of vegetation done within an open space area by a subdivision homeowner's association or similar organization or a public agency in order to maintain the health of the forest and/or enhance fire safety; and
4. Removal of vegetation to comply with the fuel clearance regulations of the Truckee Fire Protection District.

B. Building and Grading Permits. A Grading Permit shall not be issued until the associated Building Permits are issued, unless grading is secured with an appropriate performance guarantee in compliance with Section 18.84.040 (Performance Guarantees).

C. Commission requirements. As part of the approval of a Development Permit or Use Permit involving grading, the Commission shall make one of the following findings:

1. Performance guarantees in compliance with Section 18.84.040 (Performance Guarantees) shall be required prior to issuance of any grading or building permits for the project to guarantee restoration of the site if the project is not completed;
2. There is sufficient evidence demonstrating there is adequate financing for the project to guarantee that the project will be completed; or
3. Performance guarantees are not necessary, given the particular circumstances of the application.

18.30.130 - Snow Storage

All development and proposed land uses that are planned with off-street parking and circulation areas, except single-family dwellings, secondary residential units, and duplexes, shall be designed and constructed to provide snow storage areas in compliance with the minimum standards of this Section.

A. Application content requirements. All land use permit applications subject to this Section shall include identification of required snow storage areas on the required site plan.

B. Minimum storage area required. Each unenclosed parking area, including circulation drives and aisles, shall provide a snow storage area(s) as follows.

1. In areas with a snow load less than 200 pounds per square foot, the required snow storage area shall equal at least 50 percent of the total parking and driveway area.

2. In areas with a snow load of 200 pounds per square foot or greater, the required snow storage area shall equal to at least 75 percent of the total parking and driveway area.

3. The review authority may reduce or waive the required snow storage area(s) if the review authority finds one of the following:

(a) The size and configuration of snow storage area(s) allow ramping or other removal and storage methods which reduce the amount of area necessary to store snow in comparison to normal snow removal and storage operations; (b) A long-term snow hauling plan is adopted as part of the land use permit and the snow hauling plan demonstrates the property owner and/or snow removal contractor has sufficient rights to an off-site storage area(s) to store excess snow from the property with an acceptable method to transport the snow from the property to the off-site storage area(s); or

(c) An acceptable methods to remove and store snow from the property has been adopted as part of the land use permit and such method(s) clearly demonstrate that the amount of snow storage area(s) required by this section is not necessary.

C. Location. Snow storage areas:

1. Shall be located near the sides or rear of parking areas, away from the primary street frontage;

2. Shall be located to maximize solar exposure to the greatest extent feasible. Areas shaded by structures or vegetation shall be avoided;

3. Shall be located so that snow moving equipment is not required to enter the public streets to move snow to the storage area;

4. Shall be located in areas that are substantially free and clear of obstructions (e.g. propane tanks, trees, large boulders, trash enclosures, utility pedestals);

5. May be located within parking areas but such areas may not be counted towards meeting parking requirements for the use; and

6. May be located within required landscaping areas but the areas shall be planted with landscaping tolerant of snow storage or be native vegetation.

D. Minimum dimensions. The minimum dimension of a snow storage area shall be 10 feet in any direction.

E. Drainage. Snow storage areas shall be designed to provide adequate drainage to prevent ponding and the formation of ice, especially within pedestrian areas and driveways. Drainage from snow storage areas shall be directed towards on-site drainage retention/treatment facilities.

CHAPTER 18.34 - FLOOD PLAIN MANAGEMENT

Sections:

18.34.010 - Purpose of Chapter

18.34.020 - Applicability

18.34.030 - Definitions

18.34.040 - Warning and Disclaimer of Liability

18.34.050 - Variance Required

18.34.060 - General Provisions

18.34.070 - Provisions for Flood Hazard Reduction

18.34.080 - Consideration for Variances

18.34.090 - Conditions for Variance Issuance

18.34.010 - Purpose of Chapter

A. This Chapter provides regulations for development within areas of potential flood hazard to:

1. Protect, conserve, and promote the orderly development of land and water resources;
2. Protect human life and health;
3. Minimize expenditure of public money for costly flood control projects;
4. Minimize the need for rescue and relief efforts associated with flooding;
5. Minimize prolonged business interruptions;
6. Minimize damage to public facilities and utilities;
7. Insure that potential buyers are notified that property is in an area of special flood hazard;
8. Insure that those who occupy areas of special flood hazard assume responsibility for their actions;
9. Preserve the natural hydrologic and hydraulic functions of watercourses and flood plains, and protect water quality and aquatic habitats; and
10. Preserve the natural characteristics of stream corridors in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits, and enhance community and economic development.

B. In order to accomplish the above purpose, this Chapter includes methods and regulations for:

1. Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
2. Requiring that uses vulnerable to floods, including facilities which serve the uses, be protected against flood damage at the time of initial construction;
3. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
4. Controlling filling, grading, dredging and other development which may increase flood damage; and
5. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

18.34.020 - Applicability

The regulations of this Chapter shall apply to all areas of special flood hazard identified by the Federal Emergency Management Agency (FEMA) or the Federal Insurance Administration (FIA) in a report entitled "Flood Insurance Study for Nevada County, California Unincorporated Areas" dated July 2, 1987, with an accompanying Flood Insurance Rate Map with map index dated July 2, 1987 or any subsequent revisions or amendments. The report is adopted by reference and is part of this Chapter. The Flood Insurance Study is on file at the Department. The Flood Insurance Study and Flood Insurance Rate Map are the minimum area of applicability of this Chapter and may be supplemented by studies for other areas which allow implementation of this Chapter.

Uses shall not be established and structures shall not be constructed, located, extended, converted or altered without full compliance with the requirements of this Chapter and other applicable regulations of this Development Code. Docks, piers, ramps, and similar structures within the 100-year floodplain of Donner Lake shall be exempt from the provisions of this Chapter if constructed in compliance with Section 18.38.050(D) and approvals are obtained from all agencies with permitting authority.

18.34.030 - Definitions

The following are definitions of special terms and phrases used in this Chapter. Other general definitions are provided in Chapter 18.220 (Definitions/Glossary).

Encroachment. The advance or infringement of uses, plant growth, fill, excavation, permanent structures, or development into a floodplain which may impede or alter the flow capacity of a floodplain.

Fraud and victimization. As related to Section 18.34.080 (Consideration for Variances), the granting of the variance will not cause fraud on or victimization of the public. In examining this requirement, the Zoning Administrator will consider the fact that every new structure adds to government responsibilities and remains a part of the community for 50 to 100 years. Structures that are permitted to be constructed below the base flood elevation are subject during all those years to increased risk of damage from floods, while future owners of the property and the community as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

Functionally dependent. A use that cannot perform its intended purpose unless it is located or carried out in close proximity to water. This term includes only piers and other docking and port facilities that are necessary for the loading and unloading of cargo or passengers and the seasonal mooring of boats and other watercraft. It does not include long-term storage or related manufacturing facilities.

Hardship. As related to Section 18.34.080 (Consideration for Variances), the exceptional hardship that would result from a failure to grant the requested variance. The Zoning Administrator requires that the variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an exceptional hardship. All of these problems can be resolved through other means without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended.

Lowest floor. The lowest floor of the lowest enclosed area (including basement) . An unfinished or flood resistant enclosure, useable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a structure's lowest floor; provided, that the enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this Chapter. For residential structures, all subgrade enclosed areas are prohibited as they are considered to be basements. This prohibition includes below-grade garages and storage areas.

New construction. For floodplain management purposes, structures for which the start of construction commenced on or after August 1, 1988, and includes any subsequent improvements to these structures.

Obstruction. Includes, but is not limited to, any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure, vegetation or other material in, along, across or projecting into any watercourse which may alter, impede, retard or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water, or its likelihood of being carried downstream.

Public safety and nuisance. As related to Section 18.34.080 (Consideration for Variances), the granting of a variance must not result in anything that is injurious to safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin. **Start of construction.** Start of construction includes substantial improvement and other proposed new development and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days from the date of the permit. The actual start means either the

first placement of permanent construction of a structure on a site, (e.g., pouring of slab or footings, installation of piles, construction of columns) or any work beyond the stage of excavation, or the placement of a manufacture home on a foundation. Permanent construction does not include land preparation, (e.g., clearing, grading, and filling) nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation of accessory buildings, (e.g., garages or sheds) not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Substantial damage. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement. Any reconstruction, rehabilitation, addition, or other proposed new development of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not include either:

- a. Any project for improvement of a structure to correct existing violations or state or local health, sanitary, or safety code specifications which have been identified by the Chief Building Official and which are the necessary to assure safe living conditions; or
- b. Any alteration of a historic structure, provided the alteration will not preclude the structure's continued designation as a historic structure.

After August 1, 1988, the value of any work to be performed under a building permit issued after that date shall be compared to the total value of the structure at the time of the permit application to calculate the percentage of new construction, additions or repairs, under the permit. This percentage figure shall be added to any successive building permits that may be issued within a subsequent five year span. If the percentage of construction work performed under the successive building permit totals 50 percent or more, this work shall constitute a substantial improvement. If a structure undergoes substantial improvements, the entire structure shall comply with the provisions of this Chapter.

18.34.040 - Warning and Disclaimer of Liability

The degree of flood protection required by this Chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This Chapter does not imply that land outside the areas of special flood hazards, or uses permitted within these areas will be free from flooding or flood damages. This Chapter shall not create liability on the part of the Town, any officer or employee thereof, the Federal Insurance Administration, Federal Emergency Management Agency, or the State of California, for flood damages that result from reliance on this Chapter or any an administrative decision lawfully made thereunder.

18.34.050 - Variance Required

A. When required. A Variance (Chapter 18.82) shall be obtained before any construction or other development (not including trails, paths and sidewalks) begins within an area of special flood hazard. Grading or filling performed in the course of soil stabilization or erosion control measures for improvements in place as of the effective date of this Development Code may be allowed with Building Permit approval.

B. Exempt work. A Variance shall not be required for grading or filling performed in the course of providing soil stabilization or erosion control measures for improvements that were in place as

of the effective date of this Development Code or for the construction of docks and associated grading subject to the development standards for docks and approval by the Lahontan Regional Water Quality Control Board.

C. Application content. A Variance application shall include the forms furnished by the Department and may include plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question, existing or proposed structures, fill, storage of material, drainage facilities, and the location of the foregoing. An application for a variance shall also include the following information:

1. Proposed elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
2. Proposed elevation in relation to mean sea level to which any structure will be flood proofed;
3. All appropriate certifications listed in Section 18.34.070 (Provisions for Flood Hazard Reduction); and
4. Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

18.34.060 - General Provisions

A. Use of other Base Flood Data. When base flood elevation data has not been provided, the Department shall obtain, review and utilize base flood elevation and floodway data available from a Federal, State or other source, in order to administer Section 18.34.070 (Provisions for Flood Hazard Reduction).

B. Notification. Whenever a watercourse is to be altered or relocated, the Department shall notify adjacent communities, the California Department of Water Resources, Federal Insurance Administration (FIA), and Federal Emergency Management Agency (FEMA) prior to the alteration or relocation, and submit evidence of the notification to FIA and FEMA.

C. Public records. The Department shall maintain the following information and certifications and make them available for public inspection:

1. Certification of lowest floor elevation in compliance with Section 18.34.070.A.3.a;
2. Certification of elevation or floodproofing of non-residential structures in compliance with Section 18.34.070.A.3.b;
3. Certification of designs to automatically equalize hydrostatic flood forces in compliance with Section 18.34.070.A.3.c;
4. Identification of flood hazard areas for proposed tentative maps in compliance with Section 18.34.070.C; and
5. Certification of no increase in flood levels in compliance with Section 18.34.070.E.1.

D. Map determinations. The Department shall make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazard, for example, where there appears to be a conflict between a mapped boundary and actual field conditions. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation. Grade elevation and the base flood elevation shall be used in determining the area of special flood hazard.

18.34.070 - Provisions for Flood Hazard Reduction

A. Standards for construction. In areas of special flood hazards, the following standards are required:

1. Anchoring.

- a. New construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads.
- b. All manufactured homes shall meet the anchoring standards of Subsection D., below.

2. Construction materials and methods.

- a. New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

b. New construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

c. New construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located to prevent water from entering or accumulating within the components during conditions of flooding.

3. Elevation and floodproofing

a. New construction and substantial improvement of a structure shall have the lowest floor, including basement, elevated one foot above the base flood elevation for all special flood hazard areas or zones. Non-residential structures may meet the standards in paragraph b. below. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor. The certification shall be provided to the Department.

b. Non-residential construction shall either be elevated in conformance with paragraph a. above or together with attendant utility and sanitary facilities:

(1) Be flood proofed so that below an elevation of one foot above the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

(2) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

(3) Be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. The certification shall be provided to the Department.

c. New construction and substantial improvements that have fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall meet or exceed the following minimum criteria:

(1) Provide a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot above finished grade. Openings may be equipped with screens, louvers, valves or other coverings or devices provided that they permit the automatic entry and exit of floodwaters; or

(2) Be certified by a registered professional engineer or architect to comply with the guidelines for engineered openings in FEMA Technical Bulletin 1-93.

B. Standards for utilities.

1. New and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from systems into flood waters.

2. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

C. Standards for subdivisions. All tentative map proposals shall identify the flood hazard area and the elevation of the base flood. A proposed subdivision shall not create or establish building sites, or pads within flood hazard areas. Roads, driveways, and utilities shall be designed to minimize flood damage.

D. Standards for manufactured homes. Manufactured homes and additions to manufactured homes shall:

1. Be elevated so that the lowest floor is one foot above the base flood elevation; and

2. Be securely anchored to a permanent foundation system to resist flotation, collapse or lateral movement.

E. Floodway. Floodways are located within special flood hazard areas and are extremely hazardous due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential. The following provisions apply within floodways:

1. Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless certification by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in base flood elevations during the occurrence of the base flood discharge.

2. If paragraph 1. above is satisfied, new construction, substantial improvements, and other proposed new development shall comply with all other applicable flood hazard reduction provisions of this Section.

18.34.080 - Consideration for Variances

A. Application review considerations. In reviewing applications for Variances to the requirements of this Chapter, the Zoning Administrator shall consider all technical evaluations, relevant factors, standards specified in this Chapter, and the following:

1. The danger that materials may be swept onto other lands to the injury of others;
2. The danger of life and property due to flooding or erosion damage;
3. The susceptibility of the proposed facility and its contents to flood damage and the effect of damage on the individual owner;

B. Standards for utilities.

1. New and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from systems into flood waters.

2. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

C. Standards for subdivisions. All tentative map proposals shall identify the flood hazard area and the elevation of the base flood. A proposed subdivision shall not create or establish building sites, or pads within flood hazard areas. Roads, driveways, and utilities shall be designed to minimize flood damage.

D. Standards for manufactured homes. Manufactured homes and additions to manufactured homes shall:

1. Be elevated so that the lowest floor is one foot above the base flood elevation; and
2. Be securely anchored to a permanent foundation system to resist flotation, collapse or lateral movement.

E. Floodway. Floodways are located within special flood hazard areas and are extremely hazardous due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential. The following provisions apply within floodways:

1. Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless certification by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in base flood elevations during the occurrence of the base flood discharge.

2. If paragraph 1. above is satisfied, new construction, substantial improvements, and other proposed new development shall comply with all other applicable flood hazard reduction provisions of this Section.

18.34.080 - Consideration for Variances

A. Application review considerations. In reviewing applications for Variances to the requirements of this Chapter, the Zoning Administrator shall consider all technical evaluations, relevant factors, standards specified in this Chapter, and the following:

1. The danger that materials may be swept onto other lands to the injury of others;
2. The danger of life and property due to flooding or erosion damage;
3. The susceptibility of the proposed facility and its contents to flood damage and the effect of damage on the individual owner;
4. The importance of the services provided by the proposed facility to the community;
5. The necessity to the facility of a waterfront location, where applicable;

6. The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
7. The compatibility of the proposed use with existing and anticipated development;
8. The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;
9. The safety of access to the property in time of flood for ordinary and emergency vehicles;
10. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site; and
11. The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities (e.g., sewer, gas, electrical, and water system, and streets and bridges).

B. Findings for approval. In addition to the findings required for the approval of a Variance (Chapter 18.82), the following special findings are also required for development within special flood hazard areas:

1. A showing of good and sufficient cause;
2. A determination that failure to grant the Variance would deny the applicant the right to develop the property, and would result in exceptional hardship to the applicant;
3. A determination that the granting of a Variance will not result in additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of, the public, or conflict with existing local laws or ordinances;
4. All required State and federal permits have been or will be obtained;
5. The site is reasonably safe from flooding;
6. The environmental document prepared for the project complies with the requirements of the California Environmental Quality Act;
7. The proposed development complies with all applicable provisions of Section 18.34.070 (Provisions for Flood Hazard Reduction).
8. The proposed development does not adversely affect the carrying capacity of areas where base flood elevations have been determined, but a floodway has not been designated. For purposes of this Chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with other existing and anticipated development will not increase the water surface elevation of the base flood more than one foot at any one point.

C. Conditions of approval. Upon consideration of the factors of Subsection A. above and the purposes of this Chapter, the Zoning Administrator may impose conditions to the granting of a Variance as it deems necessary to further the purposes of this Chapter.

D. Records and reporting. The Department shall maintain the records of all appeal actions and report any variances to the Federal Insurance Administration and Federal Emergency Management Agency upon request.

18.34.090 - Conditions for Variance Issuance

A. Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed in the National Register of Historic Places, the State Inventory of Historic Places, or the Town of Truckee Historic Resources Inventory without regard to the procedures set forth in this Chapter upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as an historic structure and the Variance is the minimum necessary to preserve the historic character and design of the structure.

B. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

C. Variances shall only be issued upon a determination that the construction approved by the Variance is the minimum necessary, considering the flood hazard, to afford relief. "Minimum necessary" means to afford relief with a minimum of deviation from the requirements. For example, in the case of Variances to an elevation requirement, this means the Zoning Administrator need not grant permission for the applicant to build at grade, or even to whatever

elevation the applicant proposes, but only to that elevation which the Zoning Administrator believes will both provide relief and preserve the integrity of these regulations.

D. Variances may be issued for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that the provisions of Subsections A. through C. above are satisfied, and that the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

E. Any applicant to whom a Variance is granted shall be given written notice that the issuance of a Variance to construct a structure below the base flood elevation will result in increased premium rates for flood insurance commensurate with the increased risk resulting from the reduced lowest floor elevation (up to \$25 for each \$100 of insurance coverage) and that any construction below the regulatory flood elevation increases risks to life and property. A copy of the notice shall be recorded in the office of the Nevada County Recorder and shall be recorded in a manner so that it appears in the chain of title of the affected parcel of land.

CHAPTER 18.36 - HILLSIDE DEVELOPMENT STANDARDS

Sections:

18.36.010 - Purpose of Chapter

18.36.020 - Applicability

18.36.030 - Application Content

18.36.040 - Standards for Hillside Development

18.36.050 - Design Criteria for Hillside Development

18.36.060 - Criteria for Use Permit Approval

18.36.010 - Purpose of Chapter

This Chapter establishes regulations for development within hillside areas in order to:

A. Preserve and protect the views to and from hillside areas in order to maintain the identity, image and environmental quality of the Town;

B. Ensure that development in the hillside areas is concentrated on the most level portions of the site, is in locations with the least environmental impact, and is designed to fit the existing land forms;

C. Preserve significant features of the natural topography, including swales, canyons, knolls, ridgelines, and rock outcrops;

D. Correlate intensity of development with the steepness of terrain in order to minimize the impact of grading, unnecessary removal of vegetation, land instability, and fire hazards; and

E. Provide alternative approaches to conventional flat land development practices by achieving land use patterns and intensities that are consistent with the natural characteristics of hillside areas including slopes, land form, vegetation and scenic quality.

18.36.020 - Applicability

A. Hillside area. The standards of this Chapter apply to all uses, subdivisions, and structures proposed on development sites with an average slope of 10 percent or greater or on development sites with any slopes of 20 percent or greater; except that single-family dwellings, secondary residential units, duplexes, and residential accessory structures shall be exempt from the provisions of this Chapter.

B. Basis for slope determinations. For the purpose of this Chapter, slope shall be computed on the natural slope of the land before grading is commenced, as determined from a topographic map having a scale of not less than one inch equals 100 feet and a contour interval of not more than five feet. See Chapter 18.220 (Definitions, Glossary) for definitions on simple slope and complex slope and how to measure slope.

C. Use Permit required. Hillside developments other than subdivisions with any development, including roads, streets, and driveways, proposed on slopes of 20 percent or greater shall be subject to the approval of a Use Permit in compliance with Chapter 18.76. A soil and geotechnical study that identifies special constraints and mitigation measures to minimize grading, unstable soils, and erosion shall accompany the use permit application. The geotechnical study shall also analyze the landslide hazards of the site and their potential effect.

18.36.030 - Application Content

Land use permit and subdivision applications for projects proposed within hillside areas shall include all information and materials required by Section 18.70.040 (Application Preparation and Filing), and all additional information required by the Director on the basis of site topography.

18.36.040 - Standards for Hillside Development

A. Minimum lot area. The minimum lot area for new subdivisions in hillside areas shall be determined by the applicable zoning district, except where housing units are clustered and the project is approved as a Planned Development in compliance with Chapter 18.78.

B. Clustered development required. Proposed hillside development shall be clustered in compliance with Chapter 18.46 (Open Space/Cluster Requirements).

C. Preservation of steep slopes. Slopes of 30 percent or greater shall be permanently preserved as open space. Permanent open space areas may be used in compliance with Section 18.46.060 (Open Space Standards). Grading, structures, and/or streets on slopes exceeding 20% shall be avoided if there is sufficient area on the site with slopes less than 20% to accommodate development and streets. The Planning Commission may authorize grading and structures on slopes exceeding 30% only if the Commission finds there is not sufficient area on the parcel with slopes less than 30% to accommodate a reasonable development, and measures have been incorporated into the development to minimize disturbance of the terrain (e.g. use of stem walls, split foundations).

D. Setbacks between structures and

slopes. Proposed structures shall be set back from slopes as follows, based on the difference in the vertical elevation between adjoining parcels. The difference in vertical elevation shall be measured as shown in Figure 3-9.

1. On adjacent parcels having a difference in vertical elevation of three feet or more, the required side yard shall be measured from the toe or top of slope to a structure, whichever is nearer.

2. On adjacent parcels having a difference in vertical elevation of six feet or more, the minimum distance between the toe or top of the slope, whichever is nearer, and a main structure shall be 15 feet. Greater setbacks may be required when elevation changes greater than six feet are proposed.

E. Height limits. The height of structures in a hillside area shall not exceed the maximum established by the applicable zoning district. Measurement of structure height shall be as provided in Section 18.30.090 (Height Measurement and Height Limit Exceptions). Lesser heights may be required where the structure may impair prominent views to or from hillside areas or prominent ridgelines.

F. Grading and drainage.

1. Grading shall be designed to:

a. Conserve natural topographic features and appearances by minimizing the amount of cut and fill and by means of landform grading to blend graded slopes and benches with the natural topography; and

b. Retain major natural topographic features (i.e., canyons, knolls, ridgelines, and prominent landmarks.)

2. Grading plans shall identify slopes that are to be landform graded. "Landform grading" means a contour grading method that creates artificial slopes with curves and varying slope ratios in the horizontal plane designed to simulate the appearance of the surrounding natural terrain.

3. Lot pad grading for subdivisions shall be limited to the structure footprint, vehicle parking space and a yard area as shown on the approved grading plan. Lot pad grading shall be square feet in total area. Smaller pad areas may be required.
4. Cut and fill slopes shall be designed and constructed to not exceed a vertical height of 10 feet, unless the review authority approves slopes of greater height with benching, terracing, and/or the use of retaining walls.
5. All graded areas shall be protected from wind and water erosion. Interim erosion control plans shall be required, certified by the project engineer, and reviewed and approved by the Town Engineer. Permanent erosion control measures in accordance with Best Management Practices of the "Project Guidelines for Erosion Control for the Truckee River Hydrologic Unit" as adopted by the Lahontan Regional Water Quality Control Board shall be required.
6. Slopes created by grading shall not exceed a ratio of 2:1 (vertical:horizontal), except where the Director determines that a greater slope is appropriate, based on a soils report and stabilization study.

18.36.050 - Design Criteria for Hillside Development

The following design criteria shall be implemented in the design and construction of projects on hillsides whenever applicable:

A. Preservation of topography. The natural contour of the site is an important characteristic of the site, and new buildings should try to minimize alterations to the perceived slope of the area. Site grading should be sensitive to existing land forms and topography so that the natural setting may be preserved to the greatest extent possible. Every effort should be made to minimize the limits of construction on the site, and all stockpiling of materials and equipment and equipment storage should occur within those limits. Abrupt grade changes on property lines should not be permitted. Grade changes within tree driplines should be avoided.

B. Terrain alteration. The project shall be designed to fit the terrain rather than altering the terrain to fit the project. Development patterns which form visually protruding horizontal bands or steeply cut slopes for roads or lots shall be avoided.

C. Street layout. Streets shall follow the natural contours of the terrain in order to minimize the need for grading. Cul-de-sacs and loop roads are encouraged where necessary to fit the natural topography subject to the approval of the Town Engineer and the Truckee Fire Protection District;

D. Site and structure design. Site design shall utilize varying structure and setbacks, heights, split-level foundations, and retaining walls to terrace structures with the direction of the slope;

E. Lot line locations. Lot lines shall be placed at the top of slope areas to help ensure that the slope will not be neglected by the up-hill owner (see Figure 3-11);

F. Design and location of structures. Structures proposed on slopes shall be designed and located as follows.

1. The form, mass, and profile of the individual buildings and architectural features should be designed to blend with the natural terrain and preserve the character and profile of the natural slope. Some techniques which may be considered include:
 - a. Split pads, stepped footings and grade separations to permit structure to step up the natural slope.
 - b. Detaching parts of a dwelling (e.g., a garage).
2. Excessive cantilevers should be avoided on downhill building elevations.
3. Structures should be placed partly underground or utilize below grade rooms to reduce effective bulk and to provide energy efficient and environmentally desirable spaces. However, the visible area of the building shall be minimized through a combined use of regrading and landscaping techniques.
4. Roofs on lower levels should be used as the deck open space of upper levels.
5. Architectural treatment shall be provided to all sides of the structure visible.

6. Exterior structural supports and undersides of floors and decks not enclosed by walls shall be permitted provided fire safety and aesthetic considerations have been adequately addressed.
7. Building materials and color schemes should blend with the natural landscape of earth tones and natural vegetative growth.
8. To the extent possible, the width of a building measured in the direction of the slope, shall be minimized in order to limit the amount of cutting and filling and to better “fit” the house to the natural terrain.
9. Structures should be placed to minimize disturbance of natural vegetation on slopes of 10 percent or greater.

Retaining walls. Large retaining walls in a uniform plane shall be avoided. Retaining walls over five feet in height shall be divided into elements and terraces with landscaping to screen them from view. Generally, no retaining wall should be higher than 10 feet. Where feasible, retaining walls should be constructed of the same materials as the primary buildings on the site. See Figures 3-12 and 3-13.

H. Open space preservation. Open space may be preserved by reducing the width of street improvements, reducing sidewalk widths, using common driveways and clustering units subject to the approval of the Town Engineer and Truckee Fire Protection District.

I. Slope restoration. Transitional slopes shall be replanted with self-sufficient trees, shrubs and ground cover that are compatible with existing surrounding vegetation in order to enhance the blending of manufactured and natural slopes. Cuts and fills shall have good surface drainage and shall be revegetated and terraced or controlled by retaining walls to protect against erosion and sedimentation. See Figure 3-14.

J. Road alignment. The alignment of roads and driveways should follow the contours of the site. By meandering roads and driveways to follow land forms, it is possible to minimize cuts and fills, preserve natural drainage patterns, and produce roads that are easily negotiated. Roads should not be constructed perpendicular to contours.

K. Reduced street widths. On-street parking lanes may be omitted from streets when the result is a substantial decrease in cutting and/or filling. Off-street parking areas shall be provided to yield a ratio of one additional space per dwelling unit.

L. Preservation of ridgelines. Prominent ridgelines shall be preserved. Structures located adjacent to prominent ridgelines should complement, rather than provide a stark contrast with, the natural landform(s). Structures shall not be closer to a prominent ridgeline than 100 feet measured horizontally on a topographic map. In no case, shall the roofline or any other portion of a structure extend above the line of sight between a ridgeline and any public right-of-way, whether the ridgeline

18.36.060 - Criteria for Use Permit Approval

The Commission shall evaluate a Use Permit application for hillside development based on the following objectives, and the findings required for Use Permits by Chapter 18.76:

- A. The preservation of natural topographic features and appearances by means of landform grading so as to blend constructed slopes into the natural topography;
- B. The preservation of natural topographic features and appearances through restrictions on successive padding and terracing of building sites;
- C. The retention of major natural topographic features - drainage courses, steep slopes, watershed areas, vernal pools, view corridors, and scenic vistas;
- D. The preservation and enhancement of prominent landmark features - significant ridgelines, rock outcroppings, prominent trees and woodlands, and other areas of special natural beauty;
- E. The use of varying setbacks, building heights, foundation designs and compatible building forms, materials, and colors which serve to blend buildings into the terrain;
- F. The use of clustered sites and buildings on more gently sloping terrain so as to reduce grading alterations on steeper slopes;

- G. The use of building designs, locations, and arrangements which serve to avoid a continuous intrusive skyline effect and which afford view privacy and protection;
- H. The preservation and introduction of plant materials to protect slopes from soil erosion and slippage and minimize the visual effects of grading and construction of hillside areas; and
- I. The use of street designs and improvements which serve to minimize grading alterations and harmonize with the natural contours and character of the hillsides. is above or below the right-of-way.

CHAPTER 18.38 - LAKE AND RIVER/STREAM CORRIDOR DEVELOPMENT

Sections:

- 18.38.010 - Purpose of Chapter
- 18.38.020 - Applicability
- 18.38.030 - Application Content
- 18.38.040 - River and Stream Development Standards
- 18.38.050 - Donner Lake Development Standards

18.38.010 - Purpose of Chapter

This Chapter provides standards for development adjacent to Donner Lake, the Truckee River, and other significant streams throughout the Town to:

- A. Provide appropriate buffer areas between proposed development and Donner Lake, the Truckee River, and other designated stream corridors, to protect valuable environmental, scenic, and recreational resources; and
- B. Protect the public health, safety, and welfare.

18.38.020 - Applicability

The provisions of this Chapter apply to property adjoining the following waterways:

- A. Donner Lake;
- B. Truckee River;
- C. Alder Creek;
- D. Trout Creek; and
- E. Blue line permanent and seasonal waterways as shown on a 7.5 minute series USGS topographic quadrangle map.

18.38.030 - Application Content

Land use permit and subdivision applications for projects on parcels that include a 100-year flood plain or are located within 100 feet of a 100-year flood plain shall include all information and materials required by Section 18.70.040 (Application Preparation and Filing) and shall show 100-year flood plains, floodways, and base flood elevations in relation to the parcel. This flood information shall be certified by a registered engineer.

18.38.040 - River and Stream Development Standards

A. Setback requirements. Proposed development shall be designed and constructed to provide the following minimum setbacks from adjacent waterways. See Chapter 18.220 (Definitions, Glossary) for definition of the 100-year floodplain referenced in this Chapter.

1. Truckee River. Proposed structures outside the Downtown Study Area shall be set back a minimum distance of 100 feet from the edge of the 100-year floodplain. Proposed structures within the Downtown Study Area shall be set back the minimum horizontal distance from the edge of the 100-year floodplain which is one foot above the base flood elevation. The setback shall be measured from the natural elevation of the property. The setback line may not be modified by raising the property above the base flood elevation through the use of fill or other similar materials.

2. Other streams. Proposed structures shall be set back from adjacent streams as follows:

- a. Structures proposed on parcels with an average depth of 175 feet or more shall be set back a minimum of 50 feet from the edge of the 100-year floodplain of any stream;
- b. The required stream setback for structures proposed on parcels with an average depth of less than 175 feet shall be determined by the following formula, except that no setback shall be less than 20 feet:

Required setback in feet = 50 - (175 - parcel depth)

For example, a structure proposed on a parcel with a depth of 163 feet would have a required setback of 38 feet (50 - (175 - 163) = 38).

- c. Structures proposed adjacent to streams for which the 100-year floodplain has not been determined or mapped, shall be set back a minimum of 100 feet from the centerline of the stream channel.

- d. Structures proposed adjacent to streams that have been channelized by manmade improvements prior to the adoption and effective date of this Development Code shall be set back a minimum of 20 feet from the improvements. Channelized shall mean improvements that have altered and replaced the natural alignment of the stream. Examples of channelized streams include Gregory Creek south of Donner Pass Road and Trout Creek along Trout Creek Road.

3. Setback reduction in RS and RR districts. The required setback from the 100-year floodplain of the Truckee River and other streams may be reduced in the RS and RR zoning districts based on the averaging of the setbacks of structures on adjoining parcels, where 25 percent or more of the parcels in any one block have been improved with structures as of the effective date of this Development Code. In these cases, proposed structures shall be set back from the edge of the 100-year floodplain by no less than the average of the setbacks of the existing structures on the block.

4. Variances. Setback requirements may be decreased if a Variance is approved by the Zoning Administrator in compliance with Chapter 18.82, or a Variance to the stream setback was approved by Nevada County prior to Town incorporation. Approval of the Variance shall be based on findings consistent with the purpose and intent of this Chapter and with Chapter 18.82 (Variances).

5. Bridges and drainage structures. Bridges, crossings, and drainage structures and facilities may be allowed in the required setback if approved by the Town Engineer and approvals are obtained from all agencies with permitting authority.

B. Use of setback areas.

1. Structures. Fences and other structures, parking access, parking space(s), paved areas (not including trails, paths, walkways, and small sitting areas), or swimming pools, shall not be constructed within required setbacks.

2. Grading and landscaping. Grading or filling (not including trails, paths and walkways, and small sitting areas not exceeding 300 square feet), planting of exotic/nonnative or nonriparian plant species, or the removal of native vegetation except for fire safety, shall not be permitted within a setback area.

3. Drainage structures. Where constructed drainage devices and improvements are required, they shall be placed in the least visible locations and naturalized through the use of river rock, earth tone concrete, and native landscaping.

4. Allowed projections. Architectural features may extend beyond the wall of the structure and into the setback area in compliance with the following:

- a. Balconies, bay windows, and other cantilevered features may extend five feet into the setback area;
- b. Canopies, cornices, eaves, and roof overhangs may extend five feet into the setback area;
- c. Decks and porches, which may be roofed but is otherwise unenclosed, may extend six feet into the setback area provided any foundation, piers, supports, or other structural connections to the ground comply with the required setback.

C. Flood hazard areas. Development proposed in areas of flood hazard shall comply with the flood plain regulations in Chapter 18.34 (Flood Plain Management).

D. Drainage easements. Uses and activities set forth in Subsection B. shall not be permitted within open space easements created for waterways, or within drainage easements established and shown on subdivision maps.

18.38.050 - Donner Lake Development Standards

A. Setback requirements.

1. Lake side setback. Structures shall be set back a minimum of 20 feet from the high water mark of Donner Lake, which is an elevation of 5,935.8 feet above sea level. This setback requirement may be reduced through the approval of a Variance (Chapter 18.82), or where a Variance to the setback was approved by Nevada County prior to the Town's incorporation. Variance approval shall be based on findings consistent with the purpose and intent of this Chapter and with Chapter 18.82 (Variances).

2. Side yard setback. On parcels adjacent to Donner Lake, in order to reduce potential view impacts and increase visibility to the lake an additional two and one-half (2½) feet of setback on each side yard shall be provided for each five feet (or fraction thereof) of the height of a structure above 25 feet as measured in accordance with Section 18.30.090.B (Height Measurement). This setback shall apply only to those portions of the structure that are 20 feet above natural grade.

B. Use of setback areas.

1. Structures. Fences and other structures, parking access, parking space(s), paved areas (not including trails, paths, walkways, and small sitting areas) or swimming pools, shall not be constructed within required setbacks.

2. Grading and landscaping. Grading or filling (not including trails, paths and walkways, and small sitting areas not exceeding 300 square feet), planting of exotic/nonnative or nonriparian plant species, or removal of native vegetation except for fire safety, shall not be permitted within a setback area. Grading or filling performed in the course of soil stabilization or erosion control measures for improvements in place as of the effective date of this Development Code may be allowed with Building Permit approval.

3. Drainage structures. Where constructed drainage devices and improvements are required, they shall be placed in the least visible locations and naturalized through the use of river rock, earth tone concrete, and native landscaping.

4. Dredging and underwater construction. There shall be no dredging, removal or rearrangement of materials or soils or placement of fill within the area below the high water mark of Donner Lake. Dredging or excavation performed in the course of the construction of a pier, dock, ramp, or similar structure may be allowed with Building Permit approval and approval from all agencies with permitting authority.

5. Allowed projections. Architectural features may extend beyond the wall of the structure and into the setback area in compliance with the following:

a. Balconies, bay windows, and other cantilevered features may extend five feet into the setback area;

b. Canopies, cornices, eaves, and roof overhangs may extend five feet into the setback area;

c. Decks and porches, which may be roofed but is otherwise unenclosed, may extend six feet into the setback area provided any foundation, piers, supports, or other structural connections to the ground comply with the required setback.

C. Flood hazard areas. Development proposed in areas of flood hazard shall comply with the Floodplain Management Regulations in Chapter 18.34. The flood hazard area for Donner Lake shall include all lands at or below an elevation of 5,938 feet above sea level.

D. Docks and piers. Docks, piers, ramps, and similar structures including stairways and walkways connecting to the dock, pier, or ramp, may be constructed within the Donner Lake flood hazard area and setback area required by this Section in compliance with all of the following requirements:

- 1. Limitation on number of facilities.** No more than one dock, pier, ramp, or similar structure shall be constructed on any site.
- 2. Enclosing structures.** Safety railings are allowed with a maximum height of four feet. Sidewalls and roofs shall be prohibited.
- 3. Approvals from other agencies.** Approvals shall be obtained from all agencies with permitting authority.

CHAPTER 18.40 - LANDSCAPE STANDARDS

Sections:

- 18.40.010 - Purpose of Chapter
- 18.40.020 - Applicability
- 18.40.030 - Landscape Plan Requirements
- 18.40.040 - Site Landscaping Requirements
- 18.40.050 - Landscape Standards

18.40.010 - Purpose of Chapter

This Chapter provides standards for the provision of landscaping with development to achieve the following objectives:

- A. Enhance the aesthetic appearance of development throughout the Town by providing standards related to the quality, and functional aspects of landscaping;
- B. Increase compatibility between abutting land uses and public rights-of-way by providing landscape screening and buffers;
- C. Provide for the conservation of water resources through the efficient use of irrigation, appropriate plant materials, and regular maintenance of landscaped areas; and
- D. Protect public health, safety, and welfare by preserving and enhancing the positive visual experience of the built environment, providing appropriate transition between different land uses, preserving neighborhood character, and enhancing pedestrian and vehicular traffic and safety.

18.40.020 - Applicability

All projects that require approval of a Zoning Clearance, Development Permit, Minor Use Permit, or Conditional Use Permit, except single-family dwellings secondary residential units, and duplexes, shall submit landscape plans, and provide and maintain landscaping in compliance with the provisions of this Chapter. Standards for landscaping within the public right-of-way in conjunction with a subdivision are located in Chapter 18.92 (Subdivision Design and Improvements).

18.40.030 - Landscape Plan Requirements

A. Submittal of plans required. Landscape plans, and plans for the ornamental use of water, including but not limited to lakes, ponds and fountains, shall be submitted to the Department for review for compliance with the requirements of this Chapter. Changes to the approved landscape plans that affect the character or quantity of the plant material or irrigation system design are required to be resubmitted for approval prior to installation.

B. Preliminary Landscape Plan. A Preliminary Landscape Plan shall be submitted as part of an application for a land use permit, for new development, and the significant expansion or redevelopment of an existing use as determined by the Director.

C. Final Landscape Plan. Following approval of the land use permit, a Final Landscape Plan shall be submitted as part of the application for a Building Permit. Final plans shall be approved by the Director prior to the start of on-site construction or soil disturbance and prior to the issuance of a Building Permit. Projects requiring Commission approval due to their size or use shall require plans be prepared by a licensed landscape architect or licensed contractor. Evidence shall also be provided that a licensed landscape contractor, licensed contractor, or owner-builder will be responsible for plant and irrigation installation.

D. Landscape plan content. Preliminary and Final Landscape Plans shall contain all information specified in the instructions for preparing landscape plans provided by the Department.

E. Review and approval. After initial application review in compliance with Section 18.70.060 (Initial Application Review), the Director shall review each Preliminary Landscape Plan and Final Landscape Plan to verify its compliance with the provisions of this Chapter. The Director may approve the submittal in compliance with this Chapter, or may deny or require changes to a submittal that is not in compliance.

F. Effect of approval - Installation of landscaping. Landscaping shall not be installed until the applicant receives approval of the final landscape plan.

18.40.040 - Site Landscaping Requirements

Landscaping shall be provided in the locations and amounts specified in this Section.

A. General requirements. Landscaping shall be provided as follows:

1. Setbacks. All front yard setback areas and side yard setback space areas required by this Development Code adjacent to development areas shall be landscaped, except where a required setback is occupied by a drainage facility, structure, parking space, sidewalk or driveway or where a required setback is screened from public view and it is determined by the Director that landscaping is not necessary to fulfill the purposes of this Chapter.

2. Disturbed areas. All disturbed areas of a project site not intended for a specific use, including pad sites in shopping centers held for future development, shall be landscaped with native trees, shrubs, and groundcover. Trees and shrubs shall be provided at a rate of one tree and four shrubs for every 100 square feet of landscaped area or fraction thereof. Disturbed areas include areas on the project site that are not associated with the project but were disturbed by previous grading activities, structures, and/or substantial removal of vegetation on the site.

3. Credit for native plant retention areas. Where the review authority determines that a proposed site plan retains significant native trees and groundcover in the portions of the site proposed for development, the review authority may consider the native plant retention areas as counting toward the minimum percentages of site area required to be landscaped and the minimum number of trees required to be planted by this Section.

4. Alternatives to landscape requirements. The review authority may modify the requirements of this section if the review authority finds that the landscape alternatives of the project will achieve the same effect as the landscape requirements of this section.

B. Parking areas. Parking areas shall be landscaped as required by this Subsection. Parking lot landscaping, including perimeter screening, shall not be included to meet the landscape requirements of Subsection D.

1. Landscape materials. Landscaping materials shall be provided throughout the parking lot area using a combination of trees, shrubs and ground cover.

2. Location of landscaping. Parking lot landscaping shall be located so that pedestrians are not required to cross landscaped areas to reach building entrances from parked cars. This should be achieved through proper orientation of landscape areas and islands.

3. Parking lot perimeter landscaping. The perimeter of parking lots shall be landscaped as follows.

a. Adjacent to streets. Parking areas adjoining a street shall provide a landscaped strip at least six feet wide (inside dimension) between the street right-of-way and parking area. The landscaping shall be designed and maintained to screen cars from view from the street to a height of between 30 inches and 42 inches. Screening materials may include a combination of plant materials, earth berms, solid masonry walls or fences, raised planters, or other screening devices which meet the intent of this requirement. Trees shall be provided at a rate of one for every 20 linear feet of landscaped area or fraction thereof. Shrubs shall be provided at a rate sufficient to provide a dense screen to the required height but no less than one shrub for every five feet of linear feet of landscaped area or fraction thereof. Trees and shrubs need not be planted in a linear,

spaced manner, but may be grouped together where appropriate. Plant materials, signs, or structures within a traffic safety sight area of a driveway shall not exceed 30 inches in height.

b. Adjacent to side or rear property lines. Parking areas shall provide a perimeter landscaped strip at least six feet wide (inside dimension) where the facility adjoins a side or rear property line unless the parking lot is jointly used with the adjacent parcel. The perimeter landscaped strip may include a yard or buffer otherwise required. Trees shall be provided at the rate of one for every 20 linear feet of landscaped area or fraction thereof. Shrubs shall be provided at the rate of one for every five linear feet of landscaped area or fraction thereof.

c. Adjacent to residential use. Parking areas for non-residential uses adjoining residential uses shall provide a landscape buffer in compliance with Section 18.30.110 (Screening).

4. Parking lot interior landscaping. Landscaping shall be evenly dispersed throughout the parking lot at a ratio of 200 square feet of landscaped area for every five parking stalls or fraction thereof. Two trees and four shrubs shall be provided for every five parking stalls or fraction thereof. Landscaping required by 18.40.040(B)(3) shall not be counted towards meeting the requirements of interior landscaping.

C. Street buffer landscaping. A minimum five foot wide landscape strip shall be provided along all street frontages. Shrub heights shall not impair sight distance. Trees shall be provided at a rate of one for every 20 linear feet of street frontage or fraction thereof. Shrubs shall be provided at a rate of one for every five linear feet of street frontage or fraction thereof. Trees and shrubs need not be planted in a linear, spaced manner, but may be grouped together where appropriate. Landscaping may be allowed within the street right-of-way and snow storage easements where approved by the Town Engineer.

D. Zoning district landscaping requirements. Additional landscaping may be required through the land use permit process to provide visual relief or contrast, or to screen incompatible features.

E. Landscaping between neighborhood commercial and residential land uses. See Section 18.30.110 (Screening) for requirements for landscaping between neighborhood commercial uses and adjacent residential uses.

18.40.050 - Landscape Standards

Landscape areas and materials shall be designed, installed, and maintained as provided by this Section.

A. General design standards. The following features shall be incorporated into the design of the proposed landscape and shown on required landscape plans:

1. Design requirements. Landscaping shall be planned as an integral part of the overall project design and not simply located in excess space after parking areas and structures have been planned;

2. Pedestrian accessibility. Pedestrian access to sidewalks or buildings should be considered in the design of all landscaped areas;

3. Subdivision landscaping. Landscape planting shall be provided for all adjacent public rights-of-way, in compliance with, Chapter 18.92 (Subdivision Design and Improvements);

4. Protection. Areas containing plant materials shall be protected from damage by vehicles and snow removal equipment in accordance with the Public Improvements and Engineering Standards;

5. Irrigation. Landscaped areas shall be irrigated in compliance with Subsection C. below;

6. Berms. Where provided, earthen berms shall be a minimum three feet in height; and

B. Plant materials. Plant materials shall be selected and installed in compliance with the following requirements:

1. A mix of plant materials shall be provided in compliance with Table 3-6. Calculations documenting the required mix shall be shown on the landscape plan;

TABLE 3-6

REQUIRED MIX OF PLANT MATERIALS

Plant Material	Required Percentage of Mix
Trees	
24-inch box	20%
15 gallon	80%
Shrubs	
5 gallon	70%
1 gallon (herbaceous only)	30%
Groundcover	
Coverage within 2 years	100%

2. Plant materials shall emphasize drought-tolerant and/or native species in compliance with Subsection D (water conservation), below;
3. Trees and shrubs shall be planted so that at maturity they do not interfere with service lines and traffic safety sight areas;
4. Trees and shrubs shall be planted and maintained in a manner that protects the basic rights of adjacent property owners, particularly the right to solar access;
5. Trees planted near public sidewalks or curbs shall be of a species and installed in a manner which prevents physical damage to sidewalks, curbs, gutters and other public improvements;
6. All landscape areas shall be planted with groundcover in all locations not occupied by other plant materials. Groundcover shall be of live plant material. Gravel, colored rock, bark, and similar materials may be used in combination with a living ground cover. Non-plant materials may be approved for use in limited areas through the landscape plan review process but shall not comprise more than 25 percent of the total landscaped area; and
7. Any existing landscaping indicated on the approved landscape plan for retention that is damaged or removed during construction shall be repaired or replaced in kind with equivalent size.

C. Irrigation. Landscaped areas shall be supported by a permanent, automatic irrigation system coordinated to meet the needs of various planting areas and in compliance with the following standards:

1. Equipment.

- a. Anti-drain valves.** Integral, under the head, or in-line anti-drain valves shall be installed as needed to prevent low head drainage.
- b. Automatic control valves.** Different hydrozones shall be irrigated by separate valves.
- c. Controllers.** Automatic control systems shall be required for all irrigation systems and must be able to accommodate all aspects of the design. Automatic controllers shall be digital, have multiple programs, multiple cycles, and have sensor input capabilities.
- d. Rain/moisture sensor devices.** Rain or moisture sensing override devices may be required where appropriate.
- e. Sprinkler heads.** Sprinkler heads shall be selected for proper area coverage, application rate, operating pressure, and adjustment capability. Sprinklers shall have matched precipitation/application rates within each control valve circuit.
- f. Water meters.** Separate landscape water meters or sub-meters may be required for projects where service includes both landscape and non-landscape. Landscape sub-meters, if used, shall be purchased, installed and maintained by the owner.
- g. Drip irrigation.** Drip irrigation systems may be approved if commercial or agricultural grade materials are used. Components shall be installed below the soil except for emitters.

2. Runoff and overspray. Irrigation systems shall be designed to avoid runoff, low head drainage, overspray or other similar conditions where water flows or drifts onto adjacent property, non irrigated areas, walks, roadways or structures.

D. Water Conservation. Landscaping shall be designed for the efficient use of water, including provisions for efficient landscape systems. The selection of plant materials shall include

indigenous or native plant materials, providing a variety in size, shape and height. The following minimum standards shall apply:

1. Plant materials. Plant materials shall emphasize drought-tolerant and/or native species:

- a. At least 80 percent of the plants selected in non-turf areas shall be suited to Truckee's climate and require minimal water once established. Exceptions to this requirement may be granted in situations where non-potable private well water is used for irrigation purposes; and
- b. Up to 20 percent of the plant material may be of a less drought-tolerant variety as long as they are grouped together and irrigated separately.

2. Turf limitations.

- a. Turf, grasses and other ground covers which are not drought tolerant shall be minimized. No more than 25 percent of the entire landscaped area may be covered with irrigated turf or grasses.
- b. Turfgrass shall be prohibited in median areas, in parkway areas less than eight feet in width, and on slopes of 15 percent or greater.
- c. Sloped turf areas adjacent to paved or impermeable surfaces (parking lots, walkways, etc.) shall be leveled off to a flat area at least three feet wide between the slope toe and the hard surface.
- d. Turf areas exceeding 1,000 square feet or used as an essential part of development, (e.g., golf courses or playing fields) shall utilize soil-moisture sensors and rain shut-off valves as part of their irrigation systems.

3. Irrigation.

- a. Plants shall be grouped according to their water needs, in hydrozones of high, medium and low water use with areas of each type calculated on the final plan. Irrigation systems shall be designed to reflect the needs of the various hydrozones of high, medium or low water used with each area served by a dedicated irrigation controller station.
- b. Irrigation systems shall be equipped with a controller capable of dual or multiple programs with a flexible calendar program.
- c. Drip, trickle or other low-volume irrigation shall be provided on no less than 90 percent of the landscaped area of commercial landscaping except for those areas devoted to turfgrass and flat groundcover plants. If a licensed landscape architect or licensed landscape contractor verifies that a drip/trickle system is not feasible due to location, the percentage of drip/trickle irrigation may be further reduced.
- d. Sprinkler systems shall be designed to prevent overspray and runoff. Areas of sprinkler coverage shall be shown on the irrigation plan.

E. Installation. Landscape materials and support equipment shown in an approved Final Landscape Plan shall be installed as follows:

1. Construction projects. Required landscaping shall be installed and verified by the Department prior to occupancy of the site;

2. Installation. Landscape materials and irrigation equipment shall be installed in compliance with the approved plans and specifications;

3. Delayed installation. In the event that seasonal conditions prevent the effective installation of required landscape prior to occupancy, a conditional certificate of occupancy with a performance bond or similar instrument in the amount equal to 125 percent of the value of the landscape materials and labor for installation may be allowed, subject to the approval of the Director; and

4. Changes to design. Proposed changes to an approved Final Landscape Plan shall be approved by the Director.

F. Installation and maintenance of landscape. All proposed and required landscaping is an integral part of an approved project, and shall be properly maintained in healthy condition for the life of the project.

1. Landscaping shall be installed and maintained consistent with the approved Final Landscape Plan and in a manner as to fully attain the objectives of this Chapter.

2. The maintenance of approved landscape installations shall include regular watering, pruning, and fertilizing as necessary to maintain all plant materials in healthy condition. Maintenance shall also include:

- a. The regular clearing of debris and weeds;
- b. Removal and replacement of dead or dying trees and plants; and
- c. The maintenance and any necessary repair of irrigation systems.

Failure to maintain landscaping is a violation of the land use permit for the project and this Development Code.

3. Prior to two years after the establishment of an approved use, the project applicant shall provide the Director with a report prepared by the project landscape contractor or landscape architect which documents the condition of the landscaping, and provides recommendations as to whether any landscaping should be repaired, replaced, or installed. The recommendations of the report shall become a part of and incorporated into the Final Landscape Plan, and the landscaping shall be repaired, replaced, and installed within six months of the date of approval of the report by the Director.

CHAPTER 18.42 - LANDSCAPE DESIGN GUIDELINES

Sections:

- 18.42.010 - Purpose of Chapter
- 18.42.020 - Applicability
- 18.42.030 - General Guidelines
- 18.42.040 - Landscaping Along Streets
- 18.42.050 - Project Entry Landscaping
- 18.42.060 - Pedestrian Area Landscaping
- 18.42.070 - Installation of Landscaping
- 18.42.080 - Recommended Plant Materials

18.42.010 - Purpose of Chapter

This Chapter provides landscape design guidelines that are intended as a guide to assist property owners and project designers in understanding the Town's goals for attaining high quality development that is sensitive to the Town's unique character and climate.

18.42.020 - Applicability

These guidelines will be used during the land use permit process as additional project review criteria.

- A. The provisions of this Chapter apply to all development projects providing required landscaping, unless otherwise specified. Any addition, relocation, or construction requiring land use permit approval in compliance with Article IV (Land Use and Development Permit Procedures) shall adhere to these guidelines where applicable.
- B. These landscape design guidelines may be interpreted with some flexibility in their application to specific projects as not all design criteria may be workable/appropriate for each project. In some circumstances, the review authority may relax the application of one guideline in order to accomplish another, more important guideline. The overall objectives are to ensure that the intent and spirit of the design guidelines are followed and to attain the best possible design within reason.

18.42.030 - General Guidelines

- A. Proposed landscaping should relate to the scale of the structures on the site and should be compatible with the location, character and scale of adjacent landscaping that complies with the provisions of this Chapter.
- B. Landscaping should not be used to screen or hide an otherwise unattractive structure or other elements of the project (e.g. trash enclosures) that might be more appropriately located on parts of the site where screening may not be necessary.

Landscape Design Guidelines

18.42

- C. Landscape design should accent the overall design theme through the use of structures, arbors, and trellises that are appropriate to the particular architectural theme of the project.
- D. Landscape designs should generally use a three tier concept:
 - 1. Hardy, low growing ground covers;
 - 2. Medium height shrubs; and
 - 3. Trees.
- E. The following are common landscape design concepts that can be used throughout the project site to increase the visual and functional quality of the development:
 - 1. Specimen trees (minimum 24 inch box) used in informal groupings or rows at major focal points (e.g. project entry, pedestrian plaza, etc.);
 - 2. Use of flowering vines both on walls and arbors;
 - 3. Use of pots, vases, wall or raised planters for accents in locations which otherwise would be difficult to provide in-ground landscaping;
 - 4. Use of planting to soften hardscape and provide shadows/patterns against walls;
 - 5. Use of distinctive plants and colors as focal points;
 - 6. Use of berms, plantings, and low walls to screen parking areas while allowing views to larger structures beyond; and
 - 7. Dense landscaping to screen unattractive views and features (e.g storage areas, trash enclosures, freeway structures, transformers and generators) and other project features that do not contribute to the enhancement of the surroundings.
- F. All landscape areas should be separated from asphalt pavement in accordance with the Public Improvements and Engineering Standards to prevent water leakage to the pavement area.
- G. Planters for trees should be located throughout parking areas. The planters should have minimum interior dimensions of five feet by 16 feet, and be of sufficient size to accommodate tree growth.
- H. Existing on-site vegetation should be retained whenever possible and new landscaping should respect and incorporate existing landscape elements.
- I. Landscape areas should be provided in plazas, malls, and areas of frequent pedestrian use. Plazas and malls should be designed and planted to reflect an informal place suited to the pedestrian scale.

- J. Landscape design should reflect a variety of deciduous and evergreen trees, shrubs, perennial and groundcovers. Plant materials should be selected for their structure, texture, color, ultimate growth characteristics, and sense of unity with their surroundings.
- K. Lawn areas should be kept to a minimum in projects surrounded by native vegetation. The utilization of native drought tolerant grasses and vegetation should be used to help the project blend with the surrounding vegetation.
- L. Landscaping strips along walls separating non-residential land uses from residential land uses should be installed on the residential side of the wall, adjoining the property line.

18.42.040 - Landscaping Along Streets

- A. Whenever landscaping of the public right-of-way (parkway) is required along street frontages, the project's on-site landscaping should be designed in coordination with the parkway landscaping to provide an integrated design concept.
- B. Improvements in the public rights-of-way should include sidewalks and/or bicycle-pedestrian ways, trees, shrubs, and groundcover in compliance with Town standards. Landscaping should not exceed a height of 30 inches near project entries so as not to obstruct traffic safety sight areas for vehicles and pedestrians.

18.42.050 - Project Entry Landscaping

- A. Entries to multi-tenant projects should be designed as special statements reflective of the character and scale of the project in order to establish identity for tenants, visitors, and patrons. Flowering accent plantings and specimen trees should be used to reinforce the entry statement.
- B. Textured paving treatments (i.e., interlocking pavers, stamped concrete, etc.) should be used at project entries. Textures should be selected which:
 1. Give a feeling of transition between the sidewalk and the entry driveway;
 2. Do not become slippery when wet; and
 3. Are not so rough or irregular as to make walking difficult, discourage the use of baby strollers or wheelchairs, conflict with adjacent uses, or create noise.
- C. Project identification signs are encouraged at entry drives. These are subject to Sign Plan approval in compliance with Chapter 18.54 (Signs).

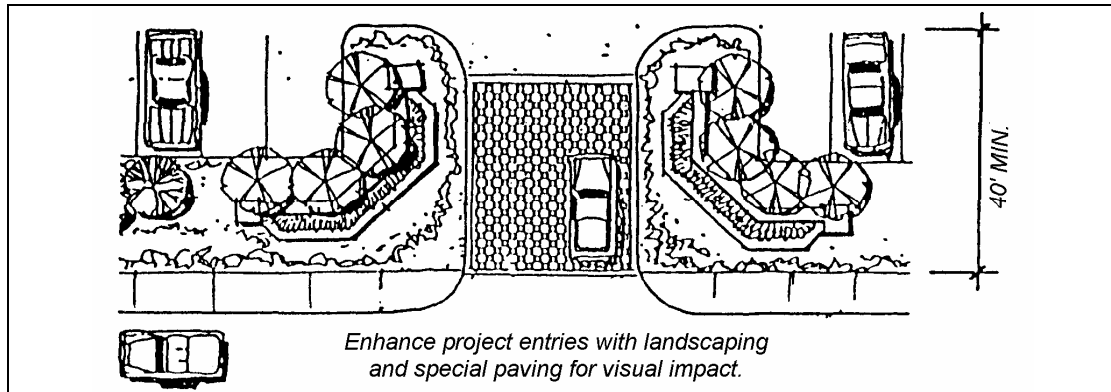


FIGURE 3-18
PROJECT ENTRY TREATMENT

18.42.060 - Pedestrian Area Landscaping

- A. Planting next to walkways, within plazas, and adjacent to other pedestrian spaces should include smaller species of shrubs and trees in keeping with the intent to maintain an intimate human scale in these areas.
- B. Pedestrian spaces should be enhanced by planting accents including vines espaliered against wall surfaces, flower beds, window boxes, and hanging pots with flowers and vines.

18.42.070 - Installation of Landscaping

- A. All landscape materials shall be installed in compliance with the Town's landscaping installation specifications as maintained by the Department.
- B. New trees should be planted so that they are separated from turf areas by three to five feet. This will prevent over-watering of the tree, surface rooting, crown-rot, and "girdling" of the tree trunk by maintenance equipment.
- C. If trees are to be planted in a turf area, the following criteria should be followed:
 1. Only deep-rooted tree species should be used;
 2. Turf areas around trees should be graded so that water drains away from the tree; and
 3. Turf irrigation should be directed away from the tree. The tree should be irrigated by a combined bubbler/deep water pipe fixture.
- D. The spacing of trees and shrubs should be appropriate to the species used. The plant materials should be spaced so that they do not interfere with the adequate lighting of the premises or restrict access to emergency apparatus. Proper spacing should also ensure unobstructed access for vehicles and pedestrians and provide clear vision of intersections.

- E. Plant material should conform to the following spacing criteria:
1. A minimum of 25 feet from the property corner at a street intersection to the center of the first tree or large shrub;
 2. A minimum of 15 feet between the center of trees and large shrubs to light standards and fire hydrants; and
 3. A minimum of 10 feet between the center of trees and large shrubs and the edge of a driveway.
- F. Tree grates should be installed around trunks where trees are planted within sidewalks or other paved pedestrian areas.
- G. Deciduous trees should predominate along south and west building exposures.

18.42.080 - Recommended Plant Materials

The following list is to provide homeowners, landscape architects, designers, contractors, and developers with a palette of plant materials suitable for use in Truckee. Due to the wide array of micro-climates, soil types, and weather extremes (both temperature and snow) it is difficult to derive an extensive plant list. Prior to specifying plant materials, research should be conducted to determine water requirements, soil needs, hardiness, and ultimate growth in Truckee.

When selecting other species for hardiness, Truckee may be considered U.S.D.A. Zone 3 or 2, although many Zone 3 plants cannot survive and some Zone 4 and 5 species survive in protected locations. (Sunset Magazine's hardiness guide is not recommended as their maps do not consider areas with climatic extremes similar to Truckee.)

**TABLE 3-7
RECOMMENDED PLANT MATERIALS**

CANOPY TREES	
Scientific Name	Common Name
Abies concolor	White fir
Abies magnifica	Red fir
Acer campestre	Hedge maple
Betula jacquemontii	Himalayan white birch
Betula papyfere	Canoe/Paper birch
Malus 'Brandywine'	Brandywine crabapple
Malus 'Dolgo'	Dolgo crabapple
Malus species	Apples and crabapples
Picea abies	Norway spruce
Picea engelmannii	Engelman spruce
Picea pungens	Blue spruce
Pinus contorta 'latifolia'	Lodgepole pine
Pinus jeffreyi	Jeffrey pine
Pinus monticola	White pine
Pinus nigra	Austrian pine
Pinus sylvestris	Scotch pine
Populus alba	White poplar
Populus alba 'bolleana'	Bolleana poplar
Populus tremula	Swedish aspen
Populus tremuloides	Quaking aspen
Populus tremuloides 'Kaibab'	Kaibab aspen
Pinus virginiana 'Shubert'	Canada Red Chokecherry

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

EVERGREEN CANOPY TREES	
Scientific Name	Common Name
Abies concolor	White fir
Abies magnifica	Red fir
Picea abies	Norway spruce
Picea engelmannii	Engelman spruce
Picea pungens	Blue spruce
Pinus contorta 'latifolia'	Lodgepole pine
Pinus jeffreyi	Jeffrey pine
Pinus monticola	White pine
Pinus nigra	Austrian black pine
Pinus sylvestris	Scotch pine

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

UNDERSTORY TREES	
Scientific Name	Common Name
Acer campestre	Hedge maple
Acer ginnala	Amur maple
Acer glabrum	Mt. maple
Acer grandidentatum	Bigtooth maple
Alnus incana	Mt. Alder
Betula papyfere	Canoe/Paperbirch
Crataegus laevigata	English hawthorne
Juniperus scopulorum	Rocky mt. juniper
Malus 'Brandywine'	Brandywine crabapple
Malus 'Dolgo'	Dolgo crabapple
Malus species	Apples and crabapples
Picea glauca 'densata'	Blackhills spruce
Pinus arisatata	Bristlecone pine
Pinus edulus	Pinyon pine
Pinus nigra	Austrian black pine
Populus tremuloides 'Kaibab'	Kaibab aspen
Prunus emarginata	Bitter cherry
Prunus virginiana	Chokecherry
Prunus virginiana 'Shubert'	Canada red chokecherry
Salix species	Willow species
Sorbus aucuparia	European mt. ash
Sorbus scopulina	Western mt. ash

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

LARGE SHRUBS	
Scientific Name	Common Name
Acer ginnala	Amur maple
Acer glabrum	Mt. maple
Acer grandidentatum	Bigtooth maple
Alnus incana	Mt. alder
Amelanchier alnifolia	W. Serviceberry
Aronia melanocarpa	Black chokeberry
Caragana arborescens	Pea shrub
Ceanothus velutinus	Snowbush
Cerocarpus montanus	Mt. mahogany
Corus stolonifera	Red-twig dogwood
Elaeagnus angustifolia	Russian olive
Euonymus alata	Burningbush
Lonicera involucrata	Twinberry
Lonicera tartarica	Tartarian honeysuckle
Malus 'Seargent'	Seargent's crabapple
Malus species	Apples and crabapples
Prunus cistena	Sand cherry
Prunus emarginata	Bitter cherry
Primus virginiana	Chokecherry
Prunus virginiana 'demissa'	Western chokecherry
Rhus trilobata	Skunkbush
Rhus typhina	Staghorn sumac

Ribes aureum	Golden currant
Rosa hugonis	Father Hugo rose
Rosa rugosa	Tomato rose
Salix enuga	Sandbar willow

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

LARGE SHRUBS - Continued	
Scientific Name	Common Name
Salix purpurea nana	Dwarf purple willow
Salix scouleriana	Mt. willow
Salix species	Willow species
Sambucus caerulea	Blue elderberry
Sorbus scopulina	Western mt. ash
Syringia vulgaris	Common lilac
Viburnum opulus	Snowball bush
Viburnum trilobum	Cranberry bush

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

SMALL SHRUBS	
Scientific Name	Common Name
Arctostaphylos patula	Green-leaf manzanita
Artemisia tridentata	Basin sagebrush
Berberis thunbergii sp.	Japanese barberry
Ceanothus cordulatus	Mt. whitethorn
Chrysothamnus nauseosus	Rabbit bush
Euonymus alata	Burning bush
Genista lydia	Lydia broom
Helianthemum nummularium	Sunrose
Juniperus communis	Common juniper
Juniperus horizontalis 'Youngstown'	Youngstown juniper
Lonicera involucrat	Twinberry
Mahonia repens	Dwarf Oregon grape
Panistema canbyii	Mt. lover
Penstemon newberii	Mt. Pride penstemon
Pinus mugo mugo	Mugo pine
Potentilla fruticosa	Bush cinquefoil
Quercus vaccinifolia	Huckleberry oak
Rhus typhina	Staghorn sumac
Ribes aureum	Golden currant
Ribes nevadense	Mt. pink currant
Ribes roezlii	Gooseberry
Rosa rugosa	Tomato rose
Rosa woodsii	Wild rose
Rubus deliciosus	Rocky mt. thimbleberry
Rubus parviflorus	Thimbleberry
Siraea 'Snowmound'	Snowmound spirea

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

SMALL SHRUBS - Continued	
Scientific Name	Common Name
Spiraea densiflora	Mt. spirea
Spirae douglasii	Western spirea
Spiraea lucida	Western white spirea
Spiraea X vanhouttei	Vanhoutte spirea
Symphoricarpus albus	Snowberry
Syringia myerii	Dwarf Korean lilac

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

GROUNDCOVERS	
Scientific Name	Common Name
Achillea fomentosa	Wolly yarrow
Arctostaphylos uva-ursi 'big-bear'	Big bear manzanita
Artemisa schmidtriana	Silvermound
Artemisa tridentata	Basin sagebrush
Ceanothus prostratus	Squawmat
Cerastium tomentosum	Snow in summer
Chrysothamnus nauseosus	Rabbit brush
Cotoneaster apiculatus	Cranberry cotoneaster
Galium odoratum	Sweet woodruff
Genista lydia	Lydia broom
Helianthemum nummularium	Sunrose
Juniperus communis	Common juniper
juniperus horizontalis 'Youngstown'	Youngstown juniper
Lysamachia numularia	Creeping jenny
Mahonia sepens	Dwarf Oregon grape
Paxistema canbyi	Mt. lover
Penstemon newberri	Mt. pride penstemon
Penstemon strictus	Rocky mt. penstemon
Potentilla verna nana	Srping cinquefoil
Prunella grandiflora	Self-heal
Rosa woodsii	Wild rose
Rubus parviflorus	Thimbleberry
Sedum camtschaticum	
Sedum spurium	Dragon's blood
Symphorocarpus mollis	Creeping snowberry

Thymus serpyllum	Creeping thyme
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**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

VINES	
Scientific Name	Common Name
Clematis hybrids	Large flowering clematis
Clematis linguicifolia	W. virgin's bower
Humulus lupulus	Hops
Polygonum ubertii	Silver lace vine

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

SNOW STORAGE AREAS	
Scientific Name	Common Name
Achillea tomentosa	Wolly yarrow
Arctostaphylos uva-ursi 'big-bear'	Big bear manzanita
Artemisia schmidriana	Silvermound
Ceanothus prostratus	Squawmat
Cerastium tomentosum	Snow in summer
Comus stolomifera	Red-twig dogwood
Galium odoratum	Sweet woodruff
Juniperus communis	Common juniper
Lysimachia numularia	Creeping jenny
Penstemon strictus	Rocky mt. penstemon
Potentilla vema nan	Spring cinquefoil
Prunella grandiflora	Self-heal
Prunus emarginata	Bitter cherry
Rosa woodsii	Wild rose
Rubus deliciosus	Rocky mt. thimbleberry
Rubus parviflorus	Thimbleberry
Salix exuga	Sandbar willow
Salix purpurea nana	Dwarf purple willow
Salix scouleriana	Mt. willow
Salix species	Willow species
Sambucus caerulea	Blue elderberry
Sedum kamschaticum	
Sedum spurium	Dragon's blood
Symphoricarpus mollis	Creeping snowberry
Thymus serphyllum	Creeping thyme

**TABLE 3-7
RECOMMENDED PLANT MATERIALS (Continued)**

PLANTS FOR SCREENING	
Scientific Name	Common Name
Acer campestre	Hege maple
Acer ginnala	Amur maple
Alnus incana	Mt. alder
Amelanchier alnifolia	W. serviceberry
Cornus stolonifera	Red-twig dogwood
Elaeagnus angustifolia	Russian olive
Juniperus scopulorum	Rocky mt. juniper
Lonicera tartarica	Tartarian honeysuckle
Malus 'Sargent'	Sargent's crabapple
Pinus edulis	Pinyon pine
Pinus nigra	Austrian pine
Populus tremuloides	Quaking aspen
Populus tremuloides 'Kiabab'	Kaibab aspen
Prunus emarginata	Bitter cherry
Prunus virginiana	Chokecherry
Prunus virginiana 'demissa'	Western chokecherry
Prunus virginiana 'Shubert'	Canada red chokecherry
Salix exuga	Sandbar willow
Salix purpurea nana	Dwarf purple willow
Salix scouleriana	Mt. willow
Salix species	Willow species
Sambucus caerulea	Blue elderberry

APPENDIX: E

Sections of the PIES

Section 5 Drainage

Section 5.01 Basic Objectives

In order to provide a uniform drainage system in the Town, the following objectives and standards will be followed unless modified by request, with approval confirmed in writing by the Town Engineer.

Drainage studies shall be required on all commercial projects, subdivisions, parcel maps and where directed by the Town Engineer.

Improvements shall be protected from inundation, flood hazard, street overflow, ponding of local storm water, springs and surface waters. The drainage system shall provide for the control of drainage flows to be carried through and also collected within the improved area without injury to adjacent property. Natural drainage ways and water courses shall be retained and used to convey surface water through the improvement unless otherwise approved by the Town Engineer.

Surface waters must be retained within the drainage way in which they collect. It is each property owner's duty to leave the natural flow of surface water undisturbed unless prior written approval for improvements, clearing, or grading has been obtained from the Town Engineer except as exempted in this document. It is incumbent upon the owner to avoid injury to adjacent property due to the flow of surface waters. Each improvement shall be designed such that there will be no additional adverse increase in concentrated flow or adverse increase in the rate of flow of water onto downstream properties contributable to the proposed project. Unless an individual project requires the diversion of water to conform to a comprehensive drainage plan, water shall be received and discharged at the location which existed prior to development.

The entity responsible for maintenance of all drainage facilities other than those within the road right-of-way shall be approved prior to filing of the Final Map.

Section 5.02 Drainage Design Considerations

The following items shall be considered and implemented into the drainage design:

- A. Diversion of drainage will only be allowed within the limits of the proposed improvement.
- B. Acceleration of drainage flows shall not cause property damage.
- C. Drainage and appurtenant structures shall be properly designed to take into account drainage flow, bedload, and debris at all stages of flow.
- D. Overland release drainage shall be designed to convey stormwater runoff without loss of life and/or damage to any building structure. No detrimental change in drainage flow pattern shall result above or below the project. This consideration shall be carefully studied in relation to erosion and pollution controls and shall be required to provide prevention, control, and abatement of erosion and water pollution. Provisions for required drainage capacity for future upstream development shall be considered. Only existing detention facilities that are to remain shall be included in the design calculations. All other facilities must be based on ultimate flows without detention.
- E. The design shall not cause stagnant pools, unless required as part of an approved Best Management Practice (BMP).

- F. The design shall avoid excessive ponding at entrances to drainage structures which may cause property damage, accumulation of drift, clogging or deposits of debris.
- G. Outlet design of drainage structures shall be effective in re-establishing non-erosive channel flow and resist undermining.
- H. Drainage structures shall be simple, easy to build, reasonably self-cleaning, and easy to maintain.
- I. The design shall consider the safety of pedestrians and vehicular traffic.
- J. The design shall not hinder the passage of fish as may be required by permits from the California Department of Fish and Game and/or other applicable agencies.
- K. Drainage system design shall include the application of "Best Management Practices" (BMP's) wherever practical and feasible for water quality protection.
- L. BMP measures shall address such concerns as erosion and sediment control, prevention of illicit or illegal discharges, protection from the discharge of petroleum products, chemicals, heavy metals, organics, hydrocarbons, and other pollutants into surface or ground waters.
- L. Compliance with the Federal "Clean Water Act", including acquisition of any necessary stormwater discharge permits pursuant to Federal or State law.
- M. necessary stormwater discharge permits pursuant to Federal or State law.
- N. For non-graded lots, storm runoff shall not cross more than one adjacent lot before entering a drainage easement or an approved stormwater drainage facility.
- O. For all critical release points for road drainage, such as low points of sags and cul-de-sacs, adequate drainage conveyance systems and associated grading shall be shown on the grading plans. Applicable easements shall be obtained.
- P. Place cutoff walls at inlets and outlets of culverts if culvert lengths are in excess of 250 feet and over 7.5% grade. Cutoff walls shall be placed at 250 feet on center.

Section 5.03 Hydrology and Runoff

General

A civil engineer registered in the State of California shall prepare drainage reports and calculations. Hydrology calculations must be made based upon ultimate land use designations in accordance with the adopted General Plan.

Watershed areas of 320 acres and less can be analyzed by the Rational Method. Watersheds larger than 320 acres shall be analyzed utilizing the Army Corps of Engineers' computer program HEC-1, or other method approved by the Town Engineer.

A submittal of the improvement plans shall be accompanied by the drainage analysis consisting of a watershed area map and drainage design calculations (2 copies).

Drainage design calculations shall show the calculations used to determine the peak flow rate for both the 10-year and 100-year design storms at each drainage facility. See Standard Drawings 60-67

Rational Method of estimating peak runoff.

The time of concentration is the time required for the runoff from the most remote point in the watershed to reach the point of concentration at which the flow is to be calculated. It is generally composed of two parts, the overland flow time (sheet flow) and the concentrated flow time.

Overland flow in underdeveloped or lightly developed watersheds, in the initial runoff, is usually in the form of sheet flow. This overland flow time shall be determined using the Standard Drawing 64. Overland flow includes flow over planar surfaces such as roofs, streets, lawns, parking lots and fields. The overland flow length is not always well defined in natural areas, but it usually becomes concentrated in shallow rivulets or swales within 600 feet on gentle terrain and within 300 feet on steeper terrain Equation 5.1 listed below is used to estimate the overland flow component of response time.

Equation 5.1

$$Tr = \frac{.355(NL)^{0.6}}{S^{0.3}}$$

Collector flow time is the time required for the water to flow from one point of concentration to the next. This flow may take place in a man-made or natural conveyance. The velocity chosen for use in this calculation should accurately reflect the hydraulic conditions in the drainage system. Equation 5.2 listed below may be used to estimate the velocity of concentrated flow. This equation applies to open channels in most situations; however Manning's equation may be used in lieu of this equation.

Equation 5.2

$$Tr = \frac{.00735LN^{0.75}(1+Z^2)^{0.25}}{S^{0.375}(AcZ)^{0.25}}$$

- Tr = response time, minutes
- N = roughness coefficient
- S = slope feet horizontal/vertical, feet
- L = length, feet
- Z = side slope, horizontal /vertical, feet.
- Ac = contributing area, acres

Infiltration Factor: When pervious overland flow areas are present the Design Engineer shall estimate the area susceptible to infiltration. The effect of infiltration is reflected in the infiltration factor Fi.

$$Fi = If(1+1/(1.3+.0005E))$$

- If = Infiltration rate inches/hr. (0.17"/ hr unless otherwise supported by the Geotechnical report)
- E = Elevation, feet

$$Q = CIA$$

$$Qadj = CIA-(Fi)(area pervious))$$

Snow Covered Areas: The Designer shall determine an assumed impervious area due to the ground being frozen and/or saturated.

Snow Melt: A minimum snow melt rate of 0.10 inches/hour shall be used for planning and design for small watersheds.

The hydrology calculation shall include a hydrology map showing:

Rational Method "C" values shall be shown for each watershed and sub watershed (See Standard Drawing 65)

Storm Intensity charts are attached as standard drawings (see drawing 59-62)

Time of concentration and runoff coefficients shall be shown for each reach.

Section 5.04 Hydraulic Capacity

Hydraulic Grade Lines

The hydraulic gradeline or HGL is computed from a known water surface elevation, usually the outlet condition, and the summation of head (energy) losses occurring in elements of the system due to friction and turbulence. These losses must be accounted for. At a minimum the following losses are to be addressed in the HGL calculations, friction loss, entrance loss, losses due to sudden enlargement or constriction, manholes, and junction losses. Closed conduit sections of pipes, boxes etc., shall be designed as flowing full whenever possible. The hydraulic gradeline (HGL) shall at all points be at least six inches below all manhole covers, gratings and inlets when operating under a head at the 10-year design flow.

Inlet structures

Design of drop inlets shall allow for 50% blockage of the inlet.

Inlet and Outlet Control

Inlet or outlet conditions usually control flow in a transverse culvert. In culverts operating under inlet control, only the entrance configuration and headwater depth affect the culvert capacity. Under outlet control, headwater depth, tailwater depth, entrance configuration and barrel characteristics all influence the culvert's capacity.

After anticipated runoff of design flow has been computed, the drainage channel downstream of the culvert should be investigated to determine normal depth of flow during peak runoff to estimate the tailwater depth and determine whether inlet or outlet control is likely.

The Federal Highway Administration Nomographs for headwater depth for culverts with inlet control are attached (See Standard Drawings 82-87).

Section 5.05 Detention Basins

Detention basins are intended to reduce the peak discharge of a watershed by storing the excess flow in a reservoir and slowly releasing it back into the system after the peak of the storm has passed. (All detention basins shall be designed such that the water surface returns to its base elevation within 24 hours of the end of the storm). Detention basins shall be fenced or otherwise protected for public safety where appropriate. The 20 year one hour event shall be detained and or treated onsite per the requirements of the California Regional water Quality Control Board (Lahontan). Flows in excess of the 10 year event shall be determined so post-

project flows do not exceed pre-project flows. The size of the detention basins should also consider downstream channel capacities, interactions with other storage basins, water quality, erosion, and sedimentation. If rock rip-rap is used to line the basin the volume of rock shall be considered in the design.

Generally the spillway crest shall be at or above the basins design year hydraulic grade line. When feasible the design year pool elevation should be at or below existing natural ground. Generally no more than 50% of the basins design year storage depth should be above the existing ground. The event equal to 125% of the design year event will be used for spillway design where a spillway is necessary. Spillways may be eliminated, at the discretion of the Engineer, when it can be shown that no damage would occur in the event of a breach. All storage basins shall be assumed to be 100% full at the beginning of the spillway design portion of the flood routing.

Storage basins shall have a minimum one foot of freeboard above the spillway design flood high water line on the emergency spillway or two feet of freeboard above the 100 year high waterline in the basin whichever is more stringent. An emergency spillway shall be required only when the exceedence of the design flood would result in damage to the structure, downstream damages, or risk of injury or loss of life.

On small basins such as parking lots the freeboard requirements may be reduced.

Basin side slopes should be 3 horizontal: 1 vertical or flatter on the wet side and 2H: 1V on the dry side.

A low flow channel shall be provided from the basin inlet to the basin outlet. The low flow outlet shall be designed to carry 0.1 cubic feet per second (cfs) per acre of upstream watershed. Earthen basin floors shall slope at a minimum 1% grade to the low flow channel and shall have a minimum grade of 1% from the inlet to the outlet.

A maintenance access easement may be required. A maintenance access easement to the basin bottom shall be a minimum 15 feet wide with no slopes in excess of 16%.

The outlet pipe for all basins shall be a minimum 18" in diameter and shall contain a trash rack at the inlet.

Section 5.06 Drainage Reports

- A. It is the responsibility of the designer to verify all design assumptions and design discharges by a review of field conditions. This review should cover but not be limited to:
1. Flow data
 2. Historical high water marks and/or recorded stream flow data
 3. Seasonal variation in channel condition
 4. Soil type
 5. Ground cover
 6. Adjacent man-made drainage works

Drainage reports shall be prepared by a registered civil engineer, and shall include the seal and original signature of the designer and shall include:

1. A title sheet with the project name, design engineer's name, address, telephone number and date of report.
2. A vicinity map showing the location of the project area in relationship to well-known features.
3. A written text addressing existing conditions; a description of the proposed improvements, both on and offsite; the effect of the improvements; the goals and all assumptions of the design; an explanation of all special designs; design concepts used in the design including a description of the hydrologic method used; any increase of flows downstream with a description of any proposed mitigation; description of easements required, drainage during construction (any special requirements outlined); proposed BMP's; description of any existing irrigation ditches/waterways on the project site, and upstream or downstream of the site with any applicable "spill rights" the canal may have which would impact the design.
4. Watershed maps as described in Section 5.07 of this document.
5. Table(s) indexed to the watershed maps indicating drainage areas in acres; soil and cover types; existing and/or future land use; pervious infiltration rates; impervious areas; flows for both pre and post-development conditions for both the 10 year and 100 year storm run-off.
6. Summary tables of the pre-development and post-development design indexed to the watershed map(s) including the following as applicable:
 - a. Identification of all inlets, outlets, manholes, and pipe runs.
 - b. Elevation of flow lines and grates of all inlets, outlets and manholes.
 - c. Contributing water sheds.
 - d. Q10 and Q100 flows.
 - e. Capacity of inlets.
 - f. Any carry over flows.
 - g. HGL elevations for 10 and 100 year events at all inlets, outlets, and manholes with available freeboard, as applicable
 - h. Pipe diameters, lengths, slopes, channel type, side slopes, bottom width, as well as length and slope.
 - i. Velocities.
 - j. n value used on overland surfaces, pipes, and channels.
 - k. Pipe and channel capacities as applicable.
 - l. Critical depth of flow and normal flow for channels and pipes not flowing full.
 - m. Summary table of detention basin design data.
 - n. For projects requiring HEC-1 and/or HEC-2 calculations, tabulate input as required and provide one copy of the output.
 - o. Additional information may be required to document other aspects of the design.
 - p. Show storm drain profiles with hydraulic grade lines.

Section 5.07 Drainage Maps

Separate drainage maps shall be submitted for pre and post-development conditions. The scale shall be acceptable to the Town Engineer and shall normally be 1" = 100' or 1" = 50' for

smaller watersheds but not less than 1" = 800'. For drainage areas exceeding 1 square mile, USGS maps may be used provided the area under consideration can be clearly defined.

The following information shall be shown on the drainage map:

- A. Site area shaded or otherwise delineated.
- B. Drainage area in acres.
- C. Existing and proposed contours/elevations with an appropriate contour interval shall be extended a minimum of 50 feet beyond the limits of the tributary area and further if needed to verify proper delineation of watershed limits.
- D. Travel paths of overland and concentrated flows with each defined and applicable lengths and slopes noted.
- E. Flow to each drainage structure (cfs) for both the 10-year and 100-year events with any carryover flow noted.
- F. Each inlet, outlet and junction identified by letters or numbers corresponding to tables and calculations included in the drainage report.
- G. All individual watersheds and sub-watersheds shall be clearly defined. Points of Concentration (POC) for each junction shall be shown throughout. At each POC note Q10 and Q100 flow rates.
- H. Show all runoff entering and leaving the site.

Section 5.08 Overland Release Points

Overland release points for the 100 year storm shall be shown and properly identified. All associated grading and limits of required drainage easements shall be shown. The easements shall be large enough to ensure that these release areas can be maintained.

Section 5.09 Design Criteria and Standards

Manning's formula shall be used to compute capacities of all open and closed conduits not operating under inlet control, and the hydraulic gradelines.

A. Culverts

1. Design flow shall be as specified in this document. Culverts shall be designed to carry the 10 year design storm with no head (i.e. a ratio of height of water at inlet (H) to diameter of pipe (D)= 1.0 unless it is part of an approved storm detention design. For upstream watersheds less than or equal to 320 acres, the 100-year storm may be conveyed with head providing the design complies with Table 5-1 Allowable Street encroachments. Designs with $H/D > 1.5$ must be evaluated for pipe seam and joint strength to ensure no failure of the pipe from larger water pressures. All storm events must be analyzed as outlined in this document unless operating inlet control.
2. Minimum depth of cover and required gage thickness for overfill conditions shall be determined from Standard Drawing 55 of this manual. Minimum cover over culverts shall be 1.5 feet. Culverts shall not extend into the road structural section. Where the 1.5 feet of minimum cover cannot be met, the conduit shall be encased in a two sack slurry on the bottom and sides of the pipe, with 1.0 feet of cover, or protected in a manner approved by the Engineer.
3. In corrosive or erosive environments, protective coating or a heavier gage may be required on metal pipe culverts.

4. Culverts under driveways shall be designed to carry the design flow of the roadside ditch with a minimum diameter of 15". (18" if cmp is used)
5. Pipe material shall be in order of preference, HDPE, concrete, cmp, and aluminum and shall conform to those specifications outlined in this document.
6. When outlet velocities exceed allowable velocities for the downstream drainage way or watercourse suitable protection shall be provided.
7. For culverts 48 inches in diameter or more, inlets and outlets shall have cut-off walls. When inlet or outlet velocities exceed allowable velocities for the soil, adequate riprap shall be provided.
8. Aluminum corrugated metal pipe shall have a minimum cover of 18", or a different acceptable pipe type shall be used and shall require other protection as in (b) above. Aluminum CMP shall not be used in conjunction with any Portland Cement Concrete.
9. To prevent sedimentation, minimum velocity allowable in any closed conduit system shall be 2.5 feet per second. The maximum velocity in any closed conduit system is 14fps. Velocities exceeding 14fps are special circumstances and criteria shall be established on a case-by-case basis by the Town Engineer. Velocities shall be computed using the Manning's equation.
10. Closed conduit pipe slopes shall be less than 70 percent of critical slope or more than 130 percent of critical slope at design flow. The maximum design quantity of flow for any line steeper than critical slope shall be computed assuming that the floor is at critical slope and critical velocity.
11. The wetted perimeter of a pipe increases more rapidly than the area as the pipe approaches full capacity. Therefore, the capacity of a circular conduit at a given grade is the same at 91% and 100% ratios of d/D. Because it is impractical to design for the theoretical range where capacity exceeds that for the full conduit, open channel flow should only be assumed for d/D ratios less than 0.90.
12. The maximum spacing between cross culverts shall be 500 feet, and the maximum grade differential in elevation between cross culverts shall be 20 feet unless otherwise approved by the Engineer.
13. Culverts within the right-of-way shall not have flared end sections.
14. The maximum spacing between storm drain manholes shall be 400 feet.
15. The maximum spacing between drop inlets shall be 400 feet.

B. Roadway Drainage

1. Roadway drainage design includes the collection and removal of drainage from the roadway. Such drainage includes that which originates from within the right-of-way, as well as surface drainage outside the right-of-way which may be impacted by road construction or impact the road. This includes overland flows, channel flow and groundwater.
2. In the design of roadway drainage facilities, provisions shall be made for stormwater release at all natural channels.
3. The limits of flooding used in the design of roadway drainage facilities shall be as set forth in the project drainage report. The limits shall conform to Table 5-1 of this document.
4. At locations of changes in cross slope or superelevation, collected drainage shall not be permitted to cross into opposing lanes of traffic.

5. Drop inlet types shall conform to the designs shown in the State of California Department of Transportation Standard Plans, these specifications, and standard drawings; however drop inlets shall have a one foot sump where possible.

6. The hydraulic design of storm drain system for the design storm (10 year) shall conform to the following:

- a. New systems shall be designed for open channel flow with the design storm flow (i.e., hydraulic grade line is at or below the crown of the pipe).
 - b. The system shall be designed for larger flows, as required by this document.
 - c. For existing systems, the hydraulic grade line shall be at least 0.50 feet below the inlet grate and/or top of manhole.
 - d. Desired minimum velocity shall 2.5 fps for the design storm.
 - e. For design storms greater than the 10-year event and watersheds larger than 320 acres, reduced velocities must be approved by the Town Engineer.
7. Joints and seams of pipes under pressure must be evaluated for leakage for all new pipes and for all existing pipes if increased heads are proposed.
8. Pipelines shall be located parallel and concentric to road center lines as close as possible. Meandering and unnecessary angular changes of pipeline shall be avoided. See standard drawing 14 for pipeline locations within the right-of-way.
9. Mainline angular changes within a manhole or junction box shall not be greater than 90 degrees, except laterals entering from drain inlets may be at greater than 90 degrees from the direction of flow through the structure. If laterals entering a structure are greater than 90 degrees from the main flow, the invert of the lateral shall be at or above the crown elevation of the main storm drain line. Where angle points in alignment exceed 5 degrees, a manhole or inlet type junction structure, or circular bends may be used, as approved by the Engineer.
10. Manholes shall be located at pipe junctions, and changes in gradient or size. "Blind connections" will not be allowed. For pipes 24" or less in diameter on curves with radii at 200-400 feet, manholes shall be placed at the B.C. or E.C. of the curve and then on 400 feet maximum intervals along the curve. Approval by the Engineer will be required for curve radii less than 200 feet. Standard pre-cast manholes shall be used whenever feasible in traffic areas. All manholes or junction boxes must have standard 24 inch diameter manhole covers and must be located out of the gutter line.
11. Drainage inlets shall have a maximum spacing of 400 feet as measured longitudinally along the road, and have bicycle-proof grates.
12. Junction boxes shall be constructed of reinforced concrete. Minimum wall thickness shall be 6 inches for cast-in place structures. Minimum wall thickness of concrete structures may have a minimum wall thickness of 6 inches. Inside dimension shall be such as to provide a minimum of 3 inches clearance on the outside diameter of the largest pipe in each face for rectangular boxes and 8 inches minimum clearance between pipes along inside wall of circular junction boxes. Junction boxes deeper than 4 feet shall have a minimum width/diameter of 48 inches. Grates shall be adequate for AASHTO's HS-20 traffic loading. 36 "diameter cmp may be used in non traffic areas.
13. Downstream pipes in a storm drain system shall be designed with the same or larger size as the upstream pipe(s).
14. Pipes entering and leaving junction boxes shall be designed with matching

crowns, or the upstream pipe(s) may be higher. In no case will the crown of a smaller upstream pipe be below the crown of the downstream pipe unless specifically approved as part of the design of a detention facility or BMP.

15. Longitudinal gutter grades shall not be flatter than 0.50 percent.
16. Pipe materials shall conform to requirements of Sec 5.09(1) (I).
17. Ditches shall be designed to accommodate the effects of supercritical flow when changing direction of a ditch. No erosion or scouring is allowed. The affect of roadside superelevation must also be evaluated on direction changes.
18. Use of OMPI inlets per standard drawing 46-2 is recommended in non urban areas in lieu of grated inlets.

C. Open Channels

1. Ditch materials are listed in order of preference: Grass lined; earth; rock lined; asphalt concrete lined. Overall preference is a closed storm drain system with dikes/curbs as appropriate and minimizing roadside ditches.
2. The minimum velocity for earth channels is 2.0 fps and the maximum velocity is 6.0 fps. The minimum velocity for concrete lined channels is 2.0 fps and the maximum is 14.0 fps.
3. The side slopes for realigned channels shall not exceed 1:1 on the lined portion and 2:1 on the unlined portion

**Table
5-1
Allowable Street Encroachments**

Type	Profile	10-yr. storm	100 year storm
Local	Continuous grade	Traveled way is open and does not carry water	Max. stormwater elev. is 4" above the top of curb and the water Velocity is less than 3 ft./sec.
	Sag points	Stormwater elev. doesn't exceed the	Stormwater is min. one Ft. below building pad.

Collector	Continuous grade and sag points	top back of sidewalk Max depth in traveled way is 6". Centerline is dry Traveled way is open and does not carry water	ponding is less than 120 feet away from inlet stormwater is within right-of-way, Center 12 feet of roadway is clear of water. Velocity is less than 3ft./sec
Arterial	Continuous grade	no encroachment allowed	All travel lanes are clear bike lane may be inundated, Max. depth of 6" over sidewalk.

D. Subsurface Drainage

1. Where subsurface drainage is encountered, special investigations and reports by a qualified Engineer shall be required.
2. All subsurface drainage shall be conveyed by perforated pipes, except at the outlet portion which shall be non-perforated pipe.
3. Minimum inside pipe diameter for underdrains shall be 6 inches for lengths of 500 feet or less. For lengths exceeding 500 feet, the minimum diameter shall be 8 inches.
4. Surface drainage shall not be permitted to discharge into an underdrain which is designed to intercept groundwater. The discharge of an underdrain into a storm drain or culvert is permissible. Designs shall include the outfall above the hydraulic grade line of the structure, unless specifically approved by the Engineer.
5. A terminal cleanout shall be installed at the upper end of the underdrain, and intermediate cleanouts shall be installed at all angles and as approved by the Engineer. The riser diameter shall be equal to the diameter of the underdrain. A suitable marker/stake shall be provided for permanent reference.
6. The underdrain grade shall not be flatter than 0.5 percent unless approved by the Engineer.
7. Outlets shall be provided at intervals of not more than 500 feet.
8. Rodent guards shall be installed on all outlets.

Section 5.10 Easements

Drainage conduits and improved channels when not located in a public street, road, alley, or within a public right-of-way must be located in a dedicated and recorded public drainage easement. Necessary dedication must be completed before the improvement will be accepted or finalized. A dedicated and recorded meandering drainage easement (MDE) shall be provided for all existing natural drainage swales.

- A. Easements for closed conduits:

1. The minimum drainage easement width shall be 20', with the conduit centered within the easement.
 2. A temporary construction easement shall be provided to ensure adequate access and working space rights during construction.
 3. For pipes 24 inches in diameter and larger or where trench depth exceeds 5 feet, additional easement width may be necessary to provide adequate working space.
- B. Easements for open channels (man made waterways):
1. Shall have sufficient width to contain the channel and a service road with a turnaround.
 2. Minimum easement requirements are the same as for closed conduits.
- C. Easements for culverts:
1. Provide sufficient easements for maintenance purposes including inlets and outlets.

Section 5.11 Fencing

Suitable fencing or barriers shall be installed should the Engineer determine that they are needed for safety or security reasons.

Section 5.12 Standard Drainage Pipe Sizes

CORRUGATED METAL PIPE PIPE (CMP) EQUIVALENTS Diam. (In.)	CROSS-SECTIONAL AREA (Sq. Ft.)	CORRUGATED METAL ARCH (CMPA) (In. x In.)
---	---------------------------------------	--

12	0.8	No CMPA Equivalent
15	1.2	17X13
18	1.8	21.X15
21	2.4	24X18
24	3.1	28X20
30	4.9	35X24
36	7.1	42X29
42	9.6	49X33
48	12.6	57X38 or 53X41
54	15.9	64X43 or 60X46
60	19.6	71X47 or 66X51
72	28.3	83X57 or 81X59
78	33.2	87X63 or 95X67

Section 8 Erosion Control

Section 8.01 General

In addition to ditch lining and energy dissipaters, an Erosion Control Plan to prevent sediment runoff from all disturbed soils is required. The Erosion Control Plan shall be submitted with, or be made a part of, the improvement plans and shall be reviewed by the Town Engineer.

The following shall apply to the control of erosion and sediment:

- A. Grading plans shall be designed with long term erosion and sediment control as a primary consideration.
- B. Grading operations during the rainy season shall provide erosion and sediment control measures except upon a clear demonstration, to the satisfaction of the Town Engineer, that at no stage of the work will there be any substantial risk of increased sediment discharge from the site.
- C. Should grading be permitted during the rainy season, the smallest practicable area of erodible land shall be exposed at any one time during grading operations and the time of exposure shall be minimized.
- D. Natural features, including vegetation, terrain, watercourses and similar resources shall be preserved wherever possible. Limits of grading shall be clearly defined and marked to prevent damage by construction equipment.
- E. Permanent vegetation and structures for erosion and sediment control shall be installed as soon as possible.
- F. Adequate provision shall be made for long term maintenance of permanent erosion and sediment control structures and vegetation.
- G. No topsoil shall be removed from the site unless otherwise directed or approved by the Town Engineer. Topsoil overburden shall be stockpiled and redistributed where appropriate within the graded area after rough grading to provide a suitable base for seeding and planting. Runoff from the stockpiled area shall be controlled to prevent erosion and resultant sedimentation of receiving water. Landscape areas may require additional soil preparation.
- H. Runoff shall not be discharged from the site in quantities or at velocities substantially above those which occurred before grading except into drainage facilities whose design has been specifically approved by the Engineer.
- I. Project proponent shall take reasonable precautions to ensure that vehicles do not track or spill earth materials into public streets and shall immediately remove such materials if this occurs.
- J. All disturbed areas shall be revegetated.

Section 8.02 Emergency Conditions

Should increased sediment discharge occur or become imminent, project proponent shall take all necessary steps to control or reduce such discharge. Such steps may include construction of additional facilities or removal or alteration of facilities required by approved erosion and sediment control plans. Facilities removed or altered shall be restored as soon as possible afterward or appropriate changes in the plan shall be immediately requested pursuant to this Chapter. Project proponent shall take prompt action to resolve emergency problems; otherwise

the Town Engineer may institute abatement proceedings pursuant to provisions of this section and section 9.

Erosion and Sediment Control Plans: Erosion and sediment control plans prepared pursuant to this Chapter shall comply with all of the following:

- A. The erosion and sediment control plan need not be a separate sheet if all facilities and measures can be shown on the grading sheets without obscuring the clarity of either the grading plan or the erosion and sediment control plan.
- B. The applicant shall submit, with the erosion and sediment control plans, a detailed cost estimate covering this work.
- C. Erosion and sediment control plans shall include an effective revegetation program to stabilize all disturbed areas which will not be otherwise protected. All such areas where grading has been completed between April 1 and October 15 shall be planted by November 1. Graded areas completed at other times of the year shall be planted within 15 days. If revegetation is infeasible or cannot be expected to stabilize an erodible area with assurance during any part of the rainy season and the unstable area exceeds 2,500 square feet, additional erosion and sediment control measures or irrigation of planted slopes may be required as appropriate to prevent increased sediment discharge.
- D. Erosion and sediment control plans shall be designed to prevent increased discharge of sediment at all stages of grading and development from initial disturbance of the ground to project completion. Every feasible effort shall be made to ensure that site stabilization is permanent. Plans shall indicate the implementation period and the stage of construction where applicable.
- E. Erosion and sediment control plans shall comply with the recommendations of the Civil Engineer, Geotechnical Engineer, Engineering Geologist, or Landscape Architect involved in preparation of the grading plans.
- F. The structural and hydraulic adequacy of all storm water containment or conveyance facilities shown on the erosion and sediment control plans shall be verified by a Civil Engineer, and they shall so attest on the plans. Sufficient calculations and supporting material to demonstrate such adequacy shall accompany the plans when submitted.
- G. Erosion and sediment control plans shall be designed to meet anticipated field conditions.
- H. Erosion and sediment control plans shall provide for inspection and repair of all erosion and sediment control facilities at the close of each working day during the rainy season and for specific sediment cleanout and vegetation maintenance criteria.
- I. Erosion and sediment control plans shall comply with any and all standards and specifications adopted herein for the control of erosion and sedimentation on grading sites. These standards and specifications shall be in general compliance with the current Erosion and Sediment control Guidelines for Developing Areas of the Sierras published by the High Sierra Resource Conservation District.

Section 9 Enforcement

The Town Engineer may issue a stop work notice for good cause, subject to appeal to the Town Council. However no work shall be performed pending appeal except as authorized by the Town Engineer.

Section 9.1 Stop Work Notices

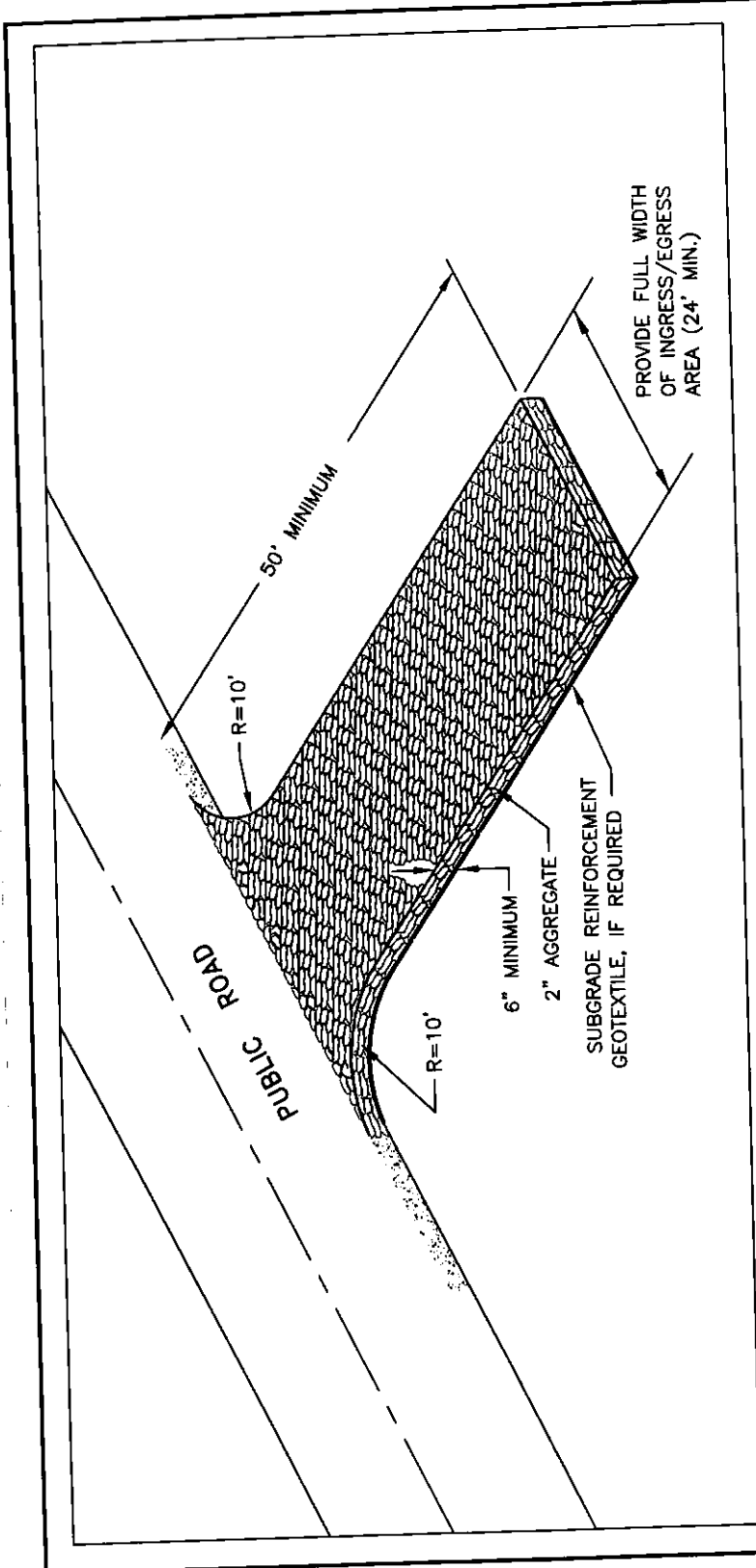
Whenever it comes to the attention of the Town Engineer that any person is performing work in violation of the provisions of this document the Town Engineer may serve upon such person a written notice citing such violations and directing that person performing the work to stop work immediately.

Upon receipt of such stop work notice, the person performing the work shall;

- A. Stop work immediately until authorized by the Town Engineer
- B. Within a 24 hour period provide the Town Engineer with a list of remedies which can be immediately undertaken to bring the work into compliance with this document and the plans and specifications.

Section 9.2 Criminal Enforcement

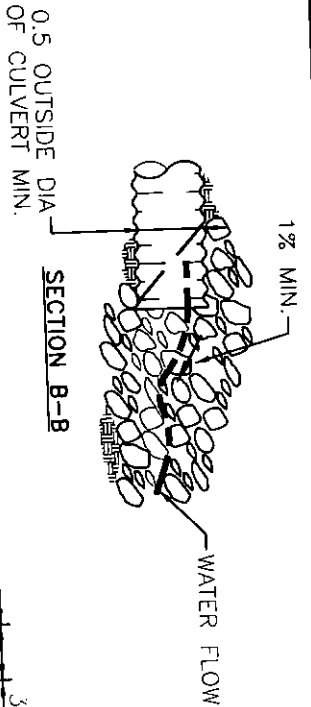
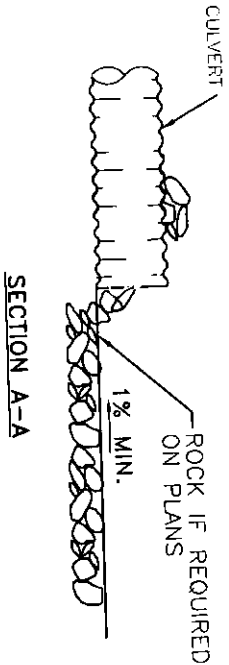
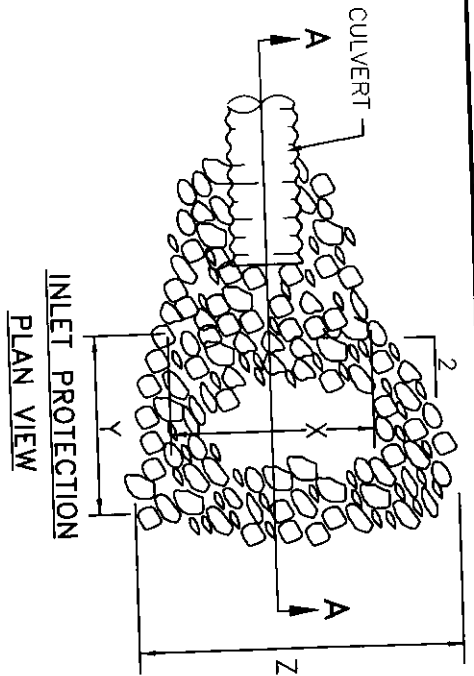
Any person violating a stop work notice may be found guilty of a misdemeanor or an infraction.



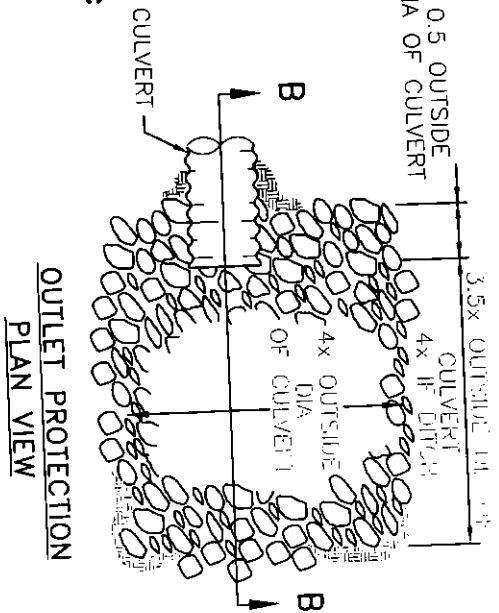
NOTES:

1. A STABILIZED CONSTRUCTION ENTRANCE SHALL BE USED AT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS.
2. THE AGGREGATE SHALL BE 2 INCH CRUSHED ROCK OR 1 TO 3 INCH DIAMETER WASHED WELL-GRADED GRAVEL.
3. THE ENTRANCE SHALL BE PROPERLY GRADED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.
4. THE ENTRANCE SHALL BE CONSTRUCTED ON LEVEL GROUND.
5. PERIODIC TOP DRESSING WITH ADDITIONAL STONE SHALL BE PROVIDED TO ENSURE THE INTEGRITY OF THE ENTRANCE DURING CONSTRUCTION.
6. THE ENTRANCE SHALL BE INSPECTED MONTHLY AND AFTER EACH RAINFALL.
7. CRUSHED ROCK MATERIAL SHALL BE ADDED WHEN SURFACE VOIDS ARE NOT VISIBLE.
8. ALL SEDIMENT DEPOSITS ON PAVED ROADWAYS SHALL BE REMOVED WITHIN 24 HOURS.
9. GEOTEXTILE SHALL BE REMOVED AT COMPLETION OF CONSTRUCTION.

TOWN OF TRUCEEE ENGINEERING DEPARTMENT	
D:\TRUCEEE\truceee logo.tif	
LOCAL ROAD SYSTEM S.D. 12	
NOT TO SCALE	APPROVED BY:
DATE:	TONY ENGINEER



DO NOT USE THIS DETAIL IF THE PIPE VELOCITY IS LESS THAN 5 ft./sec



**INLET PROTECTION
MINIMUM DIMENSIONS**

ROCK CLASS	PIPE Ø IN.	X FEET	Y FEET	Z FEET
NO. 1 BACKING	12	3	4	5
NO. 1 BACKING	18	4.5	6	7.5
NO. 1 BACKING	24	6	8	10
NO. 1 BACKING	30	7.5	10	12.5
NO. 1 BACKING	36	9	12	15
NO. 1 BACKING	42	10.5	14	17.5
NO. 1 BACKING	48	12	16	20

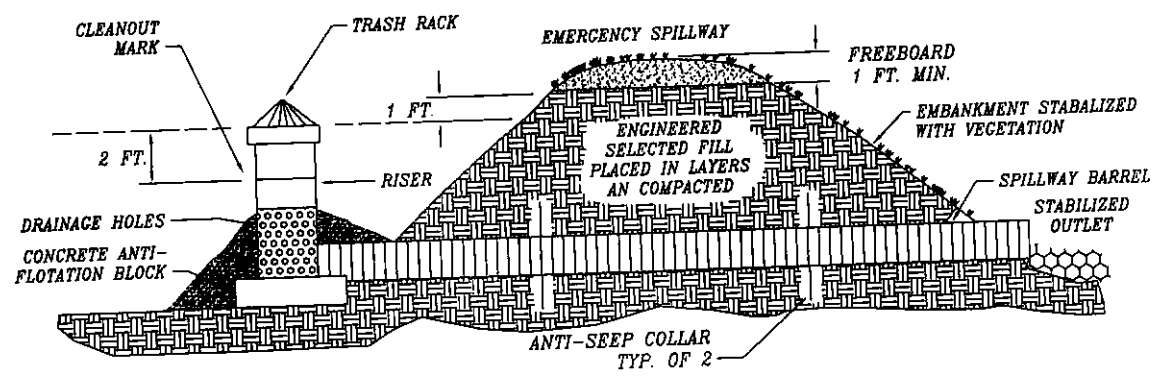
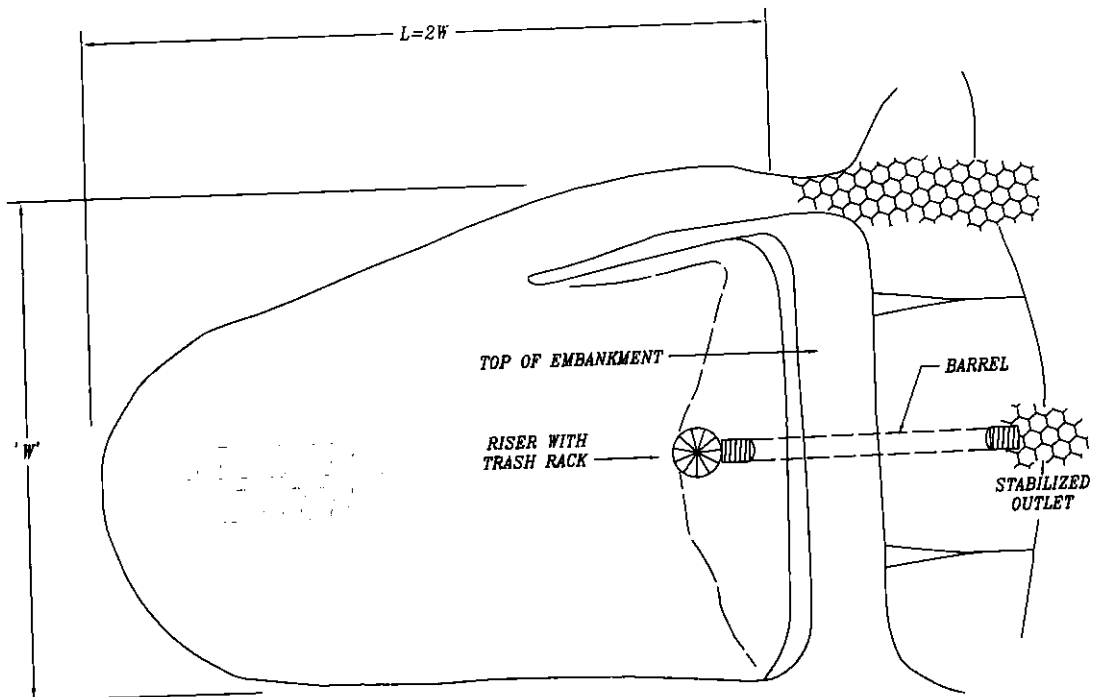
- NOTES:**
- HAND PLACE ROCKS.
 - ALL ROCKS SHALL BE ANGULAR AND HAVE TWO FACES.
 - WHERE SLOPES OF OUTLETS EXCEEDS 5%, A SEDIMENT BOWL OR ENERGY DISSIPATOR SHALL BE REQUIRED.
 - ROCK SLOPE PROTECTION SHALL BE SLOPED AT A MIN. OF 1% INTO OR OUT OF CULVERT.
 - ALL CULVERTS OF 48 IN. OR LARGER SHALL BE INSTALLED WITH REINFORCED CONCRETE HEADWALLS AND END WALLS WITH CUTOFF WALLS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
 - ON OUTLET APPLICATIONS, 50% OF THE ROCKS SHALL BE LARGER THAN HALF THE DIAMETER OF THE PIPE.

**TOWN OF TRUCKEE
ENGINEERING DEPARTMENT**

LOCAL ROAD SYSTEM STANDARDS
STANDARD DRAWING

DR: \TRUCKEE\truckshee logs.rvt

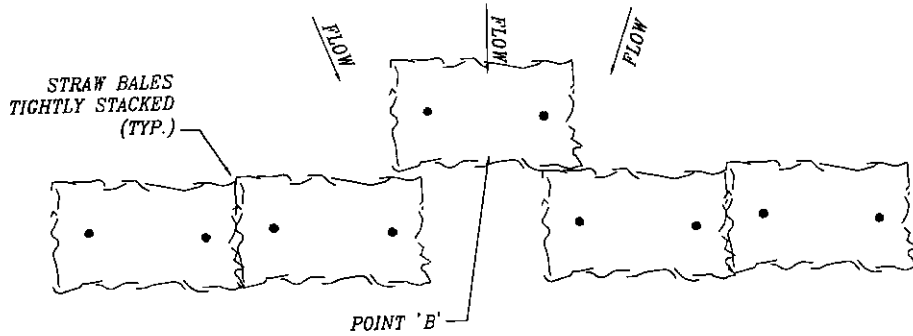
NOT TO SCALE
DATE: _____
APPROVED BY: _____
TOWN ENGINEER



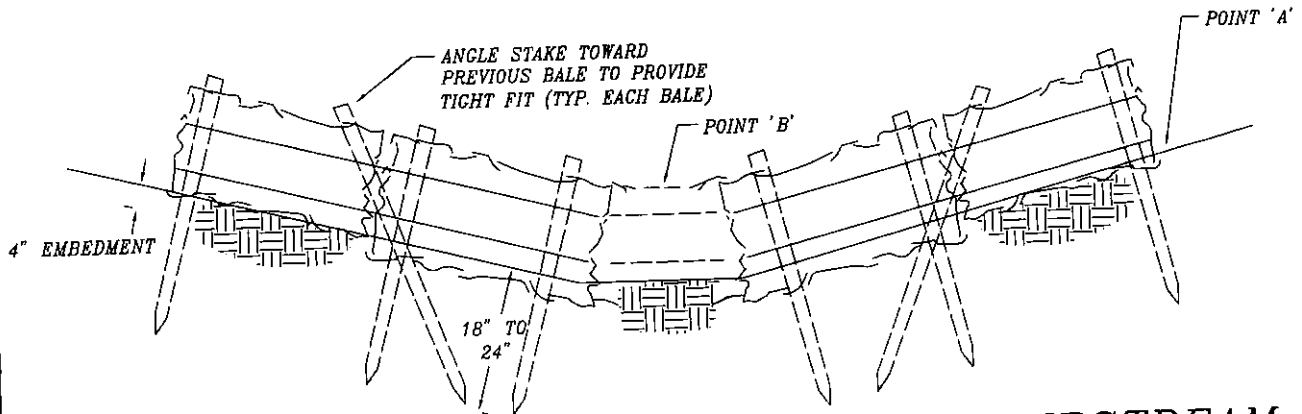
TOWN OF TRUCKEE	
ENGINEERING DEPARTMENT	
APPROVED FOR	
LOCAL ROAD SYSTEM STANDARDS	
NOT TO SCALE	APPROVED BY
MAY, 2008	TOWN ENGINEER

NOTE:

1. EMBED THE BOTTOM OF THE BALES 4" INTO THE SOIL AND KEY BALES INTO BANK AT EACH END.
2. BALES TO BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING. USE STRAW, ROCKS OR FILTER MATERIAL TO FILL GAPS BETWEEN BALES AND TAMP THE THE BACKFILL MATERIAL TO PREVENT EROSION OR FLOW AROUND BALES.
3. IF BALES ARE WIRE BOUND, THEY SHALL BE ORIENTED SO THAT THE BINDINGS ARE AROUND THE SIDES RATHER THAN THE TOP AND BOTTOM OF THE BALE TO PREVENT BINDINGS FROM RUSTING FROM CONTACT WITH THE SOIL.
4. SPILLWAY HEIGHT NOT TO EXCEED 24 INCHES.
5. INSPECT AFTER EACH SIGNIFICANT STORM (1" IN 24 HOURS). MAINTAIN AND REPAIR PROMPTLY.
6. REMOVE SEDIMENT WHEN BASIN IS 60% FULL.

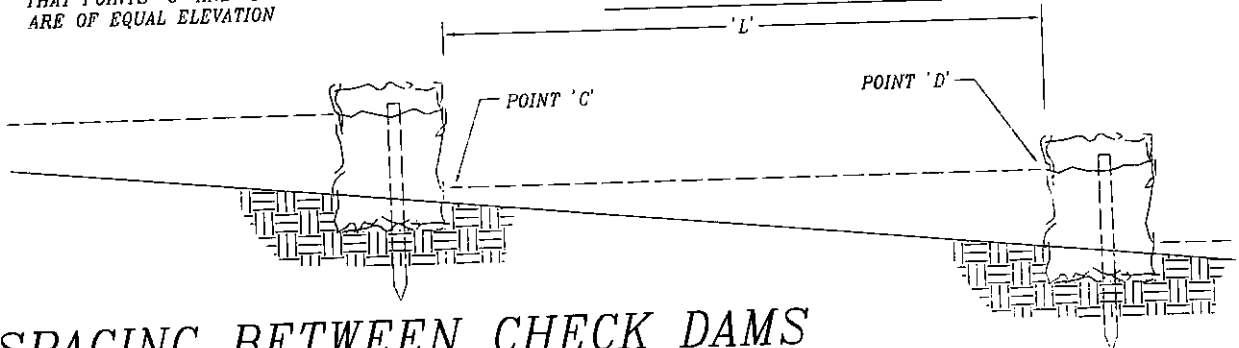


PLAN



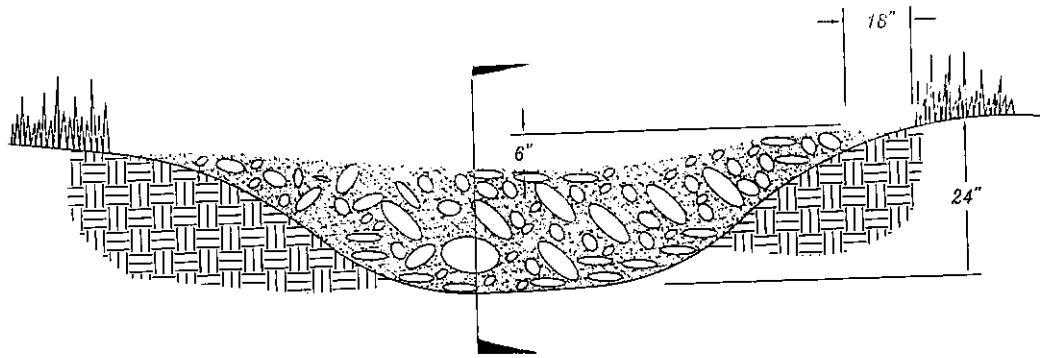
VIEW LOOKING UPSTREAM

'L' = THE DISTANCE SUCH THAT POINTS 'C' AND 'D' ARE OF EQUAL ELEVATION



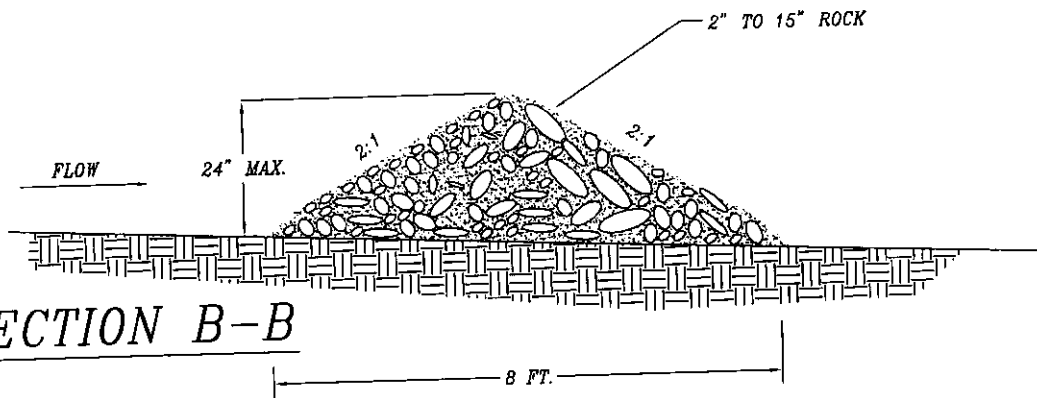
SPACING BETWEEN CHECK DAMS

FORM OF TRUCKS
ENGINEERING DEPARTMENT



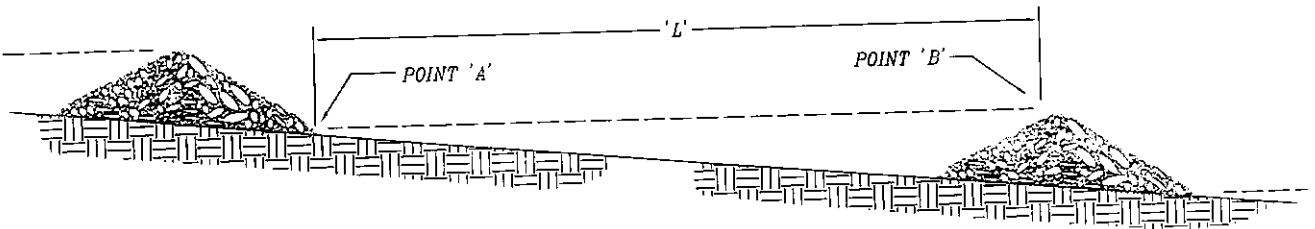
VIEW LOOKING UP STREAM

NOTES:
 KEY STONE INTO THE DITCH BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" TO PREVENT OVER FLOW AROUND DAM.



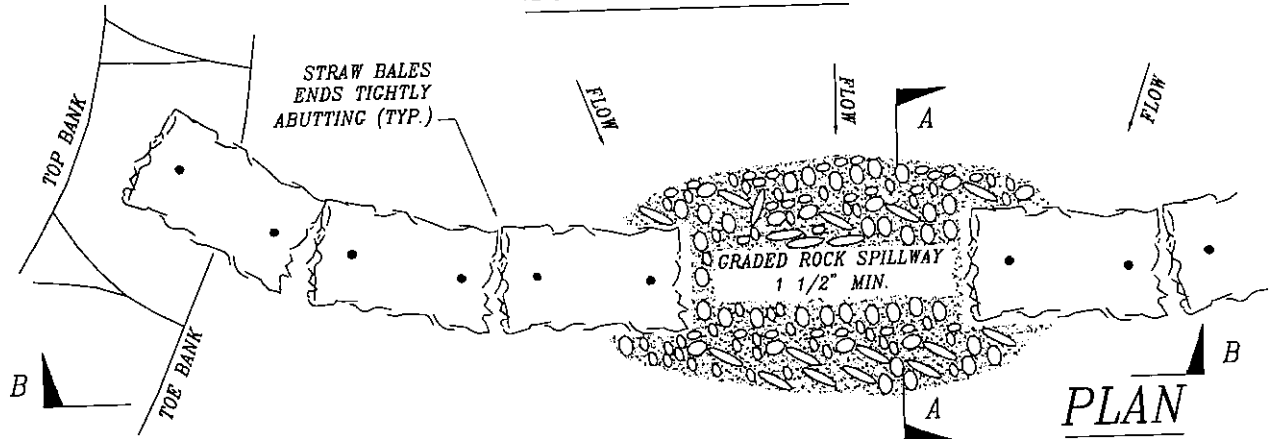
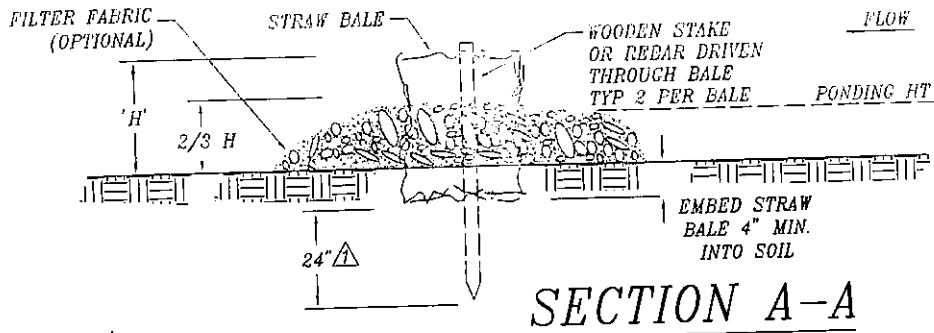
SECTION B-B

'L' = THE DISTANCE SUCH THAT POINTS 'A' AND 'B' ARE OF EQUAL ELEVATION



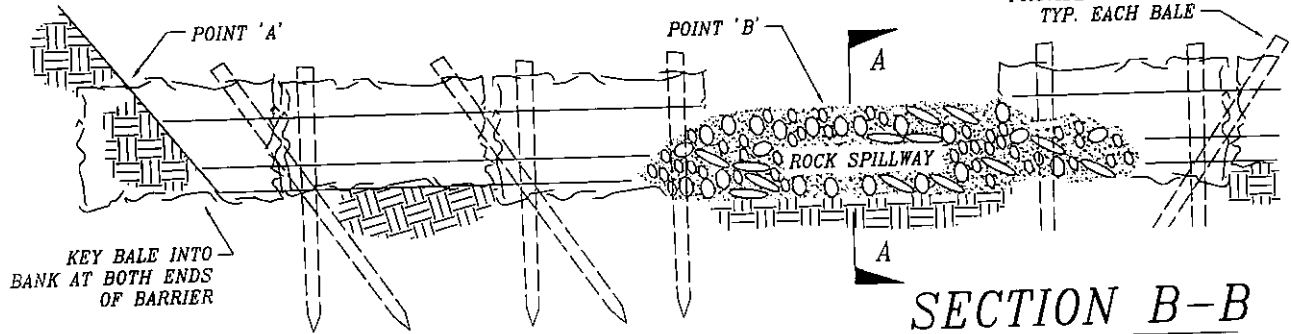
SPACING BETWEEN CHECK DAMS

		COUNTY OF TRUCKEE ENGINEERING DEPARTMENT ROCK CHECK DAM	
		PROJECT NO. _____ SHEET NO. _____ OF _____ DATE _____	
		SD#69	



NOTE:
BALES TO BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING, USE STRAW, ROCKS, OR FILTER FABRIC TO FILL GAPS BETWEEN THE BALES AND TAMP THE MATERIAL TO PREVENT EROSION OR FLOW AROUND BALES.

ANGLE STAKE TOWARD PREVIOUS BALE TO PROVIDE TIGHT FIT TYP. EACH BALE

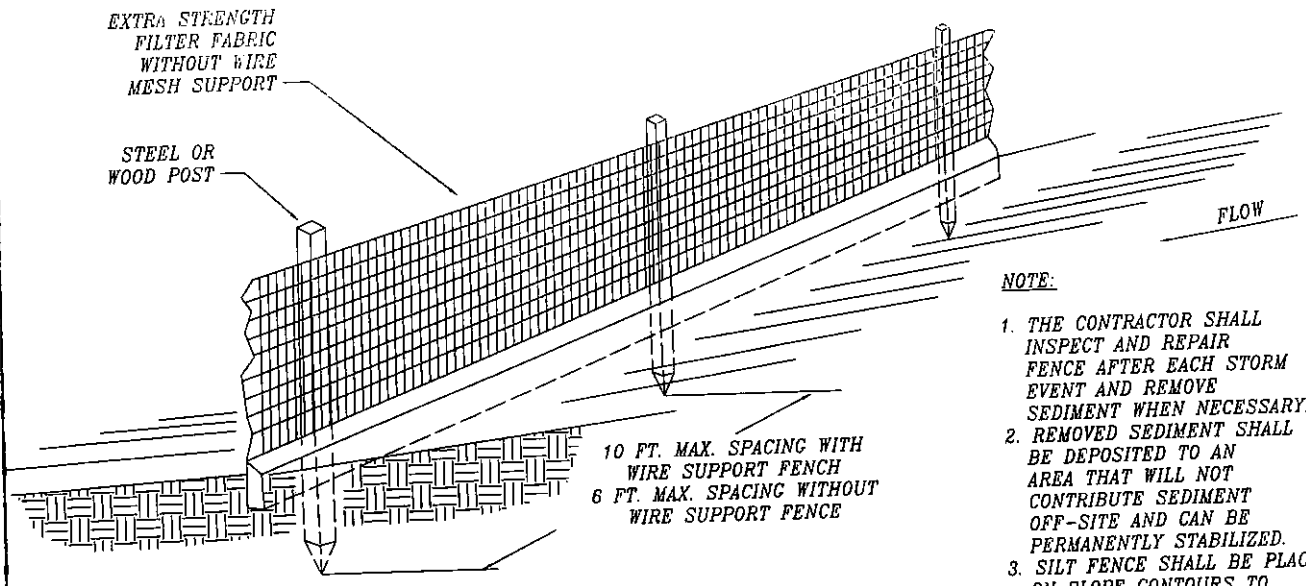


NOTES:

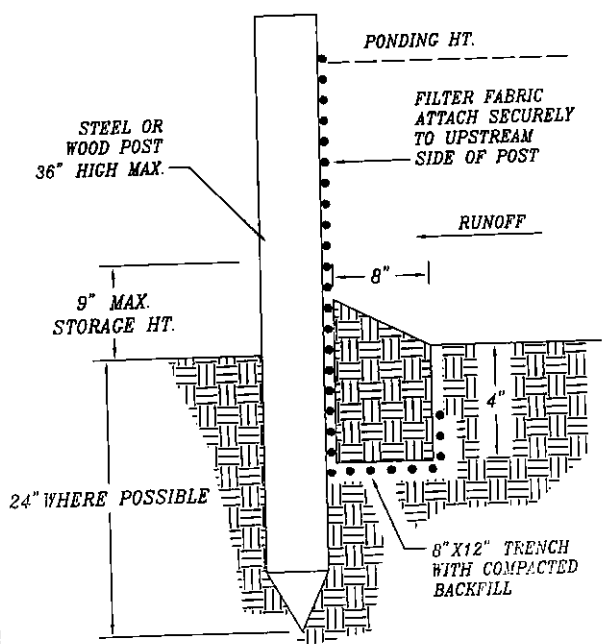
1. EMBED THE BOTTOM OF THE BALES 4" INTO THE SOIL AND KEY END BALES INTO BANK AT EACH END.
2. THE STRAW BALES BE PLACED PERPENDICULAR TO FLOW.
3. POINT 'A' SHALL BE HIGHER THAN POINT 'B'.
4. IF BALES ARE WIRE BOUND, THEY SHALL BE ORIENTED SO THE BINDINGS ARE AROUND THE SIDES RATHER THAN ALON THE TOP AND BOTTOM OF THE BALE TO PREVENT BINDINGS FROM RUSTING FROM CONTACT WITH SOIL.
5. SPILLWAY HEIGHT SHALL NOT EXCEED 24 INCHES.
6. INSPECT BARRIER AFTER EACH SIGNIFICANT STORM (1" IN 24 HOURS). MAINTAIN AND PROMPTLY REMOVE SEDIMENT WHEN BASIN IS 60% FULL.

STATE OF TRUCOSE
CONCRETE DEPARTMENT
**STRAW BALE
DIKE**

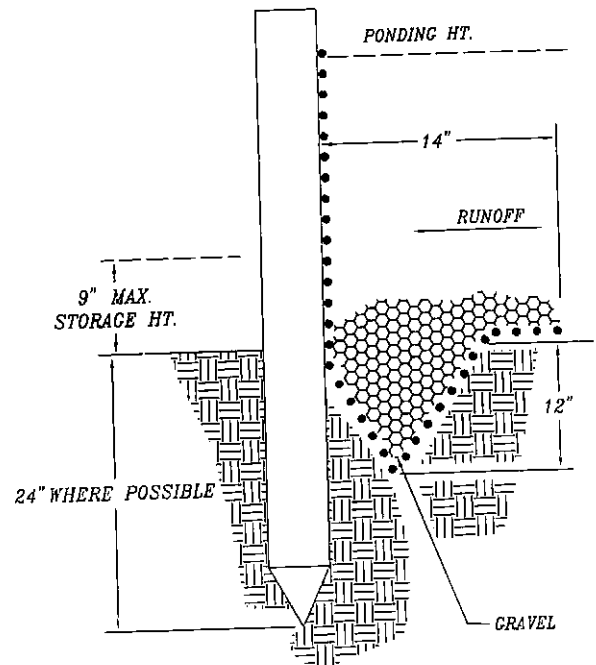
SD#70



- NOTE:
1. THE CONTRACTOR SHALL INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
 2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
 3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMUM PONDING EFFICIENCY.



STD. DETAIL
TRENCH WITH NATIVE BACKFILL



ALT. DETAIL
TRENCH WITH GRAVEL

NO. OF TRENCHES
CONSTRUCTION DATE

SILT FENCE

SD#71

10'-20'
(3-8m)

SEDIMENT, ORGANIC
MATTER AND NATIVE
SEEDA AREER
CAPTURED BEHIND
THE ROLLS.

3"-5"
(75-125mm)

8"
DIA.
(305mm)

1" X 1" STAKE
(25 x 25mm)

ADJACENT
ROLLS SHALL
TIGHTLY
ABUT

INSTALL
STAKES
THROUGH
NETTING OR
THROUGH LOG.

FIBER ROLL EROSION BARRIER

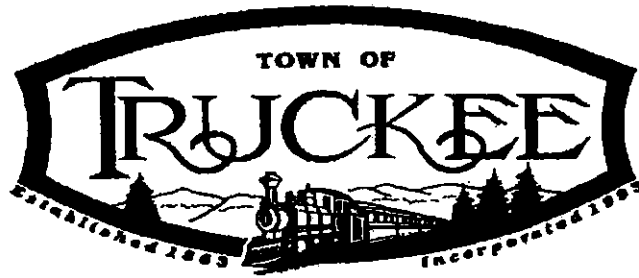
NOTES:

1. FIBER ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"-5" (75-125mm) DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.
2. USE BONTERRA BIOLOGS OR EQUAL W/ 100% COCONUT FIBER YARN. WT= 3 LB PER L.F.
3. WEIGHTED FIBER ROLLS MAY SUBSTITUTED FOR FOR TEMPORARY EROSION PROCTION ON HARD SURFACES.

LOCAL ROAD SYSTEMS NOT TO SCALE MAY, 2003 TOWN ENGINEER		D:\P\BUCKEN\truckee logo.tty TOWN ENGINEER FIBER ROLL EROSION BARRIER	SD#72
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APPENDIX: F

Minimum Standards for Erosion Prevention on One
and Two Family Dwelling Construction Projects



Town of Truckee
Minimum Standards for
Year-Round Erosion Prevention on
One and Two Family Dwelling
Construction Projects

May 10, 2007

Michael Lavalley, Chief Building Official



Town of Truckee
Minimum Standards for Year-Round Erosion Prevention on
One and Two Family Dwelling Construction Projects

These standards are intended to serve as a guideline for preventing erosion on one and two family dwelling projects. Sites within the Town of Truckee are varied from wetland to mountainous. **The responsibility of the designer is to create an effective Erosion Prevention Plan that is site specific, based on the terrain and soil properties.**

For specific details please reference Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California. It can be ordered, viewed or downloaded at <http://www.cabmphandbooks.com/Construction.asp>.

GOALS:

For construction projects that include earthwork the following goals shall be considered when preparing and implementing an Erosion Prevention Plan:

- Implement a site specific Erosion Prevention Plan and maintenance schedule to manage stormwater and non-stormwater discharges from the site at all times.
- Limit disturbed areas (areas that are cleared and/or graded) to only those areas necessary for construction. *Natural vegetation is the best and cheapest BMP.*
- Emphasize erosion prevention as the most important measure for keeping sediment on site during construction.
- Utilize sediment control barriers as a supplement to erosion prevention.
- Minimize exposure time of disturbed soil areas by phasing in construction activities.
- Stabilize disturbed soils promptly. Either temporarily or permanently stabilize, landscape, revegetate and/or mulch disturbed soil areas as early/rapidly as possible.
- Stabilize slopes as soon as possible.

REQUIREMENTS:

1. **Grading.** Any ground disturbance including grading, excavating, clearing, grubbing and/or stump removal work shall not occur until:
 - A. A grading permit has been obtained¹ or plans for the building have been submitted,
 - B. an Erosion Prevention Plan has been submitted and approved, and
 - C. temporary erosion control measures are installed.

Note: Two additional sets of erosion control plans must be submitted to begin grading work before building permits are issued. The Building and Safety Division will review requests to begin grading work at time of plan submittal.

¹ The Town of Truckee Municipal Code requires that a grading permit is required for excavation or fills greater than 20 cubic yards and/or when clearing, grubbing or disturbing ground cover in excess of 500 square feet.

2. **Erosion Prevention Plan.** When submitting plans to the Town for review, include an Erosion Prevention Plan prepared by a certified professional in erosion and sediment control, or a California registered civil engineer, licensed architect or landscape architect competent to do the work. The plan must show the following:
 - A. The limits of ground disturbance and the type of barrier to be used to delineate this in the field
 - B. A schedule showing timelines within which grading/excavation work will be completed and temporary and permanent erosion control will be installed relative to construction progress
 - C. The quantity of grading material to be removed and/or imported
 - D. Erosion Prevention barriers, their locations and a section view showing their correct installation for all disturbed soils areas
 - E. Methods of retaining and infiltrating 20 year, one hour storm event runoff from newly created impervious surfaces including roofs and driveways such as drip line infiltration trenches² and/or dry wells
 - F. Winterization procedures if construction will occur beyond the normal building season defined as May 1 to October 15
 - G. Methods of protecting dirt stockpiles
 - H. Concrete washout area
 - I. Permanent erosion prevention measures (see Item 4)

3. **Temporary Erosion Prevention Methods.** Grading and excavating shall not occur until temporary erosion control measures have been installed according to the Erosion Prevention Plan. Temporary erosion control shall include the following:
 - A. Sedimentation barriers will be placed at the downhill perimeter of all disturbed soil areas and in intermediate locations as shown on the approved plans.
 - B. Stockpiles will be protected with tarps or other waterproof membranes adequately secured to resist wind forces. An erosion prevention barrier shall protect the perimeter of stockpiles.
 - C. Provide driveway track off control. Soil and construction materials shall not be tracked offsite.
 - D. Erosion control and sediment barriers will be checked prior to anticipated storm events, immediately after storm events and weekly by the contractor or owner/builder.
 - E. Where barriers are removed and/or stockpiles not covered, they shall be available on site for installation as needed within 24 hours.
 - F. Provide a concrete washout area.
 - G. For job sites that have not received an approved final grading inspection by October 15, additional effort shall be made to protect the site for the winter. Include the following:
 1. Install and maintain effective temporary erosion control barriers such as fiber rolls for disturbed soil areas. Silt fences shall have wire backing and metal stakes for winter use.

² The California Building Code requires that water drain away from buildings. This must be considered and addressed even with drip line trenches. To prevent moisture migration into the crawl space of the building, assure that the bottom of drip line trenches is below the level of soil on the inside of the footing within the structure.

2. Stabilize disturbed and bare soil areas with vegetation, mulch, wood chips, erosion control blankets or similar methods.
3. Clean up and remove construction debris and spoil piles.
4. Remove or cover dirt stockpiles with plastic and install perimeter containment protection such as silt fences or wattles.
5. Install permanent mechanical stabilization and drainage improvements where feasible such as drip line trenches, drywells or catch basins.
6. Restrict parking and storage to paved areas and/or driveways that have track off control (gravel).
7. For sites that will be active between October 15 and May 1 where the driveway will be used for material storage and/or vehicular access, driveways with slopes in excess of 10% shall be surfaced with asphalt, concrete or the functional equivalent as approved by the Building Official.

4. Permanent Erosion Prevention Methods. Permanent erosion control barriers will include:

- A. Measures to retain, infiltrate and/or detain roof, driveway and site runoff such as infiltration trenches, dry wells and/or other suitable methods;
- B. Protection of disturbed soil areas by revegetating or by installing pine needles, wood chips, mulch, jute netting, straw blankets and/or other approved suitable method;
- C. A paved driveway or parking area.

NOTE: Failure to implement an effective Erosion Prevention Plan and accomplish the objective of managing discharge may be grounds for revocation of permits and may result in fines, reinspection fees, construction delays and/or required training.

ADDITIONAL RESOURCES:

EPA guidance document for construction site operators:

http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf

EPA sample inspection report: http://www.epa.gov/npdes/pubs/sw_swppp_inspection_form.doc

EPA construction SWPPP template: http://www.epa.gov/npdes/pubs/sw_swppp_template.doc

Stormwater and Construction Industry Poster: <http://www.epa.gov/npdes/pubs/swposter-final-fullsize.pdf>

Construction Industry Compliance Assistance: <http://www.cicacenter.org/bmps.html>

National Menu of Stormwater BMPs for Construction (scroll down for BMP fact sheets):

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4

National Menu of Stormwater BMPs for Post-Construction (scroll down for BMP fact sheets):

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5

AGREEMENT CONCERNING EROSION CONTROL AND PREVENTION

For and in consideration of the issuance of a grading permit by the Town of Truckee, the Town and the undersigned Owner/Agent agree as follows:

1. Owner shall assure that erosion prevention measures are taken throughout the life of this construction project and will prevent sediment, dust, construction debris and other illicit materials from being discharged from this property.
2. Owner has reviewed the attached copy of the Town of Truckee Erosion Prevention for One and Two Family Dwelling Construction Projects Minimum Standards (TTEPS). A copy of the approved plans for the project that include erosion prevention requirements have been provided to Owner. Owner will comply with these standards and plans in the course of constructing this project.
3. Owner will be responsible for the inspection, maintenance and correct installation of BMPs (Best Management Practices, site sediment and erosion control methods). Owner shall assure their proper installation before storm events and monitor their effectiveness the day after. Owner shall modify BMPs as the site or precipitation event requires to meet actual field conditions.
4. If owner fails to comply with the terms of this agreement, the Building Official may, at his/her discretion revoke any and /or all permits required for the project, impose an enforcement penalty for each violation in the amounts set forth below.

Enforcement

<u>Per Project</u>	<u>Penalty</u>
First Violation	Suspended Penalty of \$100
Second Violation	\$200 plus any previously suspended penalty
Third Violation	\$300
Fourth Violation	\$500

Completion of an approved erosion control course within three months of the violation may be accepted by the Building Official in lieu of the enforcement penalty. This option may be used only once annually per individual.

5. Owner shall pay penalty levied upon the Town by the Lahontan Regional Water Quality Control Board for failures on the property plus all costs, including Town's reasonable attorney's fees.
6. Agent by signing this agreement acknowledges that Agent shall be fully responsible and liable for compliance with this agreement if Owner does not perform its terms.

Project Address

Permit Number

Owner/Agent Name (please print)

Owner/Agent Mailing Address

Owner/Agent Telephone Number

Signature of Owner or Agent

Date

EROSION PREVENTION VIOLATION FEES

<u>Per Project</u>	<u>Fee</u>
First Violation	Suspended Penalty of \$100
Second Violation	\$200 plus any previously suspended penalty
Third Violation	\$300
Fourth Violation	\$500

Note: Completion of an approved erosion control course within three months of the violation may be accepted by the Building Official in lieu of the enforcement penalty. This option may be used only once annually per individual.

GRADING PERMITS

Delete and replace California Building Code Appendix Chapter 33 Section 3306.2 as follows:

3306.2 Exempted Work. A grading permit is not required for the following:

1. Clearing, grubbing, and excavation or fills less than 20 cubic yards that disturb less than 500 square feet.
2. Excavation for construction of a structure permitted under this code.
3. Cemetery graves.
4. Refuse disposal sites controlled by other regulations.
5. Excavations for wells or trenches for utilities.
6. Mining, quarrying, excavating, processing or stockpiling of rock, sand, gravel, aggregate or clay controlled by other regulations, provided such operations do not affect the lateral support of, or significantly increase the stresses in, soil on adjoining property.
7. Exploratory excavations under the direction of a registered design professional.
8. Existing nursery and agricultural operations conducted as a permitted main or accessory use.

Exemption from the permit requirements of this chapter shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this chapter or any other laws or ordinances of this jurisdiction.

GRADING PERMIT PLAN CHECK FEES

Change to hourly, one hour minimum.

Erosion Prevention Plan Check Comments:

1. Provide an Erosion Prevention Plan prepared by a certified professional in erosion and sediment control, or a California registered civil engineer, licensed architect or landscape architect competent to do the work.
2. Show the limits of ground disturbance and the type of barrier to be used to delineate this in the field.
3. Provide a schedule showing timelines within which grading/excavation work will be completed and temporary and permanent erosion control will be installed relative to construction progress. Exact dates of events are not required, but the number of days between events is.
4. Identify the quantity of grading material to be removed and/or imported
5. Show erosion prevention barriers, their locations and a section view showing their correct installation for all disturbed soils areas.
6. Show the methods of retaining and infiltrating 20 year, one hour storm event runoff from newly created impervious surfaces including roofs and driveways such as drip line infiltration trenches¹ and/or dry wells.
7. Identify winterization procedures if construction will occur beyond the normal building season defined as May 1 to October 15. Include paving driveways that are steeper than 10% that will be used to provide parking, access or material storage.
8. Show methods of protecting dirt stockpiles.
9. Provide a concrete washout area. Identify its location and construction on the plans.
10. Identify permanent erosion prevention measures. Include the following:
 - A. Measures to retain, infiltrate and/or detain roof, driveway and site runoff such as infiltration trenches, dry wells and/or other suitable methods;
 - B. Protection of disturbed soil areas by revegetating or by installing pine needles, wood chips, mulch, jute netting, straw blankets and/or other approved suitable method;
 - C. A paved driveway or parking area.

¹ The California Building Code requires that water drain away from buildings. This must be considered and addressed even with drip line trenches. To prevent moisture migration into the crawl space of the building, assure that the bottom of drip line trenches is below the level of soil on the inside of the footing within the structure.



**Town of Truckee
Building and Safety Division
Erosion Prevention Inspection Form**

Project Information				Designer Information			
Permit #:				Company:			
Owner's Name:				Address:			
Contractor's Name:				Contact:			
Address of Building Site:				Weather Conditions (Circle choice): Sunny Overcast Raining Snowing			
Project Specifications (Circle all that apply):							
Small site (<1 acre)		Large Site (>1 acre)		Gentle slope (<5:1)		Moderate slope (>5:1, <1:1)	
				Steep slope (>1:1)		Close to a water course	
				History of non-compliance			

Inspection Points	Yes	No	N/A	Description and Recommendation for Abatement
1. Erosion control plan reflects field conditions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Is there evidence of sediment or muddy water running off from the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Is there a potential for contaminated runoff in the event of rainfall? (e.g. vehicle fuel or fluid leaks, material spills, paint waste, unprotected stockpiles, etc.?)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Is track off control gravel installed & maintained on construction access/parking (i.e., no mud, debris or trash on public road)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Are erosion controls (mulching, seeding, blankets, etc.) and perimeter controls (wattles, silt fences, etc.) properly installed and maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Are dirt piles properly stored (covered when not in use, out of the right-of-way, secondary containment provided if needed, excess disposed of properly)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Are dust control measures being effectively applied?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Is a concrete/stucco washout containment area provided and used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Are dumpsters covered or tarped, cleaned-up and emptied regularly to keep the site free from trash?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Are portable toilets out of the street/setback and away from drainage paths, so that liquid cannot enter the storm drain system if knocked over?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Are all operational storm drain inlets effectively protected from sediment inflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

ACTION TAKEN:

- | | | | |
|--|----------------------------------|--|-------|
| <input type="checkbox"/> <u>First Violation</u> | \$100 suspended penalty | <input type="checkbox"/> <u>Fourth Violation</u> | \$500 |
| <input type="checkbox"/> <u>Second Violation</u> | \$200 plus any suspended penalty | <input type="checkbox"/> <u>Stop work notice</u> | |
| <input type="checkbox"/> <u>Third Violation</u> | \$300 | | |

Other: _____

Is further action recommended?

Follow-up Inspection Issue citation Urgency abatement

Other: _____

Explanation:

Inspector signature: _____ Date: _____ Time: _____ Phone: _____



Building and Safety Division Erosion Prevention Inspection Form Instructions

Instructions:

- ◆ Use this form to provide clear documented notation of violations and direction toward abatement. Erosion prevention inspection may be done at any time, in conjunction with another scheduled inspection, on a complaint basis or as the inspector is driving by and notices a violation.
- ◆ If deficiencies are noted (shaded boxes checked), describe the deficiency in the "Description and Comments" column. Enter information into permits plus immediately after completion. In case of stop work notice, copies are to be provided to the Chief Building Official and forward it to code enforcement for recordkeeping and consideration of further action (if recommended).
- ◆ If no deficiencies are noted, the inspection notice must be kept with the building permit onsite so we can retrieve the information if needed.
- ◆ Inspectors are responsible for completing the inspection form each time an erosion violation is noted. The inspector may also make a recommendation to the Chief Building Official and/or Compliance Officer for a follow-up inspection or that a citation be issued, or for urgency abatement. See below for description of enforcement options.
- ◆ Please call the Building and Safety Division at (530) 582-7820 if you have questions about the erosion prevention program, appropriate enforcement action, or use of this form.

Enforcement Options for Inspectors:

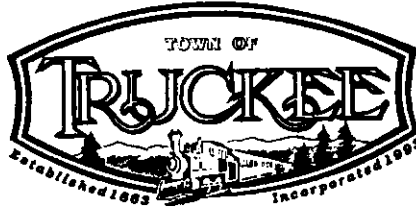
These enforcement processes shall generally be used sequentially. Inspectors shall utilize this inspection form to avoid giving verbal orders and to provide documentation of on site violations. A copy of the form shall be provided the person in charge of the construction job or shall be left on site in a prominent location.

- ◆ First Violation - The violation may be minor or egregious. If egregious, the inspector may also issue a stop work notice. The inspector may use the first violation for repeated minor violations at his/her discretion.
- ◆ Second Violation - The violation may be minor or egregious. If egregious, the inspector may also issue a stop work notice. The second violation shall be used when the owner or contractor has not responded to the first violation notice. The inspector may use the second violation at his/her discretion for repeated minor violations.
- ◆ Third Violation - The violation may be minor or egregious. If egregious, the inspector may also issue a stop work notice. The third violation shall be used when the owner or contractor has not responded to the second violation notice or when the violation persists. The inspector may use the third violation at his/her discretion for repeated minor violations.
- ◆ Stop Work Notice - The inspector may issue a stop work notice to cease operations that are actively polluting or an immediate threat to do so.
- ◆ Citation Recommendation - In the event that verbal and/or written warning(s) do not achieve compliance or in the event of an egregious violation, the inspector may make a recommendation to the Chief Building Official that a citation be issued. This will result in further evaluation of the circumstances by the Building and Safety Division, Code Enforcement personnel, and possibly others. A citation may result in fine.
- ◆ Urgency Abatement - In the event that the inspector observes a serious active pollution condition that is a threat to public health or safety and the responsible party cannot be located, a recommendation for 'urgency abatement' may be made to the Chief Building Official. The Chief Building Official may make a recommendation to the Department Head.



APPENDIX: G

Public Works Standard Operating Manuals



TOWN OF TRUCKEE BACKHOE DRAINAGE GUIDELINES

CONTENTS:

- Safety and General Information
 1. Equipment
 2. Excavation
- Dump truck Operations
- Backhoe Operations
- Drainage Cleaning Operations

GOALS:

It is the goal of the Town of Truckee's Drainage Program to safely and efficiently clear roadsides, ditches and drainage easements of vegetation, debris and other obstructions in order to provide for the free flow of all run off and storm water, preventing flooding and pavement damage. These duties shall be performed in such a manner as to provide for the safety of the homeowners, the traveling public, and the crews that perform the work.

SAFETY AND GENERAL INFORMATION

Equipment

- Employees must wear clothing appropriate for job and use all required protective safety equipment (PPE's).
- Perform required pre-operation and post-operation checks. Be familiar with operator's manuals. Do not operate any equipment that is unsafe.
- Employees should check to see that all guards and other protective devices are in proper place and adjusted, and shall report deficiencies promptly to their supervisor.
- Make sure of footing when mounting and dismounting equipment. Use proper mounting and dismounting procedures.
- Use of seat belts is required on all units so equipped.
- Drive defensively and observe all Vehicle Code laws.
- Before backing any equipment, make sure area is clear and use an observer when available.
- Observe all Work Zone Safety Regulations.
- Be sure work area is clear before operating excavating equipment.
- Employees will stay clear of moving equipment and keep hands and body away from moving parts.
- Be aware of all overhead electric, phone and cable lines. Observe high-voltage proximity rules. It is unlawful to operate equipment within 10' of high-voltage lines.
- Vehicles and equipment should be handled with care, especially in dangerous areas...edges of trenches, cut banks, and steep slopes.
- Use safety stand when working under raised body or bed.
- Do not work under vehicles supported by jacks or chains without protective blocking.
- Do not work under a vehicle unless provisions have been taken to prevent the vehicle from moving. Do not rely on the parking brake.
- Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Before disconnecting lines, be sure to relieve all pressure. Before applying pressure to the system, be sure all connections are tight and that lines, pipes and hoses are not damaged. Fluid escaping from a small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.
- All loads visible over the sideboards or tailgate must be tarped.
- Stunt driving and horseplay are prohibited.

Excavation

The California Code of Regulations, Title 8, Construction Safety Orders, Section 1541-46 contains the detailed information required for shoring, sloping and benching. All guidelines that pertain to our operations shall be observed.

- Before digging, determine whether any underground installations or utilities are likely to be encountered. Call Underground Service Alert (USA) at least 48 hours before digging. The telephone number for USA is: 1-800-227-2600.
- All work in an excavation must be supervised by a qualified person.
- Do not work in an area or enter a trench or excavation until a qualified person has determined that there is no hazard from moving ground.
- Remove trees, poles boulders and similar objects which may be a hazard to workers.
- Excavated material shall be prevented from falling back into the excavation and shall be kept at least 2 feet from the edge.
- In trenches 4 feet deep or more, a safe and convenient means of access and egress must be provided within 25 feet of any location in the trench.
- Do not enter an excavation 5 feet or more in depth without shoring, benching, sloping or equivalent alternative methods of protection. Trenches or excavations in unstable ground shall be shored regardless of depth.
- Install crossings with standard guardrails when the excavation is more than 7 ½ feet deep. Cross trenches at crossings only.
- Adequate physical barrier protection shall be provided to prevent employees and the public from falling into the excavation.
- Accumulations of water in excavations shall be controlled by dikes, ditches or other means before the work can continue.
- When excavating near highways, railroads or other sources of vibration, use additional precautions and bracing to strengthen shoring.
- Backfill or securely cover temporary excavations when the work is completed. Before backfilling, physically check to assure that no one is in the trench.

DUMP TRUCK OPERATIONS

- Pre-op equipment. Be familiar with the operator's manual. Wear appropriate Personal Protective Equipment.
- Check brake connections, pintle hook, and safety chain before towing trailer.
- Keep windows and mirrors clean. Keep tires properly inflated.
- Make sure slack adjusters on air brakes are properly adjusted. Watch for air loss. Air tanks should be drained at the end of shift.
- Operator and passenger must wear seat belts.

- Check instruments for overheating, loss of oil pressure, proper RPM and speed.
- Always use proper engine speed and gear ratio. Do not coast downhill. Use lower gears.
- Face machine, use handholds, steps and ladders while mounting and dismounting vehicle. Use vehicle ladders to access truck beds. Do not climb on tires.
- Make sure cargo is properly loaded and secured. Do not overload truck.
- When parking, set the hand brake; put the truck in gear or park. Use blocks when potential of rollaway exists.
- Use the lube chart when servicing equipment. If in doubt, talk to the shop for the current procedure.

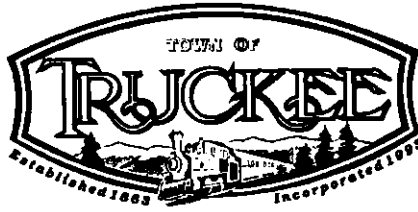
BACKHOE OPERATIONS

- Pre-op equipment. Be familiar with the operator's manual. Wear appropriate Personal Protective Equipment.
- Never attempt to start or operate the machine except from the operator's station. Never leave the machine unattended with the engine running. When in operation, only one person, the operator, should be permitted on the machine.
- Do not leave attachments in the raised position when equipment is not in use. Always lower them to the ground.
- Be sure outriggers are properly set before operating backhoe. Don't dig close to outriggers. Soft ground or sandy soil might cause cave-in. Avoid contacting outriggers with boom while digging.
- Be sure area is clear of personnel before lowering stabilizers or moving the boom. Never allow anyone to work under a raised bucket.
- Keep loading area as level as possible. Reduce boom lift speed when raising loaded bucket to full height. Shift to low gear when loading downhill with the front bucket.
- When operating on a slope, use caution when swinging the backhoe bucket to the downhill direction. Dump on the uphill side.
- Carry the loader bucket low at all times, especially when working on a hillside or backing up an incline.
- Travel slowly when moving over rough terrain. Never drive too close to the edge of a ditch.
- Reduce speed before turning or applying brakes. Couple the brake pedals together when deadheading. Be sure that both wheels are braked simultaneously when making an emergency stop.
- When driving out of a ditch or up a steep slope, engage the clutch slowly. Be prepared to declutch promptly if the front wheels rise off the ground. Use the same care if rear wheels mire in soft ground or drop into a hole. Back the unit out of these spots if at all possible.

- Use swing and boom locking pins when transporting the backhoe
- Avoid deadheading. Trailer whenever possible. Chain down boom when trailing.

DRAINAGE CLEANING OPERATIONS

- Contact Underground Service Alert (USA) at least 48 hours prior to digging.
- Pre-op equipment. Be familiar with the operator's manuals. Wear appropriate Personal Protective Equipment.
- Establish a Work Zone Traffic Control area and set up the appropriate signs, cones, etc. Conduct a site specific Hazard Review, paying particular attention to traffic, hidden hazards, USA marks, moving equipment and overcrowding of workers.
- Erosion control (straw bales, wattles, etc.) shall be put in place.
- Position vehicles and equipment in such a manner suitable for the safe entering or exiting of the vehicle and which does not cause a hazard to workers or the public. While cleaning a ditch adjacent to the roadway, the dump truck and backhoe should be positioned back to back in order to facilitate the loading of the truck.
- While digging with the boom perpendicular to the ditch, the operator should maintain a smooth, U-shaped grade, avoiding a saw-tooth appearance. Every attempt should be made to maintain an 18"-24" shoulder between the ditch and the paved edge of the roadway.
- While digging with the boom in line with the ditch, the ditch should be stepped side to side, avoiding a steep-sided square shaped ditch.
- The backhoe operator shall take care not to scar the pavement with the front bucket or the outriggers.
- Workers on foot should stay out of the way of operating equipment until the area is clear for hand work. While on foot, make every effort to perform your work facing oncoming traffic. Allow ample space for each employee to work safely. Watch for tripping hazards and uneven ground.
- In most cases, the truck driver is also the ground man for the backhoe operator.
- When the truck has been loaded, the driver will transport the spoils to the pre-designated area for disposal. While the truck is gone the backhoe operator can dress the ditch and clean the area, traffic permitting.



TOWN OF TRUCKEE

BMP GUIDELINES

Content:

- General Info
- Installation
- Safety

Goals:

To prevent unnecessary discharge of sediment into drainage systems, water ways and environmentally sensitive areas during construction and maintenance projects. To protect stock piled spoils and base materials.

General Information

BMP= Best Management Practices

BMPs are structures and practices used to prevent and minimize erosion and sedimentation into Town drainage structures and watershed areas during construction and maintenance projects. Site and project specific BMPs are best installed before construction begins and maintained throughout the duration of the project to ensure effectiveness. The BMPs shall encompass the entire effected area where soil and vegetation is disturbed.

BMPs used in construction and maintenance projects could include; straw bales, straw wattles, silt fence, wood chip mulch, tarps, filter fabric for drain inlet protection, erosion control blankets and mats, water applied by water truck for dust control, and street sweeping to clean track off and excess debris from roadway.

All sedimentation and debris accumulated by BMP structures will be properly disposed of or reincorporated into the project site.

Installation

Straw Bales: are installed during drainage maintenance projects edge to edge with no gap in between bales. They will be placed in front of a culvert inlet, or around a drain inlet.

Straw Wattles: are installed during drainage maintenance projects perpendicular to the drainage ditch down flow from maintenance project and in front of effected culvert with ends turned up towards the flow. They will also be installed around every stock pile of spoil materials and new materials. They can also be placed on contour along an effected slope. They are to be trenched in one third of the diameter and staked down with wooden stakes.

Silt Fence: is installed during shoulder rehabilitation and maintenance, where drainage structures or water ways may be affected. It will be trenched six inches deep and toed in an additional six inches with the toe facing towards the direction of flow, then backfilled.

Silt fence will be staked in every six feet and attached with bailing wire. Silt fence will be installed on contour to capture runoff and sediment from the work site.

Wood chip Mulch: will be used to protect bare soils during construction and maintenance projects. Wood chips will also be used to protect an incomplete work site over winter. Wood chips will be applied at a uniform depth of one inch.

Tarps: will be installed over the top of stockpiled spoils or base materials before rain events. Tarps will be anchored down with heavy rocks or staked down so they will not blow off.

Filter fabric: will be installed underneath the grate of a drain inlet on all drains down flow from the construction or maintenance site. Straw bales or wattles will also be used to assure proper drain inlet protection.

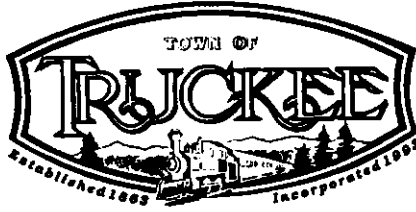
Erosion control blankets and mats: will be installed on drainage and shoulder construction projects on steep slopes generally steeper than 1:3 and or adjacent to water bodies, drainage structures, or environmentally sensitive areas. Blankets will be installed vertically down slope. They will be anchored in with six inch metal staples or wood stakes with six inch overlap. The blanket will be trenched and keyed in on all edges.

Water: will be applied to construction and maintenance sites to control dust. The water will be distributed by a water truck as needed to assure proper dust control.

Street Sweepers: will be used as needed to clean up track off and debris from vehicles entering and exiting construction and maintenance sites.

Safety

The installation of BMPs is a part of every construction and maintenance site, appropriate personal protective equipment is required. Most BMP materials are heavy and awkward to handle and proper lifting techniques are important. Many BMP applications are on steep slopes and uneven terrain, a proper site safety assessment should be done to identify all potential hazards within your work area.



TOWN OF TRUCKEE FUEL AND FUELING GUIDELINES

CONTENTS:

- Participants
- Fueling Procedures
- Spill Scenarios
- Notification List
- SPCC Plan
- Business Plan
- Tank Design

GOALS:

It is the goal of the Town of Truckee's Fuel Pump and Fueling policy to properly operate our in-house fueling facilities in order to avoid any leaks and any small or large spills. In the event of any leak or spill, proper containment, clean up, and notification procedures will be implemented. These goals and guidelines are designed for, not only the Public Works Department, but for all Town departments and other Agencies using the Town's fueling facilities.

SITE ADDRESS'

10720 Riverview Drive 14528 Northwoods Blvd. Truckee, Ca. 96161

OUTLINE-

- I. Participants
- II. Fueling Procedures
- III. Spill Scenarios/Clean up Procedures
- IV. Notification List
- V. SPCC Plan
- VI. Business Plan
- VII. Tank Design

I. PARTICIPANTS:

Public Works Street Maintenance and Vehicle Maintenance
Public Works – Engineering
Building Department.
Police Department.
Facilities Maintenance
Animal Control
Planning
Transit

II FUELING PROCEDURES:

- A) Pull up to appropriate dispenser
- B) Shut vehicle off
- C) Enter required information into card reader:
 - Vehicle Identification Number
 - Odometer/Hour Reading
 - Employee Number
 - Pump Number
- D) Remove Fuel Cap
- E) Remove Nozzle from Dispenser
- F) Lower Level on Dispenser
- G) Insert Nozzle into Fuel Tank
- H) Begin Fueling
- I) **DO NOT LEAVE YOUR VEHICLE UNATTENDED WHILE FUELING**
- J) Replace Nozzle on Dispenser
- K) Replace Fuel Cap
- L) Check Area for Fuel Spills and Leaks

This system is designed to fuel vehicles at the North and South end of the tank. Pull up to the dispenser and shut your vehicle off. The device used to activate the fuel pump is called a card reader, which is located on the west side. The card reader will ask you to enter a series of numbers: 1st, the vehicle identification number; 2nd, the odometer or hour reading; 3rd, your employees number and last, which pump you would like to use. If every thing is entered correctly, it will respond "pump is ready". Sometimes you may enter numbers that don't make sense to the system. Either you have incorrectly entered a number or in the case of a mileage error, someone previously may have entered a incorrect mileage. After several failed attempts the system will automatically go into a default mode. When this happens it will need to be reset at the computer. If no one is on site, leave a message on Tamara's or Marlins desk or you can also pass it on to a crew leader; Steve, Jim, and/or Thom. Now that you're ready to fuel your vehicle, take the cap off your fuel tank and place it somewhere it won't be forgotten and or left behind. Take the nozzle out of the dispenser and flip the aluminum lever down to the on position. This will reset the counter on the gallon meter and you should hear the pump turn itself on. Take the nozzle and place it into the neck of tank. Squeeze the trigger up and set the automatic kick out switch into place. At this time, do not leave the fueling nozzle unattended for any reason. If you should have to leave, shut the pump off and hang the nozzle up. When you're done, put your fuel cap back on and hang up nozzle. Before you climb back into the vehicle take extra time to survey the ground for a possible spill, look at the dispenser, hose and nozzle to check it for visible leaks that are present. Make sure that when you hang up the hose it is steady in place.

III. SPILL SCENARIOS:

Small Spills:

A common example of a small spill is an operator leaving his/her vehicle unattended while fueling and having the nozzle become detached from the vehicle, discharging fuel on the ground. Other causes of smaller spills common to fuel systems would include overfilling the vehicle fuel tank, spilling fuel; and, an operator leaving the fueling station with the hose and nozzle attached to the vehicle, thus possibly breaking the hose and, again, spilling fuel.

Large spills:

A large spill may consist of a hose rupturing on a tanker truck while transferring fuel or a larger overfill situation. An idea to consider here is we may need to use sand from the sand barn to direct the fuel towards our containment structures. In a large spill scenario, a contractor that specializes in hazardous material cleanup may be contacted. The Town of Truckee's emergency clean-up contractor is RDO Environmental Services, Ltd., however, we may want to use the fuel company's contractor. If we witness the event we will

assist the driver in proper notification and continue with our containment procedures until the specialized contractor arrives on scene and takes charge.

Clean-up procedures:

The emergency spill kit has the necessary supplies to do a sufficient clean up job on small spills. This kit is located in a shed east of the tank. The kit contains several items designed especially for cleaning spills of this nature. **Floor sweep** is a product that looks like ground up cardboard and is the most commonly used on concrete or asphalt surfaces. You can use a shovel to sprinkle it across small puddles or streams of fuel. Once the material is down, you use a broom to work it back and forth through the contaminated area. The floor sweep will become heavy and change to a darker color as it absorbs the fuel. To dispose of the used product, use a shovel and place the material in an approved container. Continue this process until the contaminated area looks satisfactory.

Absorbent pads look like giant paper towels and have the ability to be used on more uneven surfaces such as around a fuel tank or across a frame rail. You can also use them to wipe items down or place on top of the puddle itself, completely covering the spill area and left there to soak the product up. To dispose of the pads, pick them up and place them in an approved container. **Booms** are a long sock about 3" around and are full of a substance that soaks up hazardous material. They would typically be placed on the outside edge of the spill such as the edge of the pavement. This would catch the fuel traveling towards the dirt. You may also create a large circle surrounding the spill, preventing it from migrating further. Booms may also be placed in the bottom a drainage ditch. The same process is used for disposal. Other tools in the shed will consist of a **shovel, broom, drain pan, rubber and wooden plugs, a 35 or 55 gallon barrel for disposal and a fire extinguisher.**

The basic procedures for cleaning up a small spill are as follows:

Stop the leak. If the fuel pump is leaking, activate the emergency shut off button at the card reader or on the west side of the main shop and position the on/off handle on the dispenser to the off position. If it is a fuel tank that is leaking, put a drain pan underneath it to catch the drips and then put a rubber plug in the hole. Once you have stopped the fuel leak, contain the contaminated area with whatever means necessary and begin to soak it up with absorbent pads and booms. Once the majority of the fuel is soaked up, utilize the floor sweep and work it in to the area thoroughly. This will help to dry the surface out. After all this has been completed, dispose of the contaminated items in a barrel with a removable lid. The barrels used for this function are yellow with red letters and have either a 35 gallon or 55 gallon capacity. If any sand or dirt has been used for containment, it must be disposed of in the same manner.

Notification

- The first thing that should be done once you have some containment in place is notification. If you are in the Public Works Dept., notify a foreman: Steve Lindroth, Jim Sheehan, Thom Ravey, or Bret Albert. They will make sure you

have the proper paper work to fill out. Other departments should notify Marlin Garvin, Dave Jacobsen or Tamara Blanton.

- Under emergency conditions when no one is available, call 911.
- For fuel system problems like damaged hoses, nozzles and leaking fittings, notify Marlin.
- Notify Tamara for card reader issues like system default, wrong mileage entries, or new vehicle entries.
- To order new hazardous material clean up supplies, contact Dave Jacobsen.
- After the spill has been contained, cleaned up and all the proper notifications have been made it is time for the paperwork. The information that will need to be captured is pretty standard: type of fuel spilled, amount of product lost, location of spill, date and time, damages, clean up procedures, and corrective actions taken.

IV NOTIFICATION NUMBERS:

- Emergency 911
- Dave Jacobsen Shop 530-582-7707 Cell 530-308-0707
- Marlin Garvin Shop 530-582-7708 Cell 530-308-1212
- Tamara Blanton Shop 530-582-7707 Cell 530-308-1468
- Steve Lindroth Shop 530-582-7707 Cell 530-308-0865
- Jim Sheehan Shop 530-582-7707 Cell 530-308-0917
- Thom Ravey Shop 530-582-7707 Cell 530-308-0945
- 24 hour emergency clean up - RDO Environmental Services, Ltd.
1-775-342-0351
- Environmental Health 530-582-7884

V SPCC PLAN:

Recently a Spill Prevention Control and Countermeasure Plan (SPCC) was completed for each maintenance facility. This plan contains a set of guidelines to follow to be in compliance with all rules and regulations that surround the fuel tanks. This includes record keeping for tank inspections and training.

VI. BUSINESS PLAN:

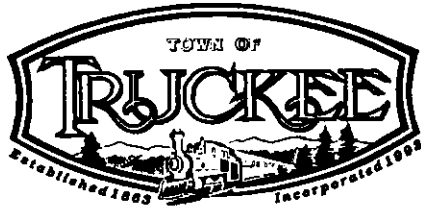
A current copy of the Business Plan is located in the break room near the MSDS log. The plan contains notification numbers for emergency contacts and evacuation of immediate neighbors as well as required Environmental Health

documents. It also contains a site map with details of other hazardous material located on the site.

VII. TANK DESIGN:

The Corporate Yard has a split tank; 6000 gallon diesel tank and a 2000 gallon gasoline tank. This system has dispensers on both ends. The south end has one nozzle for gas and one nozzle for diesel. The dispenser at the north end has only one nozzle for diesel. The tank is a double wall steel tank, and protected on all 4 sides by 4" bollards filled with concrete. There are several measures built in place to capture a spill if one should occur. The tank itself is surrounded by a 6" curb, capable of containing approximately 1200 gallons of product. Next, there is a 1500 gallon oil water separator that processes the material and passes it on to 3000 gallon rock lined pond. There are two emergency fuel shut off buttons; one is located on the card reader and the other is located on the west end of the mechanics shop. Inside the dispenser there is an automatic pump shut down switch if a leak should occur. A fire extinguisher and emergency spill kit is located in a small enclosure on the east side of the tank. The record tracking is done through a phone line to a computer located in the office.

The Tahoe Donner Yard has a 6,000 gallon single diesel tank located on the east end of the shop with the dispenser at the north end of the tank. It, too, is a double wall steel tank installed on a concrete slab and protected with 6" bollards. The tank is surrounded by a 6" curb capable of containing about 1200 gallons. There are two fuel shut off buttons; one on the card reader and the other on the outside of the shop, between bays 5-6. There are fire extinguishers and clean up supplies located inside the shop and another extinguisher outside on the east wall of the shop.



TOWN OF TRUCKEE SAND AND SALT GUIDELINES

CONTENTS:

- General Information
- Applications
- Methods
- Maintenance
- Training
- Sand Sheets
- Route Maps
- Specific Areas
- Salt/Sand Storage
- Other Corresponding Guidelines

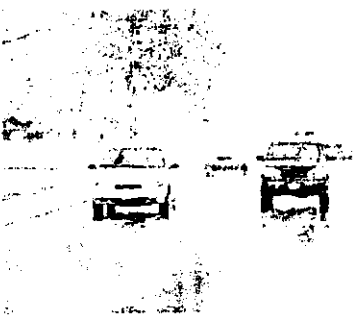


GOALS

It is the goal of the Town of Truckee to provide a level of service to the community, which will ensure the safe and efficient movement of vehicle and pedestrian traffic during snowfall/icing events.

- * PUBLIC SAFETY - Maintaining traction is very important to safe traffic flow, sand and salt is a vital part of our winter operation.
- * ENVIRONMENTAL PROTECTION - Abrasives used for winter road maintenance have a negative environmental impact on air quality and can clog storm drains.
- * REDUCING COST - The Town must use sand and salt sparingly as it ends up in the Town's drainage infrastructure and has to be removed. This is an expensive and time consuming process.

GENERAL



To make winter roads safe and passable, Public Works personnel may apply sand to provide traction and/or chemical deicers to melt snow on an as needed basis. Sanding occurs on school bus routes and major arterials - typically at intersections, hills, curves and the downtown area.

It is more efficient to have equipment out on the road patrolling areas as the storm approaches than to have operators wait at the maintenance barn for direction. Nothing is as reassuring to motorists as to see sand trucks driving the roadways.

The removal of sand with sweepers is a very important part of Truckee's Public Works snow removal program. Typically the routes are swept after every storm. If another storm arrives before the sweeping procedure is completed, crews will resume sweeping where they left off at the previous storm. It takes approximately three (3) weeks to clean up the sand applied during an average winter storm. The final step comes at the end of the season when all routes are completed, this takes approximately two (2) months to accomplish.

In the early spring unless otherwise stated, the following procedures are used to remove the sand applied during the winter months from our drainage systems:

- VACTOR - To help reduce flooding, the vactor will clean out all drainage inlets and cross culverts on all sand routes as a first priority in the spring.
- BACKHOE DRAINAGE - Routes typically sanded throughout the winter months are the first priority for the back hoe drainage crews in the early spring/summer season. The drainage crew will remove sand and sediment from the ditches on either side of the roadway. This process may take up to two months.
- GRADER DRAINAGE - During the summer months, the grader will be used to pull excess sand from the ditches and shoulders on designated sand routes.

APPLICATION

Salt prevents the bonding of snow & ice from pavement surfaces, permitting more efficient and faster removal of hazardous snow/ice. Salt is harmless to the environment when used and stored properly. Sand increases traction and also being a dark substance attracts sunlight and allows it to melt the snow & ice. Sand is also not harmful to the environment when used and picked up properly.

Public Works uses a standard 10% mixture of salt to sand to improve traction and accelerate melting. Plow operators are instructed to apply varying amounts of sand to salt mixture depending on the demands of the storm.

The following are the Public Works guidelines for conditions vs. mixture:

<u>CONDITION 1</u>	
Temperature 30° Precipitation Light Snow Road Surface Wet/Slushy	<ul style="list-style-type: none"> • Plow Entire Lane • Full Width Application • Apply 10% Mix • On Hills, Curves and Intersections
<u>CONDITION 2</u>	
Temperature 30° Precipitation Heavy Snow Road Surface Accumulation Of Snow	<ul style="list-style-type: none"> • Plow Entire Lane • Use Full Width Application • Apply 10 % Mix • On Hills, Curves and Intersections • Supervisor Call to Use 50/50 mix on Hills, Curves or Hazardous Zones at either full width application or windrow application. Leave material on roadway until pack turns.
<u>CONDITION 3</u>	
Temperature 20° or less Precipitation Light Snow Road Surface Accumulation Of Pack	<ul style="list-style-type: none"> • Cut Pack • Apply 50/50 Mix or Straight Load • Windrow Application • Allow material to build 3" – 6" before plowing and reapply

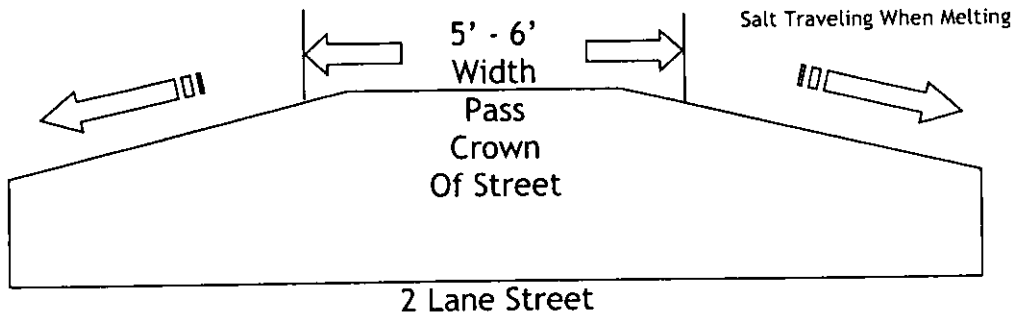
METHODS

WINDROW APPLICATION

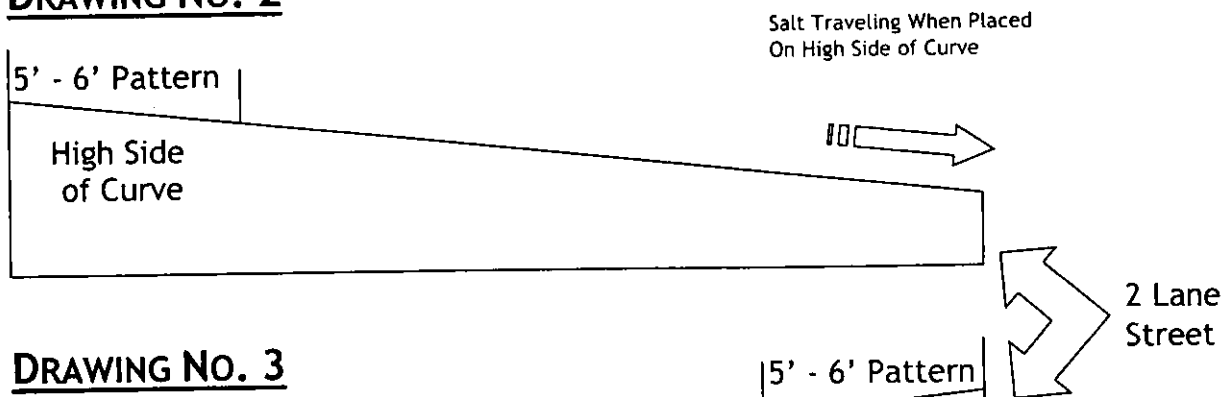
To be used with straight salt or magnesium chloride or with 50/50 mix. It is mainly used on two lane travel ways with medium to low traffic volumes and other specifically designated sections. These sections are areas where the operator can safely apply the material down the center of the roadway or on the high side of a curve. This enables the vehicles in both directions to run one (1) wheel through the mix and allows for the mix to distribute gradually down across the roadway. Application approximately 6' - 8' wide - slow spinner speed is necessary for the thickness required. Examples would be: Northwoods Blvd, West River Street, Glenshire Drive, Donner Pass Road and Brockway Road.

WINDROW APPLICATION

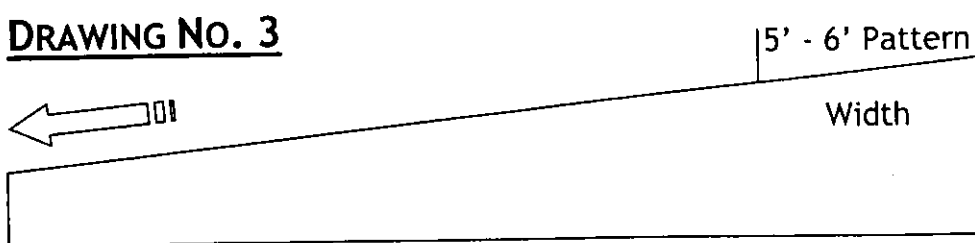
DRAWING NO. 1



DRAWING NO. 2



DRAWING NO. 3

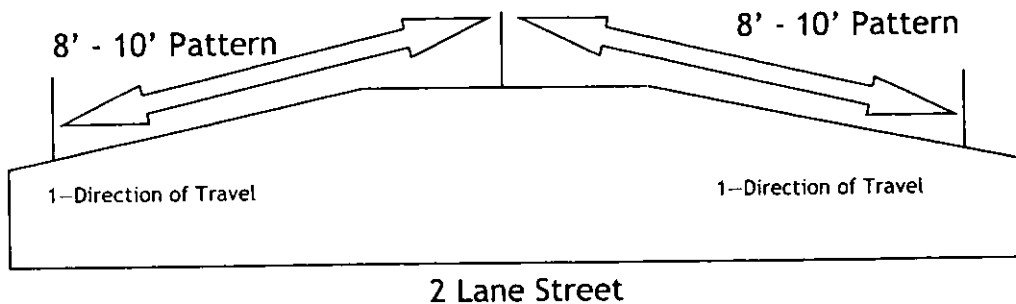


FULL WIDTH APPLICATION

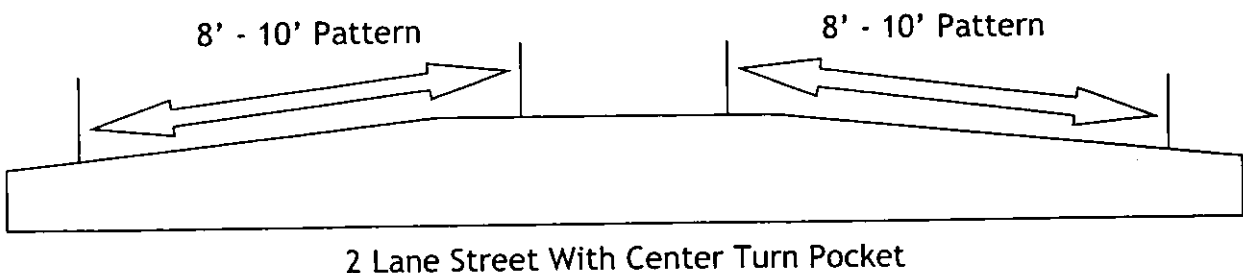
To be used with 50/50 mix of salt or magnesium chloride or with regular 10% mix. This is mainly used on multiple lanes with turn pockets, intersections and bridges with medium to heavy traffic. Operators must be able safely stay in the travel lane and apply material on the roadway where necessary. This application rate is usually the width of travel lane (12 feet wide), spinner speed is generally fast enough to spread material thin. Examples would be: Donner Pass Road and *Brockway*.

FULL WIDTH APPLICATION

DRAWING NO. 4



DRAWING NO. 5



MAINTENANCE

The first step in vehicle maintenance is to be sure every operator knows what to expect of each piece of equipment. The following is a list of procedures for operators to assure a safe driving environment as well as minimize equipment breakdowns.

- Operators should do the typical DMV inspection on their assigned equipment, paying special attention to the attachments required for snow removal.
- On the back of each sand sheet is a list of operator's responsibilities. Anything beyond this will be the mechanic responsibility.
- Use the proper chain of command when talking with mechanics. Many times they are busy with an assigned project that has priority over others. Drivers may need to use a back up piece of equipment until the mechanic is able to provide the necessary repairs.
- Follow the schedule for lubing the equipment carefully. This is located on the back of the sand sheet.
- Salt may damage the bed of the trucks if not removed. Steam clean the trucks weekly.



PLOWS

- Operators should check the plow to see if it sits level and flat on the ground, even while turning from left to right.
- Assure that the hoist chains are fastened correctly and the hoist cylinder is not leaking.
- Check that all pins are preset and secured properly.

-
- Cutting edges are brittle and pieces will break off. The cutting edge should be checked at the beginning as well as several times throughout the shift. The cutting edge as well as the plow should also be checked if the operator hits a hard object such as a manhole cover.
 - When operating the control from within the cab, operators should be aware not to raise and lower the plow too quickly or drop the plow. The plow should only be turned right to left when it is on the ground.
 - Cutting edges should be changed at the sand barn when convenient. If the operator must use the main shop, make arrangements with the mechanics first. Follow proper procedures for changing cutting edges; different blades require specific combinations of 3' or 4' carbide sections. Operators are responsible for cleanup of the shop or sand barn when completed.

SAND BOX

- Operators should walk around and climb onto equipment for a complete inspection.
- Pay special attention to the following items:
 - Check grates on top and headache rack for damage.
 - Look down the conveyer chain checking for broken links or turn on the conveyer and stand at the back watching the links as they go around.
 - Look at the back gate and adjustment screw checking to see that it works.
 - The spinner, chute and adjustment flaps should be all in working order.
 - Unroll the tarp and check for holes and rips.
 - Check the fenders and braces.
 - Check all electrical on back of the box.

CHAINS

The following procedures should be followed prior to operator putting chains on the truck racks or placing chains on equipment tires.

- At the beginning of the shift, chains should be checked by laying them out on the ground. Spread chains out and examine for damage. Repair or throw out into the junk pile all damaged chains sections.

- Operators should be aware of where new chains are stored as well as where the junk pile is located.
- Proper procedures for applying sand truck chains should be followed.
- All sand trucks use chain ASV 97.
- Once chains have been placed on required tires, briefly drive around the yard checking to see if additional slack can be taken in before heading to route.
- Chains should be checked again after operator has finished plowing a small portion of their route.
- If at any time the chains begin to 'slap' against the truck, stop immediately and investigate. Broken links can cause major damage to the aluminum fuel tank after just a few revolutions. Fiberglass fenders or break lines may be torn off.
- At the end of the day repair all broken chains and put back on the truck. Remember, chains do not have to be put on at the shop. A safe wide spot along the road may save precious time keeping the roadway safe for travel. Additionally, if at the end of your shift, snow is beginning to accumulate and your equipment is not chained up, go ahead and put chains on for the next shift. The next operator will appreciate the effort.

SPREADER CONTROLS

The sand truck is equipped with two (2) dials regulating the conveyer and spinner speed. Also, in the rear of the box is an adjustable door and chute flaps. All of these items adjust together to affect the application rate.

Operators should work with a qualified person in order to set these specific rates. Too much sand being applied may be wasted, while too little may not be safe. Operators should also be aware that sand on a dry road may make unsafe driving conditions.

ELECTRICAL EQUIPMENT

Over the years, the Town has had several problems related to the electrical system. Trucks are equipped with many lights and switches. It was determined that overloading the system was causing much of the stress. These basic rules should be followed:

- Sand lights located on the back of the box should be used only when sanding. These lights should be turned off when plowing or traveling.
- The light at the bottom of the chute needs to be turned on only when the driver will be doing a lot of backing, such as plowing an intersection, or when the sand pattern needs to be checked for consistency.
- The headlights may be used as necessary. There are lower and upper sets of headlights. Be aware the blade covers the lower set, leaving the upper as the main lights. Headlights should be shut off if the truck is temporarily parked to fuel, run in the shop or getting another load of sand.
- Parking lights may be left on if needed.
- Emergency flashers should only be used for a broken down vehicle and not when driving.
- The back up lights should be activated automatically when the vehicle is in reverse.
- For safety reasons, the rotating beacon on top of the vehicle should be on at all times. This is the only light that is legal to run at all times.
- An electrical problem may occur when the truck is temporarily parked while the wipers and heater is on. The wiper blades may melt to the windshield, leaving black streaks. Heavy draws on the electrical systems is hard on the alternator and batteries.
- Tires are usually changed by the mechanics, but you may be asked to help. Make sure that a torque wrench is used to tighten the lug nuts.
- Special attention should be made when checking wheel studs and nuts. Double check and look for cracked rims or holes that are enlarged or not uniform.

- When using an automatic transmission, It is necessary to use a lower gear when plowing and pulling hills. Back off on the accelerator when you hit the flats, this keeps the transmission from constantly shifting back and forth. Every time the transmission is placed in a higher gear than needed, it will shift down causing your wheels to spin and loose traction.

SANDING SPECIFIC AREAS

Typical sand routes are determined by school bus routes, major arterials and historically dangerous routes. Total lane miles of sand routes are approximately 30 miles. These routes are highlighted on a map and listed on a sand sheet document that records when they were sanded or checked. Additional areas sanded on a shift, such as an accident location are also noted on the sand sheet. Special handling of specific sites includes applying extra deicing agents to accelerate the melting process.

Besides the designated sand routes, there are a few specific sections to be aware of:

Tahoe Donner

- Northwoods Blvd
 - The face (both lanes)
 - S turns above the clubhouse, just below Chamonix
 - The hill coming down to NW/NW from Bernese, by the mailboxes
 - Turn pocket at Fjord
- Schussing Way
 - S Turns
 - Short downhill just before it connects with Alder Creek Rd.
- Fjord- The whole section
- Alder Creek Road
 - Carpenter Creek turn
 - Intersection of Hwy 89

Downtown

- Donner Pass Road
 - All signaled intersections
 - McGiver curve, near nursery
 - Hill heading up to I80 ramps
 - Roundabout

- West River Street
 - At Roundabout intersection
 - S turns by guardrail
 - Stop sign at Brockway Road/West River Intersection
- Brockway Road
 - Hilltop grade
 - Signal at Palisades
 - Signal at Hwy 267

Sierra Meadows/Ponderosa Palisades

- Hill on Ponderosa down to Palisades.
- Palisades Drive from Jeffrey Pine to Brockway
- Stop sign at Martis Valley Road/Brockway

Prosser Areas

- Stop sign at Alder Drive/Beacon
- Downhill curve on Beacon, top and bottom
- Prosser Dam Road. Intersection Hwy 89/stop sign
- East Alder Creek Road intersection/stop sign at Hwy 89
- Rainbow/Pine Forest intersection

Glenshire Subdivision

- Glenshire Drive
 - Intersection at Donner Pass Road
 - Bridge over the Truckee River
 - S turns to the monuments
 - S turns at Somerset intersection
 - Hill between Wiltshire and Woodbridge
- Somerset Hill between Courtney and Windsor
- Dorchester/Manchester intersection
- Royal Way/Royal Crest intersection
- Royal Way/Donnington intersection
- Donnington/Donnington intersection

METHODS

SAND TRUCKS

- Shifts
 - Non storm condition-8 hour shifts
 - Days - 4 a.m. - 12:30 p.m.

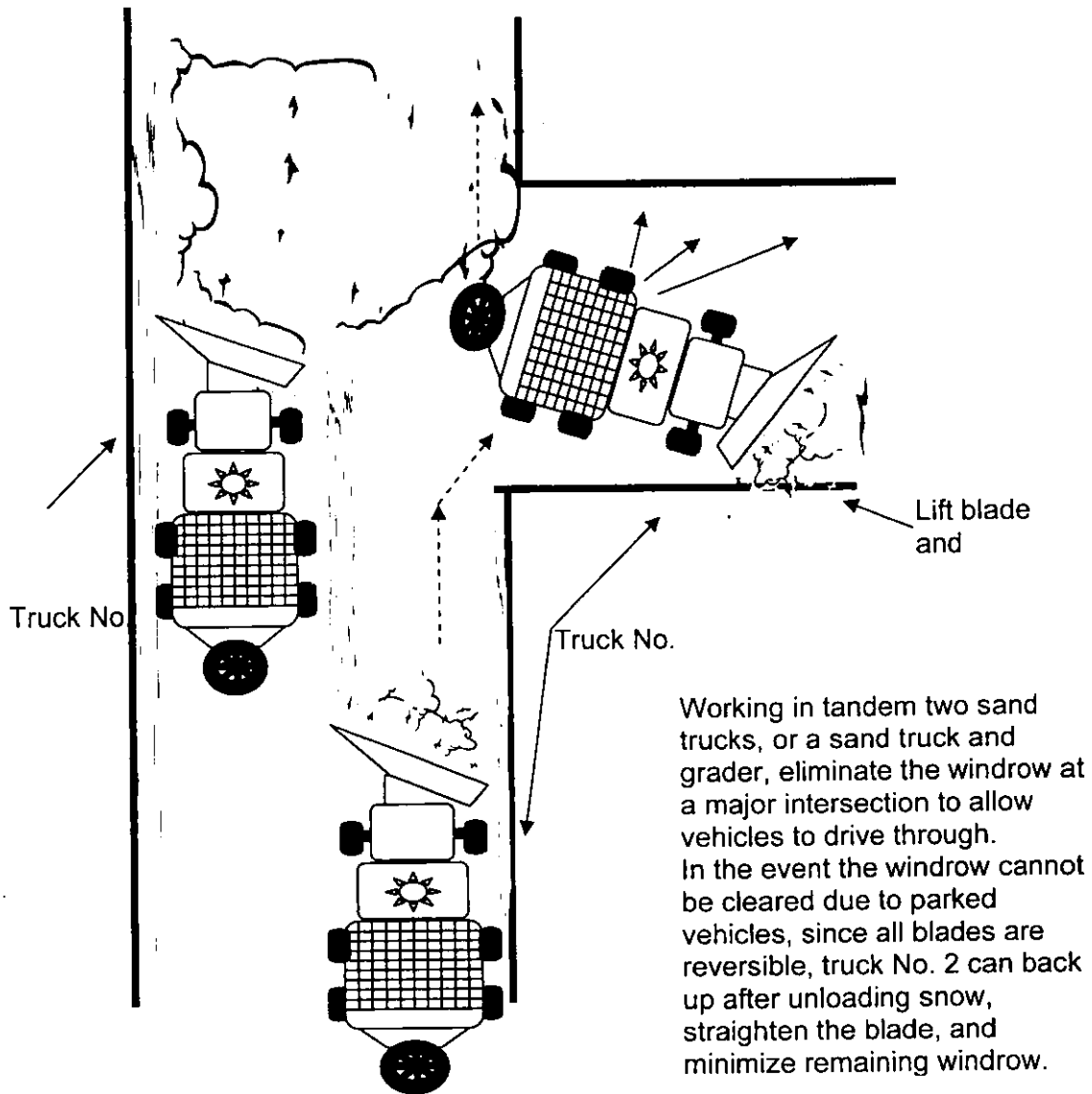
- Nights - 4 p.m. - 12:30 a.m.
- Storm conditions - 12 hour shifts
 - Days - 4 a.m. - 4 p.m.
 - Nights - 4 p.m. - 4 a.m.

PLOWING

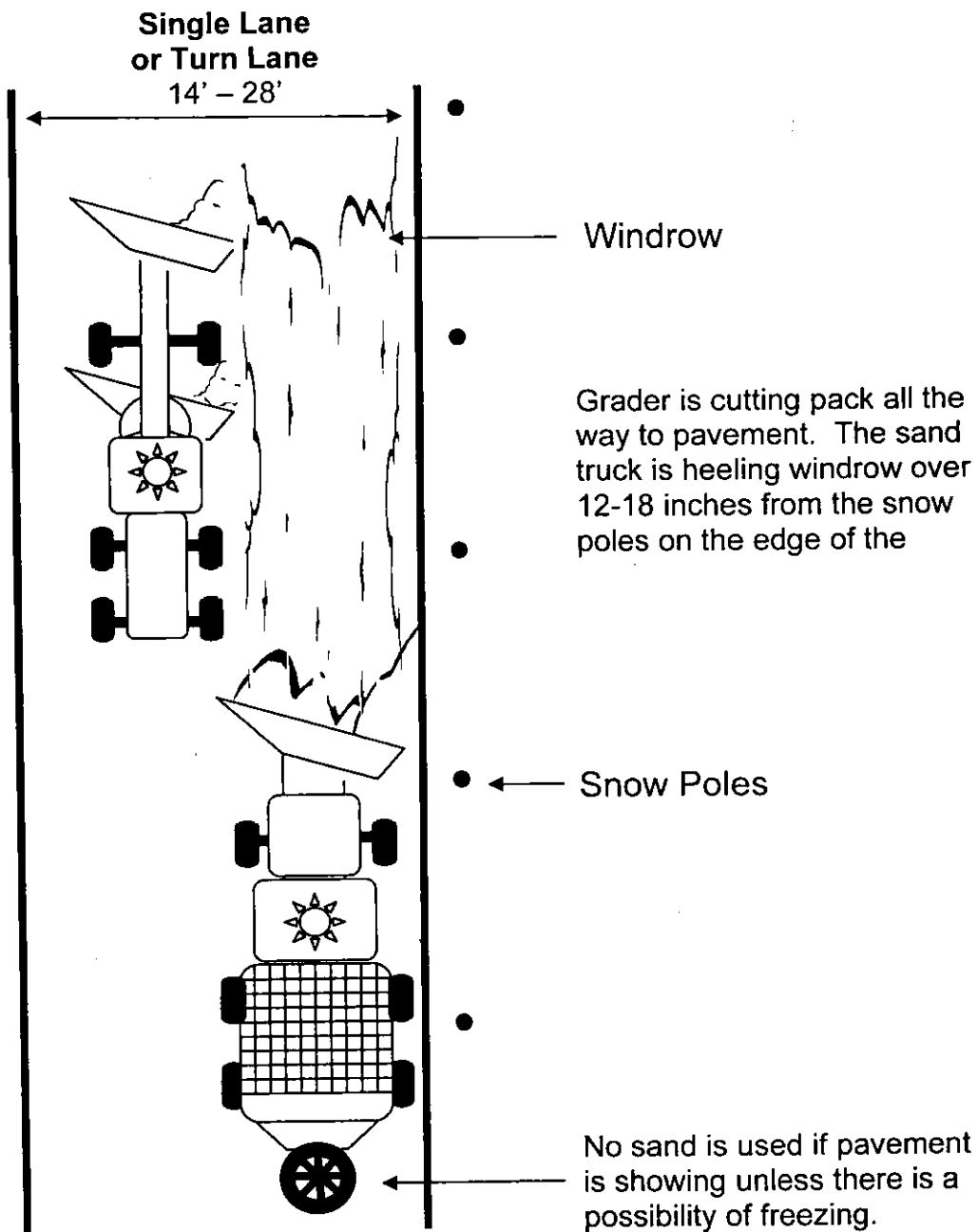
- When authorized by a supervisor, double teaming wider roadways may be scheduled. This can be an effective and efficient method when all other routes are plowed.
 - When double teaming on a roadway, trucks should be staggered to allow traffic to flow between equipment.
 - When snowing, it is more effective to plow a single lane for traffic flow. Later, return to pull from center turn lanes and then take all the way to the snow poles, staying at least 18" away from poles.
-
- To eliminate large berms at intersections on main sand routes, on your last pass turn into the side street and dump your blade off to the shoulder, turn around and plow out.
 - Most major intersections on sand routes will be pushed back with a loader. If not, ask the operator assigned to that route to make you some room. Sand trucks are not built for pushing major amounts of snow at intersections.
 - The intensity and water content of the snow varies in the Sierras. Cold snow with low water content will tend to leave pack. In these conditions we mainly plow & sand. Snow with high water content tends to go to pavement after one pass.
 - NO matter what kind of snow you are dealing with, your speed will determine the distance the snow is thrown from you blade. Wet snow tends to travel farther leading to more damage and complaints. Remember to keep your speed down in these conditions.

Double Teaming Sand Trucks At Major Intersections

Single Lane With Windrow at Intersection



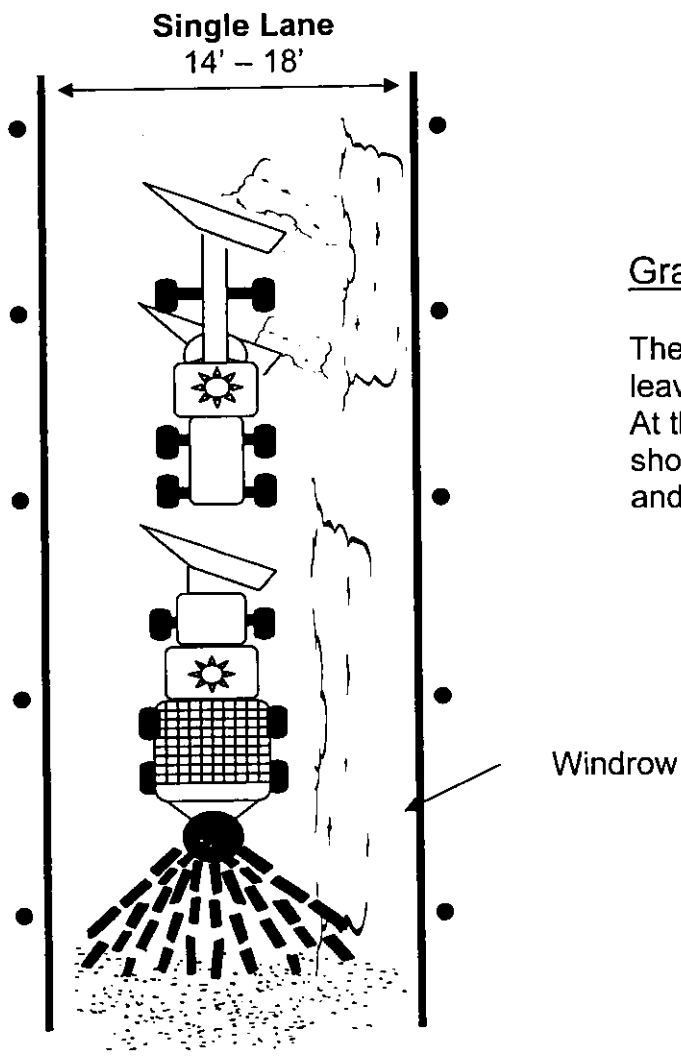
Grader Cutting Pack/Sand Truck Heeling



CUTTING PACK

- Day shift will commonly run 10 -12 hour shifts even on sunny days to cut pack.
- At major intersections, try to keep the windrows at a safe height.
- Depending if pack is coming up or not, when following a grader one of two scenarios is used:
 - Apply sand to roadway because road is slick and/or
 - Carry windrow over.

Grader and Sand Truck Cutting



Grader and Sand Truck

The grader is cutting pack and leaving a thin layer of ice behind. At the same time, the sand truck should lay sand, mainly on hills and curves.

CHAINING

- Don't be afraid to chain up all around especially if it is snowing heavily.
- Chain up before you leave the shop. Taking a special trip back to the shop to chain up after you have begun your shift is a waste of time.

HAULING

- Night shift will regularly be scheduled for 10-12 hour shifts to operate the dump trucks in Town hauling snow from the Commercial Row area. This process is also used for hauling sand into the yard.

SWEEPING

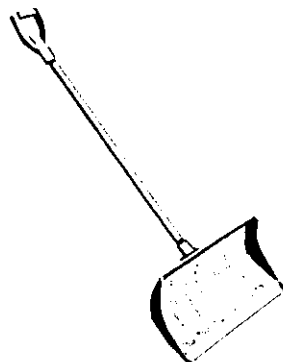
- Sweeping will begin at the supervisor's discretion and will be done on a regular basis between storms.

EQUIPMENT

Specific equipment is assigned to individual sand routes. The larger truck (209) is assigned to the larger routes that include wider roadways, i.e. Donner Pass Road & Brockway Road. The smaller trucks (211,212,213) are equipped with four wheel drive and are designed to maintain shorter routes in the smaller subdivisions, i.e. West End of Donner Lake and the Town route.

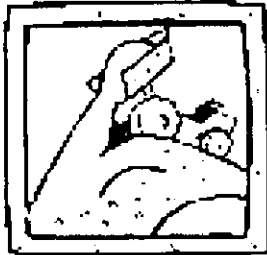
Trucks #214 & 215 are used for hauling sand from Teichert's. Don't forget to turn in your sand tags!

When sweeping, we use equipment #337 & 338. A ten wheeler is used in tandem for dumping. Another vehicle may be used as a safety buffer.



SAND/SALT STORAGE

SAND BARN



For storing sand and salt, the Town uses a 40 x 60 metal building located at the Riverview yard. The heated building has 4 foot concrete stem walls and a metal roof. The inside of the building is split into two sections; one side for salt storage and the other for storing sand with a 10% salt mix.

The barn will hold approximately 500 tons of sand and 300 tons of salt, depending on how well it is stacked.

The barns drainage system directs all runoff on asphalt w/ a-berm dikes to an underground sediment/oil vault with a 20'x 20' overflow sediment basin. This vault is regularly cleaned.

This building is designed for storage only. Because of the low roof height, no loading or dumping is allowed inside the building.

SAND DELIVERIES

Sand will either be trucked by the Town or contracted with an outside hauler for delivery. The sand will be dumped just outside the sand barn door. Before unloading, clean out in front of the barn to cut down on any moisture from mixing into the sand.

The sand should be mixed with salt using 1 bucket of salt for every 2 - 10wheeler loads of sand. One bucket of salt weights 4180 lbs (2 tons) and one truck off sand weights 12 tons. Afterwards, the mixture will be bucketed or pushed into the barn.

Use caution when loading the sand. The pile should be as high as possible without damaging the structures ceiling, stem walls, door, etc. When pushing the sand, try taking $\frac{1}{4}$ - $\frac{1}{2}$ bucket loads, this will reduce windrows forming. Please attempt to keep all sand out of the salt section of the barn.

Occasionally the day crew may haul during their shift and may leave the loads on the ground for the night crew to put in the barn

It is very important to collect all delivery tags and bring to the supervisors or crew leaders office.

SALT DELIVERIES

The salt is delivered in a conveyer style trailer that dumps out the back end of the trailer. Each of these loads runs approximately 24 tons. The driver is able to back his trailer into the barn and unload. Occasionally the hauler will need assistance with guiding the trailer back into the barn.

Salt should be placed into the barn ASAP and only on rare occasions (weather/forecast permitting) should be unloaded outside. Again, clean out in front of the barn as well as possible to avoid moisture mixing with the salt.

Occasionally snow removal contractors for the Town may come to the yard to pick up salt or sand. Please take the time to count the buckets loaded or loads taken and then notify the supervisor. The contractors usually contact the Town prior to picking up the sand/salt, but occasionally they forget.

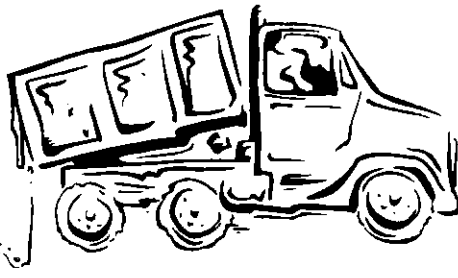
It is very important to collect all delivery tags and bring to the supervisors or crew leaders office.

LOADING TOWN SAND TRUCKS

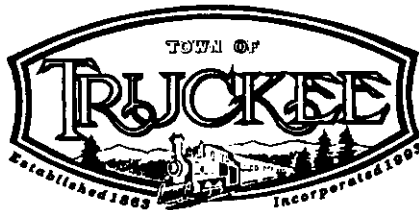
All loading is done outside of the sand barn. The truck is parked perpendicular to the front of the building and loaded. Loads should not be piled above the grates. Never use the loader bucket to smash clumps of sand or remove snow, damage to the grates will occur. All loads must be tarped, reducing the chance of freezing. The truck beds are slightly heated, but if a load freezes it takes extensive work to hand chip them free of debris.

At night every effort should be made to load on the opposite side of the building to avoid shining the equipment headlights into the adjacent residential area.

If you have to park a sand truck outside, please unload the left over material into the sand barn and then tarp the truck bed. This will eliminate snow from accumulating in the bed.



If there is room in the shop or sand barn, with the supervisor's permission, you may park the equipment inside.



TOWN OF TRUCKEE SNOW REMOVAL GUIDELINES

CONTENTS:

- General Information
- Methods
- Application
- Equipment
- Maintenance
- Training
- Communication
- Contract Areas
- New Areas
- Trade Out Areas
- Snow Dump
- Misc.
- Flooding
- GPS
- Corresponding Guidelines

GOALS

The primary goal of the Town of Truckee's Public Works Department is to provide for the safe and orderly movement of emergency equipment, vehicle traffic and pedestrians throughout the community during winter months, especially during storm periods.

In an effort to achieve the Town's goal of safe snow removal operations, priorities are set as conditions change to establish an efficient and safe order of snow removal

PRIORITY ORDER

- * Support for emergency agency responses.
- * Main arterial and school bus routes..
- * Secondary residential streets.
- * Cul-de-sacs.
- * High elevation areas subject to high winds.

GENERAL



During the winter months, the Department of Public Works will monitor the weather and street conditions daily. Storm conditions will vary due to temperature, wind, snow moisture content and snowfall amounts. Over 30 miles of street or designated as main arterials and bus routes requiring immediate and sometimes continuous plowing and sanding.

All department personnel shall be available for snow and ice control operations. The Town may utilize seasonal personnel and contract services to assist with the snow removal operations as necessary. Town crews removal snow from approximately 153 miles of street within the Town.

The Town has enacted a winter parking ban effective from November 1 - April 30 of each year. This ban prohibits parking in or on the Town roads and rights-of-way. The purpose of this winter parking ban is to allow winter maintenance crews unobstructed snow removal and ice control routes, as much as possible, to maintain the maximum effectiveness of their efforts.

In the event of equipment failure, extreme snowfall or other unanticipated events, deviation from these standards may be appropriate at the discretion of the Supervisor.

The Town of Truckee owns several facilities located within the Town of Truckee limits: Town Hall located in the airport center; the Depot located on Commercial Row; the old Nevada County yard located on West River Street; the Martis Shop and the Tahoe Donner Shop. Snow removal operations are run mainly from the Martis Shop using the Tahoe Donner Shop as a satellite office. The Martis yard contains an office building, shop, sand barn and animal control facilities. .

METHODS

ROUTES

Each operator has an assigned route. After you receive a map of your route, you will drive it to become familiar with streets, drainage and special circumstances. Make notes of these special areas and be sure to talk to the driver on the opposite shift about anything new that comes up. After each operator is familiar with their specific route, adjacent routes will be introduced. Many times operators will be asked to help out in the adjacent areas. Lastly, each operator will be shown all of the town/Tahoe Donner routes.

Sand routes are run with sand trucks, however you may be asked to help out by cutting pack or clean intersections while traveling to your area.

EQUIPMENT

There are many varieties of snow removal equipment; loaders, blowers, graders, sand trucks, sweepers and smaller trucks with blades. Each piece of equipment has its 'specialty' and should be used when necessary. Know where the specific parking spaces are located for each piece of equipment.

Loaders -

Our loaders consist mainly of cats, JD's and case. Most of the loaders have an additional bucket and two to three different blades available (12', 13' and 14'). Over the years, loaders have been purchased and put into particular routes. For example: JD624 is used in the Town routes because of the narrow streets. The larger loaders are used on the wider streets, this helps keep the size of the berms consistent throughout the town.

Graders -

There are two graders in the Town fleet; one John Deere and one Caterpillar. Graders are intended to be used solely on the sand routes.

They tend to leave very large berms and are designed to cut pack and make one very wide pass. Most times, a sand truck will run behind the grader cleaning up the berms where needed. As the grader moves throughout different routes, the designated sand truck should be contacted and used.

Blowers -

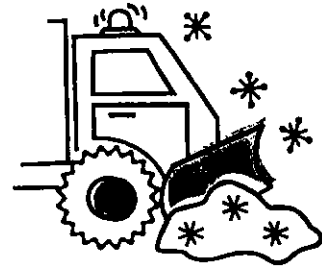
We have three different models of blowers in our fleet; (2) 966 & 2700 ton Snowblast; (3) 950 & 1500 ton Snowblast, (3) Caterpillar/JD & Kodiak blowers and (1) Oshkosh blower. Each unit has its' designated area. Most of our blower work is performed in Tahoe Donner because of its high volume of snow. They are designed to move snow from the bank or windrow and throw it into the designated snow storage areas.

PLOWING

- Loaders need to be shoveled off especially around the blades. In the past cylinders have been bent because of snow and ice build up.
- Operators should check the plow on sand trucks to see if it sits level and flat on the ground, even while turning from left to right.
- Check that all pins are preset and secured properly on equipment.
- The most efficient method of plowing a route is to turn right at every intersection then turn around at main roadways.
- Most equipment has a maintenance book with a lube chart. Some have equipment specific charts.
- Please stay a minimum of 12 inches from the snow poles keeping a single windrow. We will let the snow blowers get closer if needed. Avoid pushing behind, weaving in and out and knocking down snow poles. We replace approximately ____ poles each year.
- At intersections, keep the snow pushed back where possible avoiding street signs, fire hydrants and power poles. This is also a good time to clean out any nearby DI's.
- When authorized by a supervisor, double teaming wider roadways may be scheduled. This can be an effective and efficient method when all other routes are plowed.

- When double teaming on a roadway, trucks should be staggered to allow traffic to flow between equipment.

- When snowing, it is more effective to plow a single lane for traffic flow. Later, return to pull from center turn lanes and then take all the way to the snow poles, staying at least 18" away from poles.



- To eliminate large berms at intersections on main sand routes, on your last pass turn into the side street and dump your blade off to the shoulder, turn around and plow out.
- Most major intersections on sand routes will be pushed back with a loader. If not, ask the operator assigned to that route to make you some room. Sand trucks are not built for pushing major amounts of snow at intersections.
- The intensity and water content of the snow varies in the Sierras. Cold snow with low water content will tend to leave pack. In these conditions we mainly plow & sand. Snow with high water content tends to go to pavement after one pass.
- No matter what kind of snow you are dealing with, your speed will determine the distance the snow is thrown from you blade. Wet snow tends to travel farther leading to more damage and complaints. Remember to keep your speed down in these conditions.
- The right-of-way varies in each subdivision. Find out what the right-of-way is in your area so you can be aware of where you can store snow. For example, Tahoe Donner has mostly a 60' rw. This means you may measure out 30' from the center of the roadway to find the appreciate property line. Tahoe Donner also has a 20' snow storage easement on each side. This means that 20' inside the property line may be used for snow storage. You may not take a piece of equipment into this area, but you may push or blow snow into it.

ROAD TYPE	EXAMPLE	# OF PASSES
10 Ft Lane	<ul style="list-style-type: none"> • Sierra Meadows • Ponderosa Pal • Meadow Park • Armstrong • Rex Reids • West End 	<p>2 Passes</p> <p>(Unless otherwise instructed by foreman)</p>
12 + Ft Lane	<ul style="list-style-type: none"> • Donner Pass Rd • Northwoods • West River • Brockway <p>(These roads are usually classified as main arterials and grader routes).</p>	<p>3 Passes</p> <p>(Unless otherwise instructed by foreman)</p>

- When operating the control from within the cab, operators should be aware not to raise and lower the plow too quickly or drop the plow.
- When plowing, keep in mind the areas that you will be storing snow when you are blowing your route.
- Remember the closer you stack snow to the roadway, the higher the banks will become. However, be cautious not to store snow on private property.
- Good guy/bad guy - if the weather forecast allows, we should not be leaving a berm during the clean up phase. The foremen will make that decision before each shift.
- When a shift is unable to complete their route, it is very important that the next shift takes up where the previous shift left off before starting at the beginning of the route. This assures no one street is missed during a storm.

-
- Each operator must fill out a daily plow map showing streets completed, date and equipment # used. All plow routes have a specific route to follow, unless directed by supervisor, there should be no deviations.
 - Check out sheets must be completed on each piece of equipment.
 - Please steam clean your equipment every other week. If your equipment is located in Tahoe Donner please check with supervisor before cleaning.
 - The cab of each rig should be cleaned out of trash, grease, etc. If you have been working outside, use a different set of gloves when inside the cab reducing the amount of grease on the controls. To keep the seats clean, when working outside the cab, be aware of the grease/dirt on your coveralls before entering the cab. Please have the courtesy to smoke outside your rig, not everyone is comfortable around cigarette smoke. If running in slush during the day, common courtesy is to clean the windows for the night guys. They will appreciate the effort!

BLOWERS

- Snow should be completely shoveled off the equipment before going into service. All blowers must be shoveled off at end of shift whether parking inside or out.
- Blowers will cut one side of Tahoe Donner 1st, staying 12"-18" from poles. After all routes are completed begin double cutting where you left off. Crews will be working 10-12 hour shifts until this part of the clean up is completed. If a Tahoe Donner blower is down and the Town routes are not completed, finish at least on cut of Town before sending the blower up top.
- If necessary, after 1st cut a loader may be needed before second cut is started.
- Talk to your foreman before cleaning out driveways with blades, a bucket may be the best choice.
- It is very important not to deviate from the designated plow route. This helps reduce the chances of missed streets.
- Contract areas should be checked after other routes are completed.

-
- Blower maps from each operator must be completed and dated after each shift. A master blower map with dates and equipment numbers must be filed with daily storm documents.

CHAINS & CUTTING EDGES

The following procedures should be followed prior to operator putting chains on the truck racks or placing chains on equipment tires.

- Operators should be aware of where new chains are stored as well as where the junk pile is located.
- New chains are stored in the sand barn. You may use this building to chain up or change cutting edges if the main shop is full. Be careful entering the sand barn, the door is very narrow.
- At the beginning of the shift, chains should be checked by laying them out on the ground. Spread chains out and examine for damage. Repair or throw out into the junk pile all damaged chains sections.
- Chain up before you leave the shop. Taking a special trip back to the shop to chain up after you have begun your shift is a waste of time.
- Once chains have been placed on required tires, briefly drive around the yard checking to see if additional slack can be taken in before heading to route.
- Chains should be checked again after operator has finished plowing a small portion of their route
- Don't be afraid to chain up all around especially if it is snowing heavily.
- If at any time the chains begin to 'slap' against the equipment, stop immediately and investigate. Broken links may cause damage to the aluminum fuel tank, hoist cylinder, hydraulic tanks and brake lines.
- At the end of the day repair all broken chains and put back on the equipment. Remember, chains do not have to be put on at the shop. A safe wide spot along the road may save precious time

keeping the roadway safe for travel. Additionally, if at the end of your shift, snow is beginning to accumulate and your equipment is not chained up, go ahead and put chains on for the next shift. The next operator will appreciate the effort.

- Check tire pressure
- Cutting edges must also be maintained. Put an actual wrench on each bolt at the beginning of the shift and replace if necessary (less than ½"). If you are unsure, ask your supervisor. Ask for assistance to change edges, the operator taking your place is a good choice. Be extremely careful not to get into the mold board, it is a costly and time consuming procedure to repair. On the other hand, do not change too often. We document each cutting edge changed, so please let your supervisor know.
- Loosing a chain or cutting edges must be reported immediately. Try to back track to find it. The cost for repairing a blower damaged by something like that could surpass \$5000.
- Cutting edges should be changed at the sand barn when convenient. If the operator must use the main shop, make arrangements with the mechanics first. Follow proper procedures for changing cutting edges; different blades require specific combinations of 3' or 4' carbide sections. Operators are responsible for cleanup of the shop or sand barn when completed.
- Cutting edges are brittle and pieces will break off. The cutting edge should be checked at the beginning as well as several times throughout the shift. The cutting edge as well as the plow should also be checked if the operator hits a hard object such as a manhole cover.

FUELING

If the Tahoe Donner fuel system is not working, use the clipboard inside the building to document fuel/equipment used. All bulk tank deliveries need to be recorded too. We are reimbursed the fuel tax for all fuel used in the blower units, so it is very important to keep the documentation separate and accurate.

Loaders and blowers run about 8 hours on one tank of fuel when pushing heavy snow. We try to schedule someone to come to you with fuel, so do not travel a long distance back to the shop to fuel up. An exception would be if your route is close to the shop, use common sense.

Please read the safety procedures located on the fuel dispenser tank for an accidental fuel spill.

SHIFT AND SCHEDULES

- Non snow event days - 8 hr from 7-3:30
Snow event days - 12 hours from 6 - 6
- Non snow event nights - 8 hr from
Snow event nights - 12 hours from 6 - 6
- Schedules vary from Tuesday - Saturday/Sunday -
Thursday/Monday - Friday.
- Year to year operators shifts may vary. The goal is to have all drivers stagger from day to night shift, but this is not always possible.
- When the weather is continuously nice, night shift may move to a temporary swing shift schedule.
- Standby will be used when a storm is possible but not inevitable. Please be aware of how stand by works in our department.
- Vacations requests are approved on a case by case basis during the winter season. Supervisors will look at crew availability, storm forecasts and other factors.
- **Big weather events**

Temporary Seasonal Employees -

- The normal temporary start date is sometime during the end of October or the beginning of November. This may vary from individual to individual, but you must not exceed 1000 hours each fiscal year.
- Temporaries do not receive holiday pay. Every effort will be made to allow the operators to make up the lost time.
- The normal temporary lay off date is March 31st, This may vary from individual to individual.

MAINTENANCE

The first step in vehicle maintenance is to be sure every operator knows what to expect of each piece of equipment. The following is a list of procedures for operators to assure a safe driving environment as well as minimize equipment breakdowns.

- Operators should do the typical DMV inspection on their assigned equipment, paying special attention to the attachments required for snow removal.
- Follow check out sheet procedures at the beginning and end of shift.
- Use the proper chain of command when talking with mechanics. May times they are busy with an assigned project that has priority over others. Drivers may need to use a back up piece of equipment until the mechanic is able to provide the necessary repair.
- If your equipment has a mechanical problem, call a supervisor and /or mechanic. Explain the best you can the type of problem you are having; broken line, tires, gauges... If the breakdown is haz mat related, refer to the appropriate guidelines. There are some small spill kits in blowers. When calling over the radio, use appropriate codes. There are many people who scan our radio channel.
- When asking mechanics for last minutes repairs or assistance, ask Bret or Marlin first. It is important to follow the chain of command. Don't hesitate to ask your supervisor if you are unsure.

TRAINING

- All new operators are required to take the orientation class with video.
- If possible, schedule to complete your loader certificate, forklift certificate and work zone safety.
- Drive all plow routes dry.

SAFETY

- There is bi-weekly safety meeting on topics with a pick list of important simple topics such as fire extinguishers, steam cleaner, driving to fast, accident reports, keeping equipment clean.... Topics may be assigned. Each meeting may last 30 minutes to 1 hour.
- Tailgate meeting in field or conference room.
- The locker room and restroom is located in the main shop. The office building also has a men's & ladies restroom.
- The break room located in the main shop contains many important items: Material Safety Document Sheet (MSDS); Workers Right to Know; keys for all equipment; a large area map; small area maps of routes; first aid supplies; equipment check out books; television and safety videos; a library of safety manuals; and employee mailboxes. The door to the break room is a good place to check for recent memos and important information. Please check it frequently.
- The main office building contains administration and support staff.
- Find out where the MSDS, Workers Right to Know and Workers Comp information and fire extinguishers are located within the shop.

-
- Daily plans are made and passed on in the foremans office located in the main office building. Maps, Workers Comp paperwork, accident reports and statement of facts are all located in the main office building.
 - The most common accidents with equipment are:
 - Hitting vehicles parked in the right-of-way.
 - Hitting vehicles/homes with blower debris.
 - Snow from blades damaging vehicles/homes when traveling too fast.
 - Damaging driveways when back dragging.
 - Damaging driveways while plowing.
 - Damaging landscaping.
 - Watch your speed. Larger vehicles may appear to be going faster than they actually are. We receive numerous complaints from citizens on this matter.
 - When plowing, be aware of vehicles and trailers parked on the shoulder.
 - Be extra cautious when backing up in intersections.
 - Be aware of where propane tanks on private property are located. It is very dangerous to bury these tanks.
 - Please notify your supervisor if you are injured on the job. Paperwork needs to be completed within 48 hours after an injury. If you need immediate doctors' care, let your supervisor know and they will get you to the doctors ASAP. If it is not an emergency, you will need to make an appointment with occupational health.
 - Please know the proper procedures for dealing with Hazardous Material spills.
 - All temporary employees will receive the following safety material:
 - Hard Hat
 - Safety Glasses
 - Flashlights
 - Safety Vest

OTHER

- Temporary employees should be familiar with the Martis shop, Tahoe Donner shop and Town Hall locations.

-
- Get to know the names of other employees as well as what their duties are.
 - Know where to find copies of plow maps and incident reports.
 - Become familiar with who your "opposite" operator is. Talk to them frequently.

COMMUNICATIONS

- Keep radio chatter to a minimum. Be familiar with the ID codes and use where appropriate. Swearing on the radio is not acceptable at any time.
- Keep in mind that many citizens have scanners and listen to them frequently. Watch what you say.
- Personal hand held scanners.
- It is dangerous to use cell phones while operating your equipment. Keep personal calls to a minimum.
- If you have a question out in the field, be sure to follow the chain of command.
- Communicate with your direct supervisor.
- Do not call Police Department directly unless you are unable to contact your supervisor. Talking with dispatch should be your last resort.
- When talking with the public be polite and brief. If they have questions, direct them to the office number or give their name and number to supervisor at the end of shift.
- Complete all plow route maps at end of shift
- Lets keep the competition between the day and night crew at a minimum, even when it is in fun, sometimes it can go too far.

CLEANING TOWN/SNOW DUMP

There are specific maps of where downtown piles should be located and their priority. Be familiar with all of them. We will be using the new Cal Trans snow dump this year. We are negotiating the lease purchase of the pond east of Cal Trans for future snow storage area.

FLOODING

Occasionally after a couple of weeks of constant snow, a warm system will move in bringing rain to our area. Drainage systems may be blocked with stockpiles of snow, causing the water to follow the blower cuts. At this point it is necessary to remove snow with a backhoe around the drainage inlets, allowing the water to run off the roadway. Punching holes along the snow banks will also help with the drainage. Trucks may also be used to haul snow from stockpiles blocking drainage. Ditches full of slush and snow can be cleaned out to allow the system to function properly. Be aware that once a ditch or DI is cleared, slush may reappear quickly causing the same blockage. Remember; do not store snow in or on major drainage infrastructures.

GPS

GPS is a relatively new concept in snow removal operations. The process involves bouncing a signal to a satellite which sends it back to a computer. The computer is loaded with a map of the plow routes, allowing the office to see where plows are located in a real time mode.

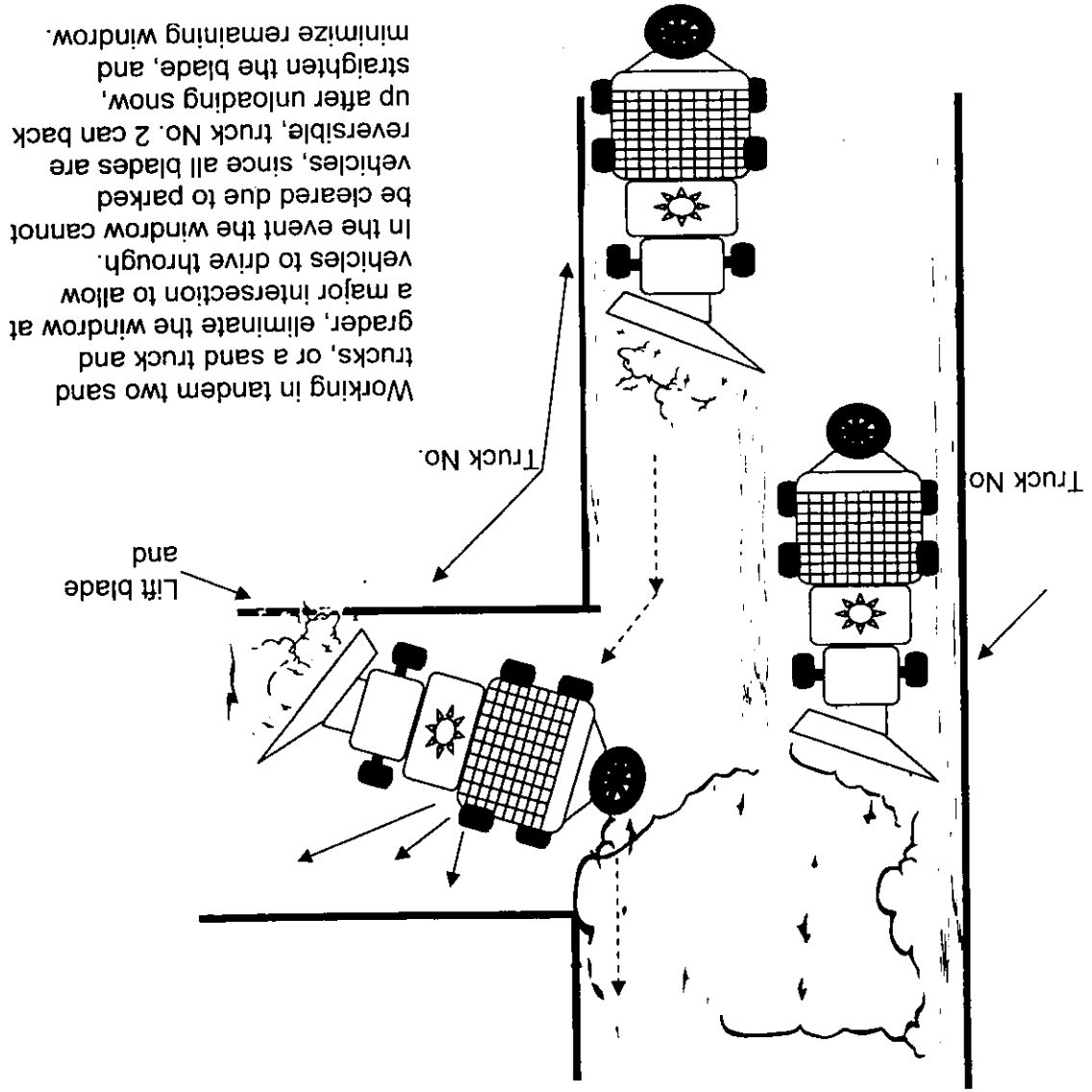
There are many advantages to using this system for snow removal operations. Here a just a few

- Answering the accusation that a road has not been plowed. The office would be able to inform the citizen of exactly when the plow had cleared their roadway.
- Being able to determine if a Town plow or private contractor had been responsible for berming in a particular driveway.
- Being able to respond to inquiries with the statement that we have GPS and are currently looking at the data available. This will give the citizen a sense of having current information, not just guesses.
- Being able to track the routes of blowers to determine if private property damage was due to private or Town equipment.
- Sensors on the vehicles are able to show speed, whether the blade was up or down, direction traveling, engine running and door open or closed.

-
- The ability to print up maps at the end of the shift showing equipment routes and miles traveled.
 - The data may be stored for future reference on the computer for as long as needed:

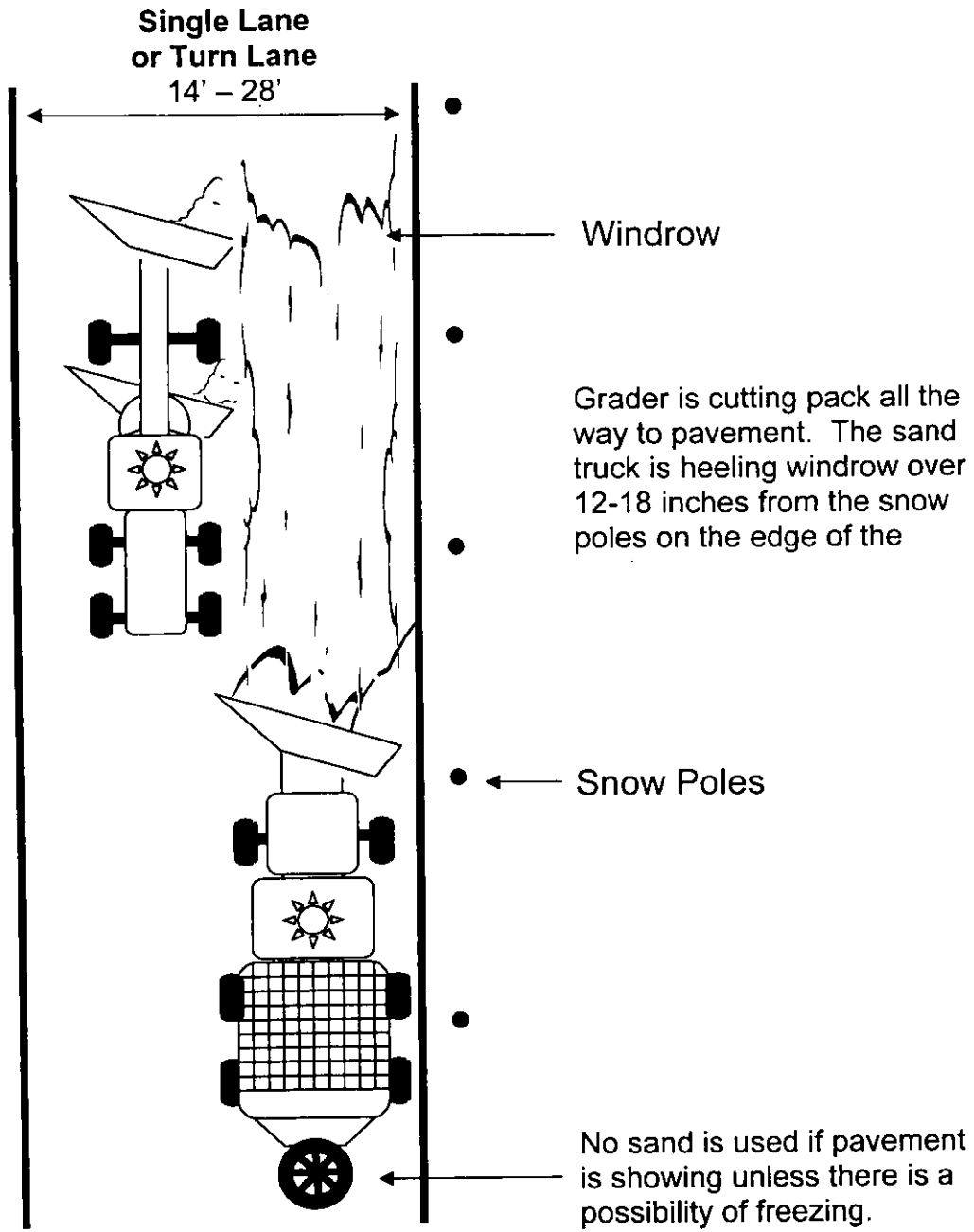
Double Teaming Sand Trucks At Major Intersections

Single Lane With Windrow at Intersection



Working in tandem two sand trucks, or a sand truck and grader, eliminate the windrow at a major intersection to allow vehicles to drive through. In the event the windrow cannot be cleared due to parked vehicles, since all blades are reversible, truck No. 2 can back up after unloading snow, straighten the blade, and minimize remaining windrow.

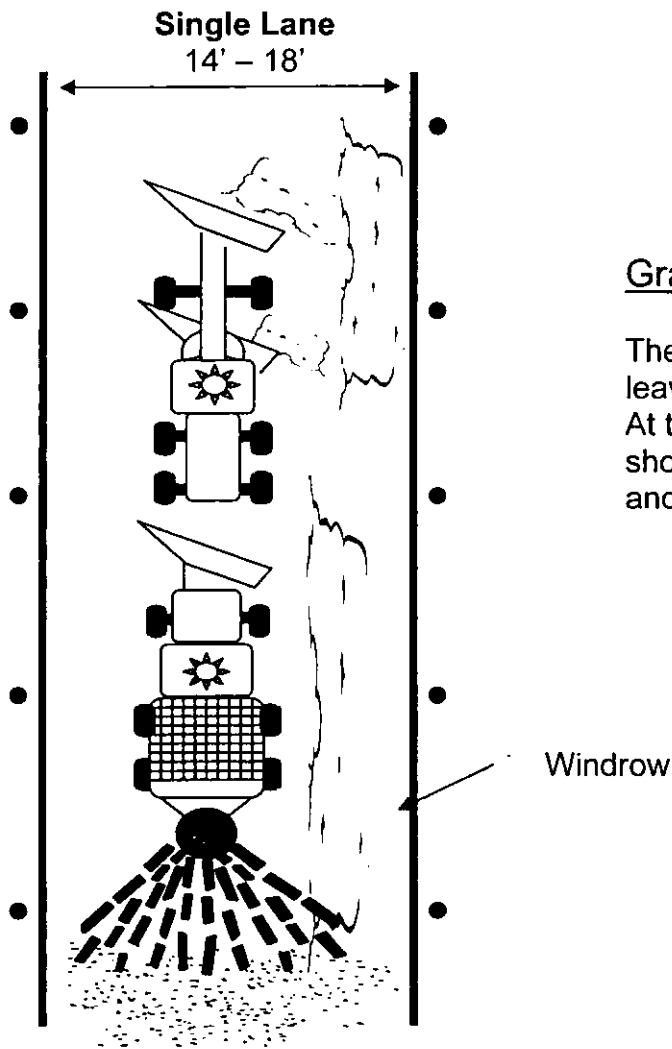
Grader Cutting Pack/Sand Truck Heeling



CUTTING PACK

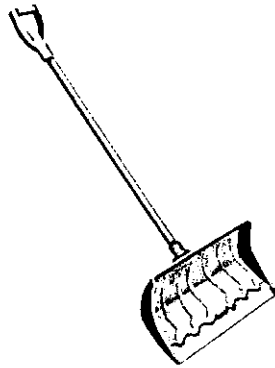
- Day shift will commonly run 10 -12 hour shifts even on sunny days to cut pack.
- At major intersections, try to keep the windrows at a safe height.
- Depending if pack is coming up or not, when following a grader one of two scenarios is used:
 - Apply sand to roadway because road is slick and/or
 - Carry windrow over.

Grader and Sand Truck Cutting



Grader and Sand Truck

The grader is cutting pack and leaving a thin layer of ice behind. At the same time, the sand truck should lay sand, mainly on hills and curves.

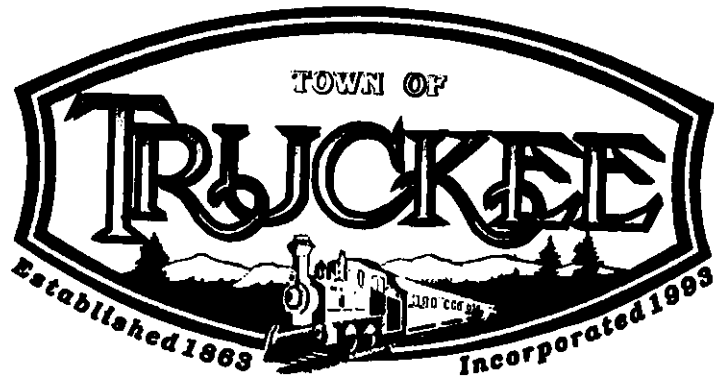


COORESPONDING GUIDELINES

- Haz Mat Clean Up-
 - Most common with blowers
 - Most important is proper clean up and documentation.
- Snow poles installation
 - What the color codes on poles indicate
 - How close to plow to the poles
 - Where they are located
 - Avoid hitting/damaging poles, very costly to replace
- Sand and Salt Guidelines
 - Grader cutting pack
 - Blowers widening routes
 - Routes, where they are
 - Clean out intersections
- Chains and Cutting Edges

APPENDIX: H

Erosion Prevention and Maintenance Guidelines



EROSION

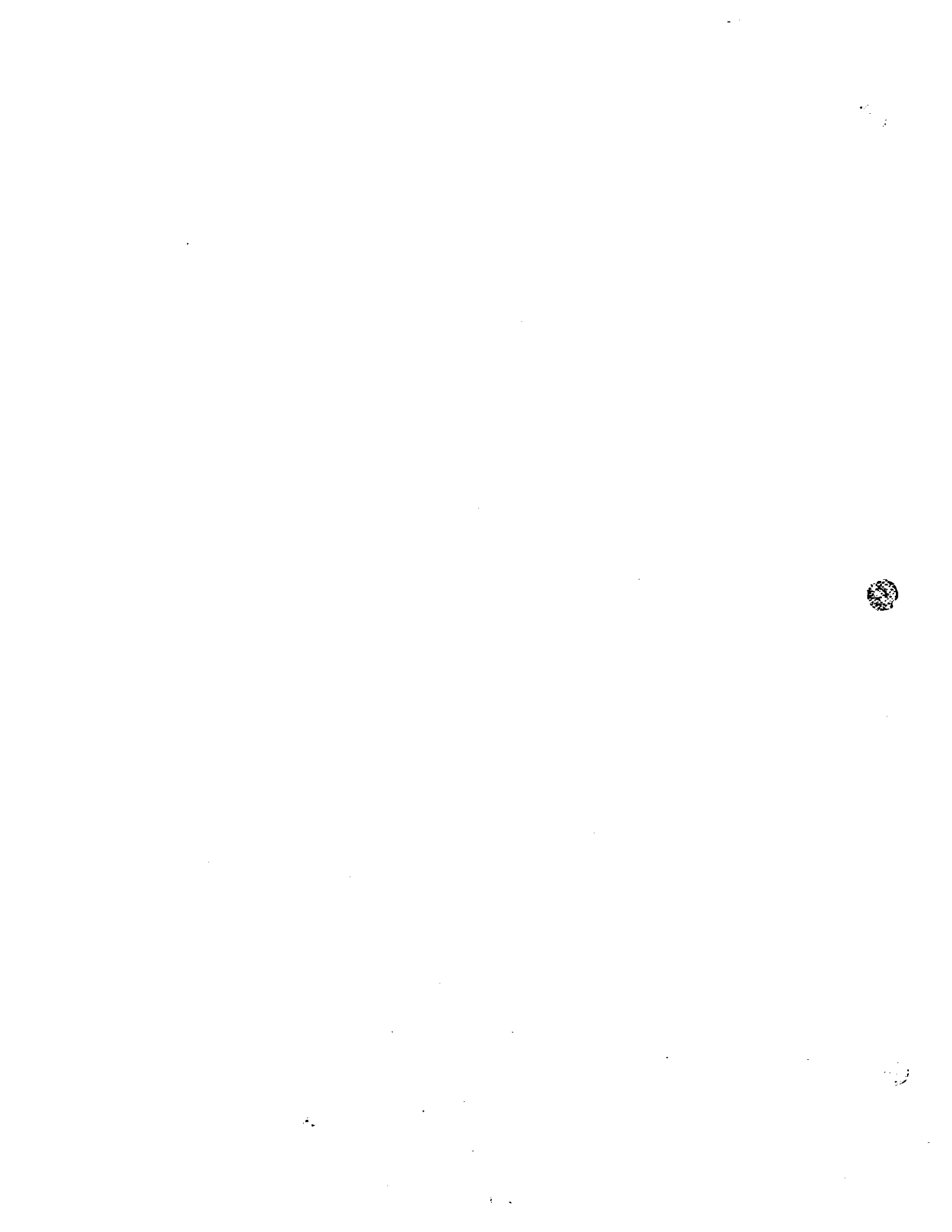
PREVENTION

&

MAINTENANCE

GUIDELINES

Community Development Department (530) 582 - 7820



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Resources: For Extra Help

Books, Classes and websites.	Attached
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Hall of Shame

Pictures.	Attached
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Chapter 1

Temporary BMPs for Construction Sites

When sediment-laden runoff flows from construction sites and into lakes and rivers, the nutrients attached to the sediment spur algal growth. The small or "fine" sediment particles also remain suspended in the water. Both algae and fine sediment reduce lakes and rivers clarity. Construction sites are especially susceptible to erosion due to the nature of the activity, which disturbs large areas of soil and vegetation, leaving it vulnerable to erosion. Therefore, construction sites are required to have temporary Best Management Practices installed BEFORE any disturbance occurs.

What are temporary BMPs?

Temporary BMPs are practices and structures used to prevent or minimize erosion and sedimentation before and during construction and until permanent BMPs have been installed. Temporary BMPs are installed before the onset of construction and must be maintained until all construction activity is completed and/or until permanent BMPs

are installed. Temporary BMPs must be sized to control runoff for the 20-year/1-hour storm, which is approximately one inch of rainfall in an hour in this area. If properly installed, temporary BMPs can prevent the discharge of degraded runoff water from construction sites.

What is the difference between erosion and sediment control?

Erosion control includes practices that keep soil particles in place by protecting them from being eroded by water or wind. In this approach, soil is valued as a natural resource that needs protection. (See photo of mulch below).

Sediment control includes practices that try to capture soil particles after they have been



The 1-2 inch layer of decomposing pine needle mulch controls soil erosion.

picked up by wind or water. These BMPs usually try to filter or trap sediment out of the water or wind. Sediment control does not treat soil as a natural resource to protect, but instead emphasizes removing it from runoff, then redistributing it or disposing of it safely. (See photo of silt fence and fiber roll log below).

The silt fence and fiber roll log will remove sediment from runoff if a rainstorm occurs.



Which is the easier and cheaper approach: erosion or sediment control?

Erosion control is generally less expensive. Once soil is suspended in water, it is costly and difficult to remove. Also, if you violate surface water discharge standards, you are liable to pay a fine according to federal, state and local laws. Ultimately, erosion control practices should be "backed-up" by sediment control practices, increasing the protection of the construction site.

When do I need to install temporary BMPs? A siteplan prepared by a certified professional is required.

Installation of temporary BMPs is required on all sites where the vegetation and soil will be disturbed. Temporary BMPs are site-specific, must be constantly maintained, and are usually good for only one year or one winter season. Some of the BMPs named here are intended for construction that involves more disturbance than most residential BMP implementations will create. However, ANY time soil is disturbed, temporary BMPs are required to prevent sediment from leaving the site.

What are the maintenance needs of temporary BMPs?

Temporary BMPs require much more maintenance than permanent BMPs. Due to their temporary nature, these practices usually require daily checking, especially during clearing and grading activities. They should also be checked immediately before an impending storm and after the storm has passed. Sediment that accumulates behind temporary BMPs must be removed and stabilized onsite.

When should I start thinking about BMPs for my construction project?

You should start thinking about BMPs during the planning phase of your project. With proper planning, disturbance to a construction site can be minimized and managed. By staging your construction process carefully, you can reduce how much area you disturb. Additionally, by phasing stages of your project, you can disturb less area at one time, minimizing the threat of serious soil loss.

What temporary BMPs need to be in place BEFORE I start construction?

Temporary Construction Site BMPs

Before you start construction on a project, the following BMPs need to be properly installed and must remain in place until all construction activity is completed and/or until permanent BMPs are installed:

1. Boundary Fencing is temporary fencing used on the construction site to mark the limits of clearing and grading and to define areas which must be protected. Boundary fencing is used in order to minimize disturbed areas, to protect trees and vegetation and to prevent any encroachment in stream environment zones, on steep slopes or in other highly sensitive areas.

2. Traffic Control is the control of onsite traffic during construction activities, especially during the clearing, grading and excavating phases of site development. Areas where construction vehicles can travel must be well marked with flagging, markers and/or temporary fencing before construction activity begins. This can be combined with boundary fencing. The following guidelines need to be considered:

- ❑ Locate construction roads where future roads, driveways, and parking lots will be.
- ❑ Store materials and park equipment where permanent parking areas will be.
- ❑ Avoid sensitive areas such as steep slopes and stream zones.
- ❑ Avoid areas planned as future open space to prevent compaction of soils. Keep traffic away from wet soils.
- ❑ Clean wheels of construction vehicles before they leave the construction site.
- ❑ Create a temporary stabilized construction entrance and roadway by providing track off control.



- ❑ Use the minimum number of temporary routes to access the construction site.
- ❑ Sweep and/or scrape any dirt and mud off public streets at the end of the workday, and store sediment onsite with a temporary sediment barrier.
- ❑ Do not allow vehicles to travel over exposed soils when they are muddy.

3. Stabilized Construction Entrance consists of a pad of crushed stone or gravel located at any point where construction traffic enters or leaves the site. This pad reduces the tracking of sediment off of the disturbed site. When necessary, washing of vehicle wheels to remove sediment before leaving the site will be conducted on this type of stabilized crushed stone pad, with an approved sediment barrier in place to trap water and sediment. The entrance pad should consist of 1 to 3 inch diameter, clean, crushed stone or gravel, at least 3 to 4 inches deep or however deep necessary. The entrance must be maintained, which may require periodic addition of crushed stone or gravel to the surface. If the construction site already has a paved or stabilized entrance that will be used as the only point of ingress and egress, or if trucks and other heavy equipment will not be used onsite, a stabilized construction entrance is not necessary.

Boundary fencing around construction sites prevents vehicles and equipment from damaging adjacent vegetation and habitat.

4. Dust Control is the control of wind blown soil or other materials from construction sites or soils. Dust control practices are required for all grading activity. There are a variety of methods to control dust, including:

- ☛ Sprinkle the exposed soil surface with water as needed to keep the surface moistened to a depth of 2 to 3 inches.
- ☛ Mulch the area with 1 to 2 inches of pine needles.
- ☛ Establish a vegetative cover on bare soil surfaces using native and or adapted species.

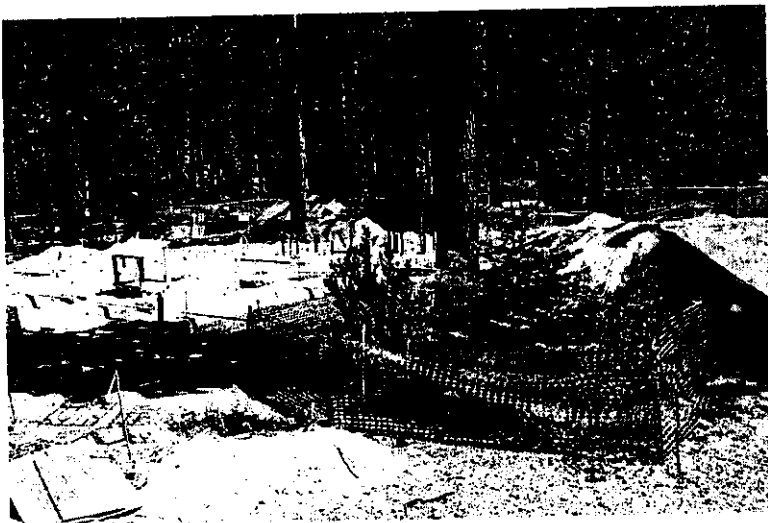
Vegetation is the most effective practice to stabilize disturbed, bare soils not exposed to construction traffic. Sprinkling is the least effective of the practices and has to be repeated several times a day. Sprinkling also increases the probability that soil particles will be entrained in water, increasing the need for effective temporary sediment barriers to prevent any sediment-laden water from leaving the site. **Please note: Organic mulch (such as pine needles) is required on all denuded soil for the duration of the soil disturbance.**

5. Protection of Trees and Other Vegetation involves installing temporary fencing or other barriers along the dripline of tree and other vegetation's branches to prevent disturbance to the vegetation itself as well as the root system. Protective fencing for soil and vegetation must be constructed with metal posts, industry standard mesh fencing, and must be at least four feet in height. Boards, wire, rope or other materials should not be nailed to trees and fill materials should not be placed next to the trunk of a tree that is designated to be saved. Trees and other vegetation outside of the grading limits will be protected by the boundary fencing and do not need individual protection.

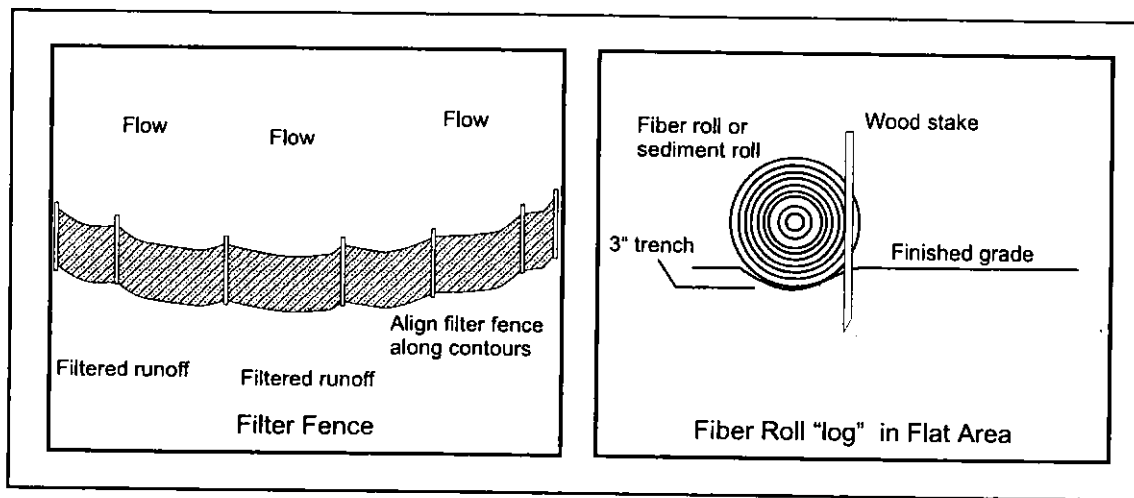
What temporary BMPs do I need to use to prevent sediment from leaving the construction site?

Temporary sediment barriers are structures constructed to slow runoff and trap small amounts of sediment temporarily. Temporary sediment barriers must be installed around the downhill perimeter of disturbed soil areas. Historically, straw bales have been used as temporary sediment barriers. However, due to their limited ability to effectively trap sediment and the danger of noxious weeds being introduced by their use, they are no longer recommended for use in the Truckee Area. Instead, use **one or more** of the temporary BMPs listed below:

Protective fencing is used to protect the root systems of trees on construction sites. This fence should be further from the tree. Vegetation fencing is required to extend around the full dripline of the tree.



1. Fiber roll barriers (also called sediment logs) usually consist of milled wood or other natural fibers sewn into a circular weave fabric. Fiber rolls are a good perimeter protection BMP, as long as they are installed properly. Fiber rolls should be installed on the contour line, perpendicular to the slope direction, keyed into a concave trench at least three inches deep, and staked securely on both sides of the roll every twelve inches (see diagram next page). When two rolls are installed abutting



each other, the ends should create a tight joint to prevent sediment from escaping.

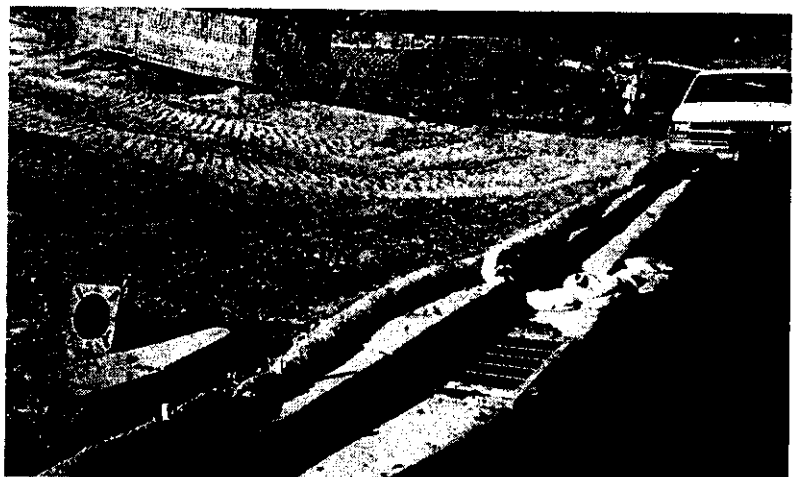
2. Filter Fence consists of a permeable filter fabric that is keyed into the ground at least 6 inches deep, backfilled with dirt or gravel, and staked along the contour line below the disturbed slope (see diagram above). The fabric pools the runoff, causing the sediment to be dropped behind the fence while the water slowly filters through the fabric. This BMP is widely used, but unfortunately is often installed improperly and ineffectively (see the Temporary BMP Hall of Shame attached for examples.) This BMP should never be installed across stream channels or areas of concentrated flow. The ends of the fence should be installed with a turn uphill to create a "J" shape that will pond water.

3. Drop inlet barriers prevent sediment and debris from entering nearby storm water conveyance systems by slowing runoff and trapping sediment. Drop inlet barriers are temporary devices including gravelbags and drop inlet filters. These devices are intended for use on a construction area with a curb and drop inlet system only.

Gravelbags are bags made of a permeable fabric and filled with clean (washed) 1 to 3 inch diameter gravel. Historically, sandbags have also been used,

but because the fabric bags eventually rip and sand can leak out and become a source of sediment, they are no longer recommended. The gravelbags are stacked tightly in a U-shape abutting the curb and intersecting the flow. When installed properly, the bottom of the U-shape is where the runoff will pool. When the construction runoff is trapped in the U-shape, it slows, ponds, and settles out sediment. Gravelbags can also be stacked tightly around drop inlets to prevent sediment from entering the drop inlet. Accumulated sediment trapped behind the bags needs to be removed often and disposed of properly. Gravelbags also need to be inspected often to ensure that they are trapping the runoff.

An example of tree protection (fence), fiber roll barriers and gravelbags on a construction site in the San Francisco Bay Area.



Drop Inlet Filters are various proprietary BMPs designed to capture sediment as it enters a drop inlet and filter it out of the runoff. They are usually designed to fit inside the drop inlet itself, attaching in different ways to the inlet and the grate. Drop inlet filters are used as a secondary line of protection only, and do not preclude the need for other required temporary BMPs on the construction site. Examples of brands of drop inlet filters include: Fossil Filter, HydroKleen, DrainPac, Ultra-Urban Filter, and S.I.F.T Filter. Please be aware that the Town of Truckee does not endorse any stormwater products.

What temporary BMPs do I need to use to prevent erosion from bare, exposed soils?

All bare soil areas that are exposed for any amount of time must be stabilized by one or more of the following BMPs:

- ☒ Pine Needle Mulch / Wood Chips
- ☒ Erosion Control Blankets or Geotextiles
- ☒ Chemical Mulches and Tackifiers
- ☒ Hydromulch and hydroseed

Each of the different stabilization methods have various technical specifications that need to be followed to ensure success. For example, pine needle mulch is not effective on slopes of more than 3:1, or 33%, without vegetating the slope as well or adding

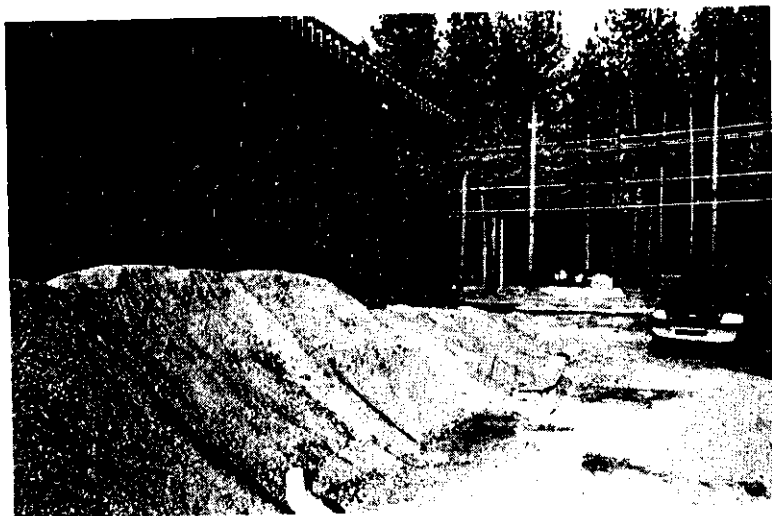
bio-technical stabilization methods.

Also, erosion control blankets and geotextiles need to be installed correctly, which involves stapling them securely to the slope and overlapping the materials correctly to prevent runoff from undermining the material. (See Chapter 3)

If you are unfamiliar with the application of chemical mulches, tackifiers, hydromulch and hydroseed, we recommend that you work with an erosion control specialist until you are familiar with the technical aspects of these practices. For more information on slope stabilization, please refer to Chapter 3: Slope Stabilization. Temporary sediment barriers should be installed below the area that is being stabilized by one of these practices.

How do I protect spoil piles on my construction site?

Spoil piles (piles of excavated soil) that remain onsite one day or longer need to be surrounded by properly installed temporary sediment barriers (fiber rolls or filter fence) and must be completely covered by an impermeable fabric within 14 days. The impermeable fabric must also be placed on spoil piles whenever a storm is impending. This practice will allow rain to flow off of the fabric instead of allowing it to quickly erode the spoil pile. Spoils must be removed from the construction site and disposed of or may be stabilized onsite if used for landscaping.



How do I install temporary BMPs?

Installing temporary BMPs correctly and maintaining them are the two keys to successful erosion and sediment control. We will revisit and demonstrate how to correctly install various temporary BMPs at the outdoor


This spoil pile should be surrounded by sediment barriers (fiber roll or filter fence) and covered completely by plastic sheeting.

segment of the BMP training. To see how NOT to install temporary BMPs, please see the Temporary BMP Hall of Shame in Appendix B.

Always call before you dig

Before any excavation, call 1-800-227-2600 to get a free site inspection to locate any gas or electric lines beneath the ground surface.

Conclusion



Construction activity has a high potential to pollute our surface waters and ultimately rivers and lakes with sediment and other construction debris. With some forethought and diligence, this type of pollution can be prevented. When in doubt, contact a BMP design professional, California licensed Engineer/licensed Landscape Architect who will be happy to come out to your site and discuss appropriate BMPs for your project with you. Remember, you are required to prevent sediment-laden water and wind from leaving your construction site and are liable for fines according to federal, state and local laws should any runoff leaving your construction site be in violation of Lahontan Regional Water Quality Control Board's or the State of California's concentration limits. An ounce of prevention is worth a pound of cure.

Disclaimer


This section does not attempt to discuss all temporary BMPs that may be required or appropriate for construction sites, but rather intends to provide a foundation of basic temporary BMPs that are appropriate in a wide array of situations. Any brand name products mentioned in this chapter are for informational purposes only.

Notes:

Chapter 2

Runoff and Infiltration

Why are infiltration systems needed?



The purpose of infiltration systems is to prevent erosion by infiltrating storm water into the soil. This reduces concentrated flow so that it does not overwhelm downstream systems. Increased urban and residential development has had harmful effects on lake and river water quality. Increased development results in an increase in impervious areas. Impervious areas do not allow water to soak into the ground, but rather cause it to run over the ground, collecting and carrying sediments, nutrients and traces of other pollutants into rivers and lakes. Infiltration systems are installed to reduce

the amount and rate of runoff and its erosive force downstream. Infiltration systems are practices that help large volumes of concentrated runoff soak into the ground, where soils and plant roots can naturally filter out pollutants.

Impervious areas generate runoff

Impervious surfaces prevent water absorption, and cause water to concentrate as stormwater runoff. Types of Impervious Surfaces include:

Roofs - Roofs are impervious surfaces that convey water to eaves or gutters. Water falling

Basic working definitions

Infiltration:	Entry or absorption of water from precipitation, irrigation or runoff into soil.
Runoff:	The portion of rain or irrigation water failing to infiltrate into soil. Surface runoff is the primary cause of soil erosion and nonpoint source water pollution.
Impervious:	Resistant to penetration by water or plant roots. Impervious surfaces create runoff.
Soil Permeability:	Ease with which water transmits through saturated soil, often expressed as a rate; i.e. inches per hour.
Problem Drainage:	Relates to a high water table and the inability of water to be transported through soil.

from eaves or gutters without downspouts typically causes erosion and runoff.

Driveways - Driveways are impervious surfaces that, without the aid of a conveyance and infiltration system, often contribute large volumes of flow to public right-of-ways.

Compacted Soils - Soils that have been walked, driven or parked on regularly are usually compacted enough to prevent water from entering the soil.

Raised decks and stairways - Structures that do not have spaces between wood planks create impervious surfaces where water can run off. If there are spaces between planks, water falling through them to the soil below may cause erosion.

Dog Runs - Paved or not, dog runs become compacted due to concentrated animal traffic and cannot support vegetation.

Patios and Walkways - Runoff from paved patios and walkways can often infiltrate into the adjacent soil if the area is flat and well vegetated or mulched.

What are infiltration systems?

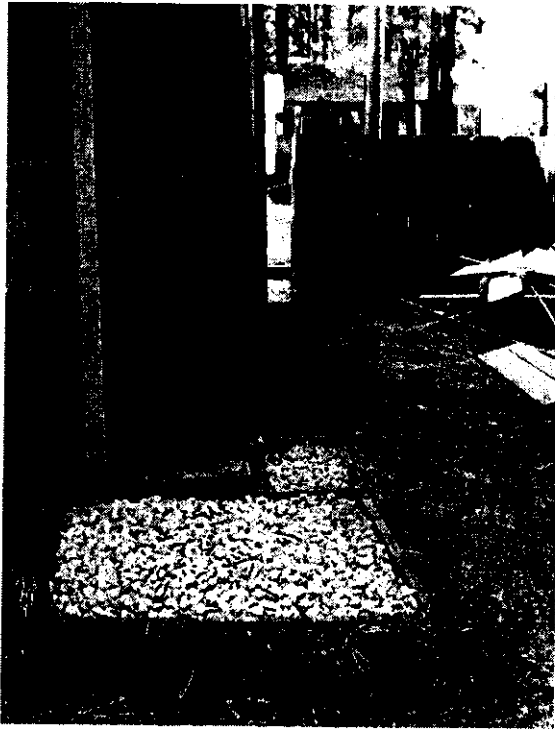
Infiltration systems are structures or planted areas that allow concentrated volumes of runoff from a property's impervious surfaces to soak into the ground. Infiltration systems are often located under roof driplines, under gutter downspouts, at the end of conveyance structures on driveways or adjacent to other impervious surfaces, such as parking areas. All infiltration systems must be sized appropriately according to soil type, soil permeability, and volume of surface runoff. Whenever possible,

naturally vegetated level areas should be protected and used for infiltration. The natural plant-soil complex can usually treat runoff better than any artificial infiltration system. Also, runoff is stored in the vegetated cover. Infiltration systems installed upslope of building foundations should be designed to prevent water damage (see Conveyance subtitle in this chapter).

By infiltrating stormwater into the soil via BMPs, we mimic natural conditions of an undisturbed watershed. As the stormwater travels through the soil, sediment is filtered out and some nutrients may bind to the soil or be taken up by roots. This process helps to purify the water before it reaches any rivers. However, polluted water containing high levels of nutrients or toxic substances like gasoline and oil can contaminate the soil and ground water. Therefore, stormwater runoff containing these toxic substances must be pretreated prior to infiltrating it into the soil. Stormwater collected on residential areas generally does



Runoff from paved surfaces can carry pollutants to rivers and lakes.



This infiltration system captures, stores, and infiltrates roof runoff.

not require pretreatment devices and can usually be safely infiltrated into the soil. If you are concerned that a property may have contaminated stormwater, contact the Town of Truckee Building Department.

Maintenance of infiltration systems

Infiltration systems require maintenance and routine checking to remain effective. Accumulated debris on gravel mulch must be removed periodically. The gravel, rock or prefabricated structures that fill the infiltration system must be periodically removed and cleaned to keep available storage space open. How often an infiltration system must be cleaned is dependent upon site-specific conditions, the frequency and intensity of storms and how well the system was installed.

Infiltration systems trap fine sediments and provide storage space for runoff until it can

infiltrate into the soil. Over time, the systems fill with sediment and fail to work properly. By periodically removing the collected sediments, the system can function at full capacity. It is good to check your BMPs after each storm, in the spring, and just before winter. A visual inspection can determine if the BMPs are functioning properly: run a hose over the system to determine if the water infiltrates or if it overflows and runs off quickly.

By installing a sediment trap upstream of an infiltration system, the life of the infiltration system is prolonged. The extra cost spent installing sumps and clean-outs will be exceeded by the savings of not having to dig up and clean the entire infiltration system.

All systems that are backfilled with gravel should be constructed with maintenance in mind. A simple layer of filter fabric placed near the top of the infiltration trench will catch fine sediments and prevent them from being transported to the rest of the infiltration system. When the system shows signs of clogging, one only needs to remove and sift the top 3 inches of gravel to uncover the fabric. Then carefully lift, roll and discard the clogged fabric. Next, place a new layer of fabric over the trench and replace the sifted gravel. A cleanout port can be used as a means to access storage facilities for easy maintenance.

Common types of infiltration systems:

Underground Infiltration Systems

- Infiltration trenches (prefabricated or gravel)
- Drywells (prefabricated or gravel)

Above Ground Infiltration Systems

- Gravel armoring under driplines on flat or gently sloping land
- Water spreading over flat vegetated or mulched areas
- Infiltration Basins, vegetated or rock-lined
- Grassed or rock-lined swales
- Planter boxes

Common infiltration systems are described briefly below:

Infiltration trenches are shallow rock, gravel, or prefabricated structure-filled trenches located adjacent to impervious surfaces and beneath roof eaves. Their purpose is to infiltrate runoff from impervious surfaces and to prevent erosion. Infiltration trenches are applicable on many sites, but are not appropriate on slopes unless installed along the contour. When on a slope, infiltration trenches not installed level serve as conveyance structures and their infiltration storage capacity is limited. Terracing of the trench bottom and installation of baffles can allow the trenches to operate properly. In locations where the foundation would be negatively impacted by an infiltration trench, a subsurface drain should be placed under the dripline to convey the water away from the structure. Trenches filled with gravel should be bordered with larger rocks or treated lumber to keep it clean and in place.

Drywells are rock, gravel or prefabricated structure-filled pits. Their purpose is to infiltrate runoff from impervious surfaces preventing direct discharge to surface waters. Drywells are applicable to sites requiring additional storage capacity for runoff from impervious surfaces, such as at the end of a conveyance structure on a driveway, or as an alternative to infiltration trenches on slopes. A gravel armored dripline can convey the water down a slope to a drywell at the bottom. They are also applicable at the foot of downspouts. If gravel is used to fill drywells, it should be $\frac{3}{4}$ "- $1\frac{1}{2}$ " in diameter.

Gravel Mulch, also called inorganic mulch, can be used to armor soils in the Truckee Area which have rapid permeability. Soils of this type have the capacity to infiltrate the volume of runoff generated by a typical (19 foot wide) residential roof during

a 20 year/1 hour storm which generates approximately one inch of rainfall. A gravel mulch layer 3" deep and 18" to 24" wide on level land under roof driplines is sufficient to prevent splash erosion and allow runoff to infiltrate without the requirement of additional infiltration systems. The gravel used to armor roof driplines should be $\frac{3}{4}$ "- $1\frac{1}{2}$ " in diameter. For soils with slow or moderate permeability, adequately sized infiltration trenches or conveyance to drywells are required under roof driplines. For defensible space purposes, the gravel mulch should extend under the roof eaves all the way to the foundation wall. In areas of high fire hazard, fire districts recommend inorganic (gravel) mulch five feet out from the foundation wall. Gravel should be contained by a border.

Water spreading over large flat vegetated or mulched areas is another alternative that has advantages for cost, aesthetics, and simplicity. This type of infiltration system should be used when soils are not compacted and have good infiltration capacity. If runoff flows to a flat or gently-sloping, well-vegetated or mulched area with little runoff potential, it will infiltrate naturally. Calculation of the amount of vegetated surface area needed to infiltrate stormwater is currently being researched. Water spreading capacity to infiltrate runoff varies depending on the soil type. Conveyance structures are often necessary to redirect water away from foundations to flat or gently-sloping, well-vegetated areas. Borders may be necessary to prevent water from running off the property (e.g. rock, wood borders or vegetated berms). A major advantage to using natural infiltration is that there is no excavation or soil disturbance. A flat lawn can sometimes function for this purpose.

Infiltration basins are shallow depressions in the ground or areas bordered by berms which are designed to store and infiltrate runoff into the ground. This practice is believed to have a



Above Top: This large infiltration basin treats runoff from a multi-family property. Above bottom: Grassed swales can be used along roadsides and parking lots to collect and treat storm water runoff.

high pollutant removal efficiency and can also help recharge the ground water, thus restoring low flows to stream systems. Like all infiltration systems, they need to be sized for the storage of runoff from a storm of one inch of rain in an hour, based on the permeability of the soil on the site. Shallow basins or bermed areas can also be used as snow storage areas. If used for this purpose, they should be designed with additional capacity so that a rain-on-snow event can be treated. If used to treat runoff from a parking lot where salt is used as a deicer, the area should be planted with salt-tolerant, nonwoody plant species or covered with rock. Shallow basins can also be perched on gradual slopes like water terraces.

Grassed swales. The term swale (a.k.a. grassed channel, dry swale, grassed swale, biofilter, dry creek bed) refers to an open channel designed specifically to convey, treat and attenuate storm water runoff for a specified water quality volume. As storm water runoff flows through a channel or series of channels, it is treated through filtering by the vegetation in the channel, filtering through a subsoil matrix, and infiltrating into the underlying soils. Variations of swales include the grassed swale and rock-lined swale, which can be designed to resemble a dry creekbed with small dams to slow and pool the water. The specific design features and methods of treatment differ in each of these designs, but all are improvements on the traditional drainage ditch. These designs incorporate modified geometry and other features for use of the swale as an infiltration and conveyance practice. Ponds, basins, and swales can all be shaped to meet the aesthetic desires of the owners.

Planter Boxes may be designed to make use of our rare summer rainstorm runoff as irrigation water. They work best on rapid permeability soil. Calculation of storage capacity and treatment capacity of planter boxes is being researched. The planter box itself has capacity to hold water from the soil to the top of the lowest border. The planter box needs to be strong enough to prevent structural failure and displacement of soil in a high flow event. The planter box must be designed to prevent standing water at the



Planter boxes work best on rapid permeability soil.

foundation. If the planter box is raised, filter fabric can prevent the fines in the soil from escaping through gaps in the planter box. Be aware that building codes require a minimum separation of 8" from the soil to the wood siding. Defensible space practices also require low flammability vegetation and inorganic mulch within 5 feet of foundations. Vegetation in planter boxes should be dense and robust enough to stabilize soil by dissipating the energy from roof runoff. The designer can use drywells to supplement the planter box to meet the storage capacity required. They should not be placed where roof avalanches can destroy them.

Use your soil characteristics to design your infiltration system

Infiltration systems will vary from property to property due to the variation in soil characteristics in. The different soil types in the Truckee vary greatly in nutrient content, permeability and drainage properties. If you do not have a site evaluation report, you may determine the soil type on your property by

contacting the Natural Resources Conservation Service (NRCS).

Soil Permeability Rates:

The permeability rate measures the maximum speed at which a soil will absorb water in inches per hour. Any water falling in excess of the permeability rate becomes stormwater runoff, which flows over the soil surface, collecting sediment. Soil drainage problems can occur regardless of soil permeability if the groundwater table is close to the soil's surface or a compacted layer that water cannot penetrate (such as bedrock or clay) lies below the soil. NRCS, or a California Registered Engineer, licensed Architect /Landscape Architect should be consulted before installing an infiltration system.

Calculating volumes of runoff

Calculations are made for a 20 year/1 hour storm event, which roughly equals three quarters of an inch of rain falling in a one hour time period (See Diagram next page).



Original formula for calculating infiltration system storage capacity

(This calculation is already completed on the site evaluation report.)

TRENCH STORAGE CAPACITY IN CUBIC FEET =

$$\left(\frac{\text{width}^*}{12} \times \text{length}^* \times \frac{\text{permeability}^*/\text{hr}}{12} \right) + \left(\frac{2}{3} \times \frac{\text{depth}^*}{12} \times \text{length}^* \times \frac{\text{permeability}^*/\text{hr}}{12} \right) + \left(\% \text{ void} \times \frac{\text{width}^*}{12} \times \text{length}^* \times \frac{\text{depth}^*}{12} \right)$$

The three levels of the above formula are based on the three parts of the trench or gallery to infiltrate stormwater.

- Entire bottom of trench takes on water at the full rate of permeability. Static pressure created by the water stored in the trench is exerted on the bottom soil.
- Sides of the trench only get credit for infiltrating 1/6th of the wetted wall of the trench.
- Void space created in the drywell is credited for storage volume.

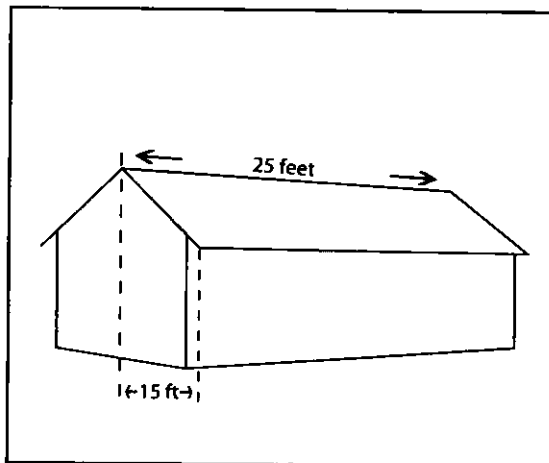
Runoff Calculations

The volume of runoff produced by the design storm is calculated by the design professional. To compute it yourself, use the formula below, or use the spreadsheet developed by NRCS. Call (530) 543-1501, ext.104.

Note: Distances are measured horizontally. The coverage that produces runoff is a flat plane projection or a plan view (roof area ft²).

(roof area ft²) x ^{3/4}/12 foot of rain = volume of runoff ft³

(25ft x 15ft) x ^{3/4}/12 foot = 31.25 ft³ of runoff for half of the roof



Different materials can fill subsurface infiltration systems

Infiltration trenches and drywells can be filled with different types of materials. The most commonly used materials to fill infiltration systems are gravel or prefabricated infiltration units. Prefabricated infiltration units are made of materials that provide a rigid structure with a large void space available to store water. This space within the infiltration system is called void area, which allows water to be stored beneath the ground surface until it completely infiltrates into the surrounding soil.

Different materials have different amounts of void areas, referred to as percent void. $\frac{3}{4}$ to 1 $\frac{1}{2}$ inch graded gravel, for instance, has roughly 33 percent void space, while some prefabricated structures have up to 95 percent void. The percentage of void space is based on the volume of open storage space that exists in the infiltration system in proportion to the total volume of the completed infiltration system.

Two commonly used infiltration system materials are contrasted below.

Rock infiltration systems have been used for many years. They are a tested method for infiltrating excess water. While effective, their drawbacks are numerous. As stated above, rock typically has only 33 percent void space, so in order to infiltrate a required volume of runoff, the excavation for an infiltration system filled with rock must be almost 3 times larger than one filled with prefabricated infiltration materials,

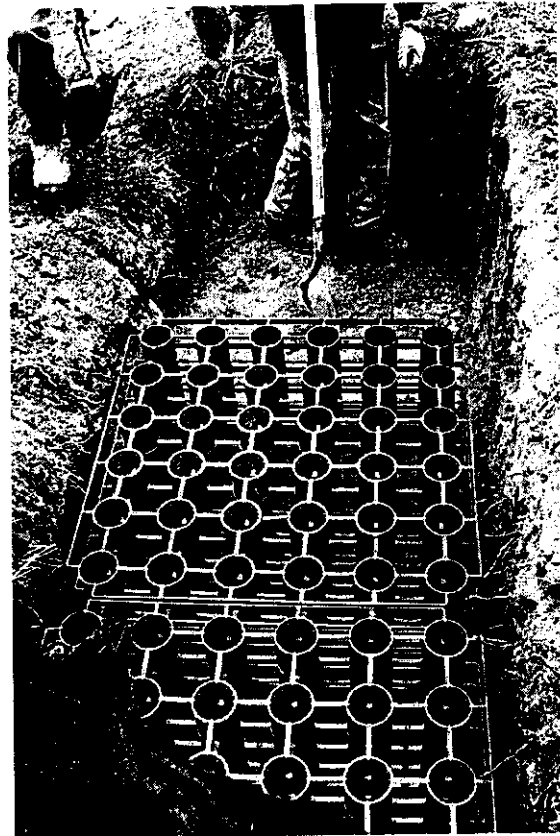
which have up to 95% void space.

Another drawback to rock infiltration systems is maintenance. Rock infiltration systems become "silted in" over time if there is sediment entering the system. As the sediment settles out of the runoff in the system, it clogs the void spaces, which renders the system ineffective. Once silted in, the rock infiltration system must be completely dug up, the gravel must be cleaned and replaced, and the sediment disposed of properly. To increase maintenance intervals and avoid having to dig up the entire system, rock filled systems can be wrapped with a filter fabric on the sides and top and then covered with a 3" layer of rock. This way, when the fabric becomes plugged with sediment, the owner only has to remove the top 3" layer of rock, cut out the top layer of fabric, place a new layer of fabric, and finally place 3" of clean rock back on top of the system.

Prefabricated infiltration systems consist of proprietary BMP product materials that

Below: View of rock filled infiltration system.

At right: View of a prefabricated infiltration product about to be wrapped in filter fabric and placed in an excavated hole below a conveyance structure.



have a large percent void space that are wrapped in a geotextile fabric and placed in an excavated hole in the ground. Prefabricated infiltration systems function almost identically to rock infiltration systems, but due to the increased void space, they require less excavation and therefore less labor. Another advantage to these systems is maintenance. Prefabricated infiltration systems are often covered with approximately three inches of gravel. If they become silted in, only the top three inches of gravel must be cleaned to keep the system functioning properly. Although silting in may occur slightly more often than with rock infiltration systems, three inches of gravel is easier to clean than an entire trench or drywell. Installing prefabricated infiltration structures is slightly more complex than installing rock filled infiltration structures, but with a little practice it will become routine.

There are several proprietary BMP products designed for use as prefabricated infiltration systems. Void space is variable between different prefabricated materials. "Rainstore" (manufactured by Invisible Structures), "High Capacity Infiltrator Chambers" (manufactured by Infiltrator Systems), "Storm Tech Chambers" (manufactured by Storm Tech) and "Raintank" (manufactured by Atlantis Water Management) are currently the most common prefabricated infiltration materials used. These products vary from 80% to 95% void space. This allows prefabricated infiltration systems to be significantly smaller, with less excavation than traditional rock infiltration systems. Information on specific proprietary BMP products is for informational purposes only.

All infiltration systems must be sized appropriately according to soil type, soil permeability, and volume of surface runoff. Old fashioned "Standard sized" drywells and

Prefabricated filled Drywells vs. Gravel/Rock filled Drywells	
Prefabricated	Rock
<ul style="list-style-type: none"> ☒ More void space—up to 95%. ☒ Requires smaller excavation. ☒ Possibly less labor costs. 	<ul style="list-style-type: none"> ☒ Less void space—around 33%. ☒ Requires larger excavation. ☒ Possibly more labor costs.
<ul style="list-style-type: none"> ☒ Easier to maintain. ☒ Clean top 3" of gravel every 2-5 years depending on contamination. 	<ul style="list-style-type: none"> ☒ Difficult maintenance. ☒ Clean top 3" of gravel every 2-5 years depending on contamination. ☒ If maintenance is deferred too long, all gravel may have to be removed and cleaned.
<ul style="list-style-type: none"> ☒ Cost of material. ☒ Expensive compared to rock. ☒ Overall cost may be less due to labor and maintenance. 	<ul style="list-style-type: none"> ☒ Cost of material. ☒ Inexpensive compared to prefab. ☒ Overall cost may be more due to labor and maintenance.
<ul style="list-style-type: none"> ☒ New skill to learn, but fairly simple installation. 	<ul style="list-style-type: none"> ☒ As simple as digging a hole and filling it with rock. Labor involved to wheelbarrow the gravel.
<ul style="list-style-type: none"> ☒ Stricter dimensions for hole size, but may be variable as long as overall volume is the same. 	<ul style="list-style-type: none"> ☒ Hole size may be variable as long as overall volume is the same.

infiltration trenches may not be large enough to store runoff in a 20 year, 1 hour storm.

Components of an effective infiltration system:

- ✓ Install a sump pretreatment area or "catch basin" to capture sediment for "clean-out" before it enters the infiltration system.
- ✓ Wrap the system with filter fabric to avoid migration of fine material into void spaces of infiltration system.
- ✓ Include borders to define the edges of surface infiltration systems. This helps to contain the system for neat housekeeping.
- ✓ Disperse energy at the discharge ends of drainage pipes or conveyance structures.
- ✓ Spread flows at the discharge end of a system on a level, vegetated surface to prevent concentration of flows and erosion.
- ✓ Build in access ports and clean outs that aid in the maintenance and periodic monitoring of the system.

Here are some important things to keep in mind when installing infiltration systems:

- ❶ Determine appropriate dimensions based on a completed BMP Site Evaluation.
- ❷ If disturbing more than 20 yards or 500 Sq. Ft. without grading permit, contact Building Department for permitting requirements. Install proper temporary BMPs to protect disturbed soil.
- ❸ Infiltration systems must not adversely affect nearby foundations or footings. Use an impermeable layer of plastic to prevent the migration of water into the crawl space. Care must be taken to properly assess soil and groundwater conditions to ensure that water does not degrade the integrity of the foundation or cause mold growth. See next section to learn how to convey runoff to infiltration systems that are not located above the foundation.
- ❹ Gravel mulch under driplines should be at least 18 inches wide and at least 3 inches deep. When the dripline is 32 feet or higher (2 story structure) above the mulch, the armoring layer should be at least 24 inches wide for increased splash protection. Bordering structures should be used to isolate and contain gravel armor.
- ❺ When excavating for prefabricated structures leave an extra 2" + on all sides. Allow for 4" - 6" extra depth. It is recommended that 3" of gravel be laid to even and level the base of the excavated area.
- ❻ Always call 1-800-227-2600 before you dig.
- ❼ Storage and infiltration structures must be installed level and along the contour of the existing slope.
- ❽ A geo-grid (such as Tenax or equivalent) is necessary to protect the top of some types of prefabricated structures and zip-ties must be used to anchor it to the prefabricated system.
- ❾ A geotextile fabric must be draped around the top and sides of all prefabricated storage structures with 3" of overlapping fabric at all seams.
- ❿ Backfill around prefabricated structures with the excavated material.
- ⓫ Cover prefabricated structures with a minimum of 3" gravel.
- ⓬ A drainage inlet device to allow inflow of water into the prefabricated structure may be necessary. Grating is recommended for ease of maintenance.

Common methods of conveyance to aid infiltration

Conveyance methods are often needed to transport runoff to appropriate areas for infiltration. Common conveyance treatments are:

- Subsurface conveyance of water away from up-slope portions of foundations
- Gutters, downspouts or deflectors
- Slotted drains or swales (asphalt, concrete, vegetated, and/or rock lined)
- Gravel trenches or gravel armor

Subsurface drains capture runoff and convey water to treatment areas or away from sensitive structures vulnerable to water damage such as foundations. (Infiltration systems should not be installed upslope of foundations). Subsurface drains rarely infiltrate a significant amount of water.

There are local site conditions, such as slow soil permeability, steep slopes, and localities near sensitive structures where the standard

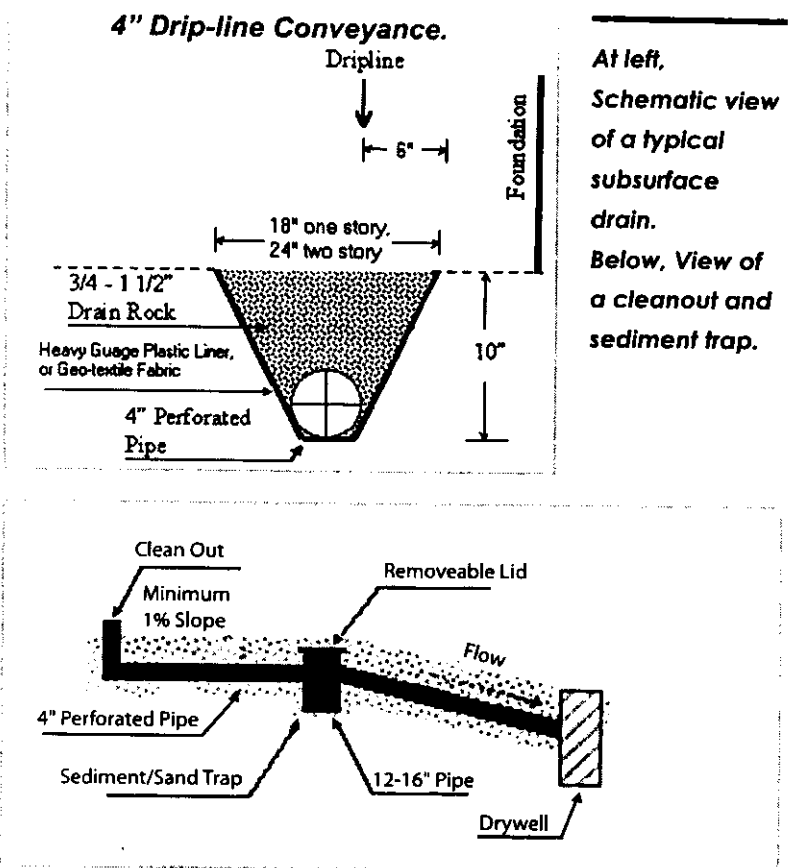
design may need to be augmented by the addition of a subsurface drain to more efficiently convey water to an infiltration system. This standard applies to the design and installation of perforated pipe conduits placed beneath the surface of the ground, to provide for the collection and conveyance of snowmelt and storm runoff from roofs.

Subsurface drains could be used for applications in the Truckee Area covering less than 3000 square feet of contributing roof surface area. A subsurface drain can be installed using standard 4-inch diameter perforated PVC pipe or perforated polyethylene tubing. Trenches should be excavated to create a minimum 1% slope in the direction of flow. In addition, an 8 mil heavy gauge plastic liner should be placed at the base of the trench to capture the runoff and direct it into the drainpipe. Geotextile fabrics may replace plastic liners for applications where water will not flow or percolate towards a foundation. Refer to the diagram for a typical installation design.

Cleanouts and/or sediment traps should be installed at the upper and lower end of each pipe section, and at all bends and abrupt changes in slope. Cleanouts can be constructed by the inclusion of an elbow or a 'T' extending above the surface and capped with a threaded or slip cover. Inline sediment traps can be included into the system by placing a pre-cut culvert section vertically into the trench. Refer to the figure on this page for installation details.

Subsurface drainage systems deliver flow to a drywell, where runoff is allowed to infiltrate into the surrounding soil. Drywells require the design expertise of a qualified professional to insure adequate capacity and performance.

The trench should be excavated to the dimensions indicated in the diagram on the previous page. The trench bottom should be smooth and free of clods, loose or exposed rock. Care should be taken when placing the pipe into the trench bottom to avoid direct



All materials should comply with the following applicable reference standards:

Pipe:

- 1. ASTM D2729 - Polyvinyl Chloride (PVC) Sewer Pipe and Fittings or ADS
- 2. ASTM F405 - Corrugated Polyethylene Tubing and Fittings
- 3. HDPE Pipe specifications
- 4. Gravel for dripline drains should be clean, washed, free of fines and poorly graded 3/4 to 1-1/2 inch diameter.

contact with protruding or sharp rocks. The trench for the standard 4" subsurface drain is to be lined with a heavy gauge plastic liner prior to placement of pipe. Non-perforated pipe or tubing may be used when the line passes through areas where root growth may create an obstruction, or when crossing hard rocky areas.

Subsurface drains require maintenance to continue to be effective. Buildup of leaves, conifer needles and sediment should be

periodically removed from the drain and clean-out access pipes to ensure adequate capacity. Further maintenance should be performed on all sediment traps and infiltration drywells to remove the buildup of sediments from the bottom of the structure. Vector clean-outs are best when feasible.

All installers and homeowners should note that the design of this shallow drainage system does not include the ability to support extreme surface loading due to vehicular traffic. Damage to the pipe and reduced long-term function may result from driving vehicles over the top of the trenches.

Roof runoff conveyance (gutters, downspouts or deflectors)

Water falling on impervious surfaces, such as the roof of a house, collects at the down-slope edge. Most homes in Truckee do not have gutters, so water is conveyed to the roof eave. The surface below the roof eave that receives the concentrated water flow is the dripline. Several options are available to convey the concentrated water to an appropriate infiltration system. Allowing the water to fall from a dripline is acceptable if an appropriate infiltration system is installed along the dripline area (See "Common Infiltration Systems" p. 12). Another option is to capture the water in gutters, which creates higher concentrations of water that require additional conveyance measures

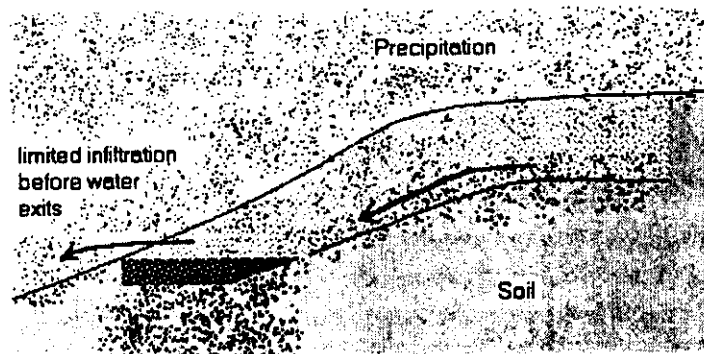
or infiltration systems. Downspouts are highly recommended to prevent splash from gutters, but usually require the addition of an infiltration system below them to infiltrate the conveyed water. Open gutters and deflectors must have soil protection and an appropriate infiltration system installed where the runoff hits the ground.

Vegetated or Rock-lined Swales are conveyance structures that are often used beneath roof driplines. A vegetated or rock-lined swale is designed, shaped, and lined with vegetation or rock to convey and infiltrate surface runoff. Healthy, well-maintained vegetated swales have better soil protection and increased infiltration potential compared to rock-lined swales.

Gravel Armor is generally three inches of gravel mulch and is used to eliminate splash erosion and protect soil beneath roof driplines. If slopes are modest, and soil is of high permeability, water will infiltrate as well (consult the Infiltration section of this chapter).

Gravel Trenches are often improperly installed as infiltration systems. When installed down a steep slope, gravel trenches serve as conveyance structures and their storage and infiltration capacities are limited. Consult the infiltration section of this chapter for further details.

Any infiltration system such as this gravel trench will fail to work properly if its bottom is not level or if the stored runoff can escape out the lower end



Chapter 3

Slope Stabilization

In many cases an erosion prevention plan will call for slope stabilization. While soil loss can occur on level ground during high wind or rainstorms, soil erosion is much more severe on unvegetated, sloping ground.

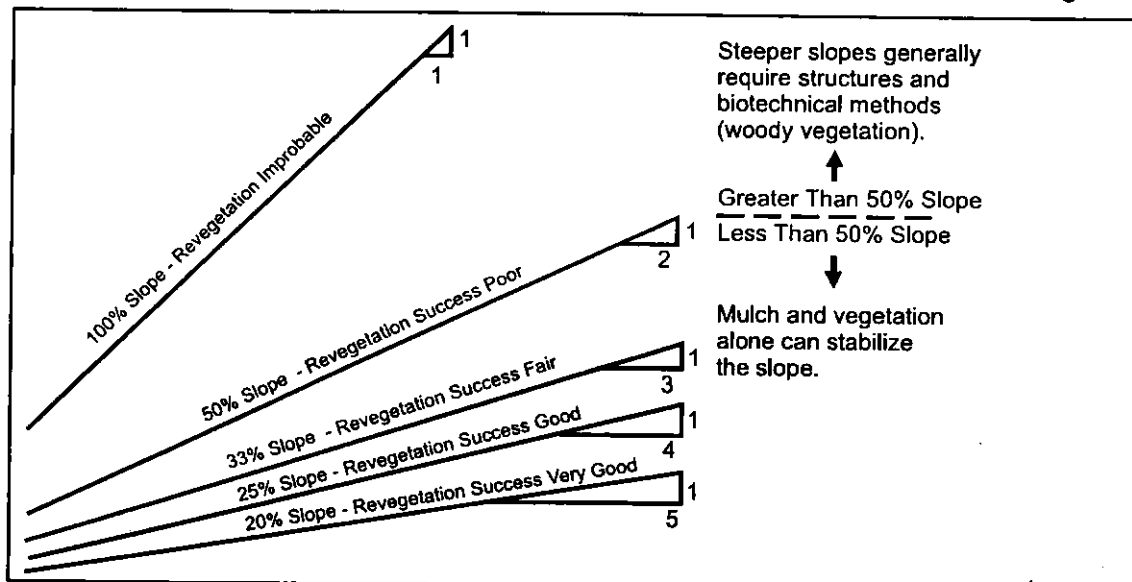
The following information will help you determine what methods can be used to successfully stabilize everything from a slight slope to a steep, severely eroding slope. One method alone is not as effective as a combination of different methods.

As the following diagram shows, the steeper the slope, the greater the difficulty in

successfully establishing vegetation.

Note: Some of these practices are very technical in nature and may need a qualified, licensed engineer's assistance in design and application.

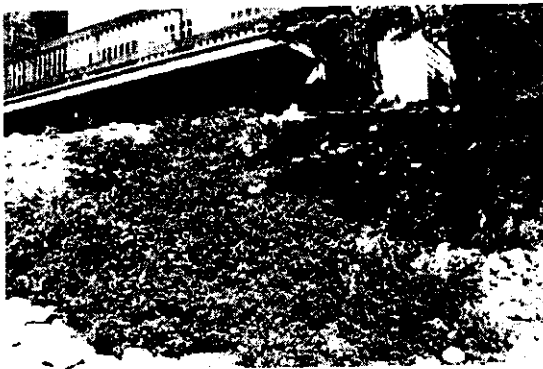
It is important to note in this illustration that slope stabilization with vegetation and mulch is generally successful only on slopes up to 50% in steepness. Anything greater than 50% should incorporate biotechnical methods such as willow wattling, or structural methods, such as terraces, concrete or wood retaining walls, erosion control blankets or rock retaining walls.



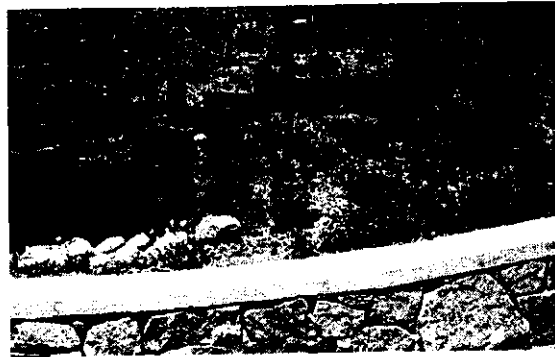
The steeper the slope, the more difficult it is to revegetate bare soil and stabilize the slope.



Moderate to steep slopes can be stabilized with an erosion control blanket, rip rap, or a combination of river rock or other mulch and vegetation.



Below, a rock-faced retaining wall with nearly level planting terraces above it stabilizes and beautifies this slope.



Extremely steep, eroding slopes like the one above need to be stabilized by incorporating structural means such as retaining walls or sturdy terraces.¹²

Guidelines for stabilizing slopes of various steepness

Moderate Slopes (< 33% slope): A combination of vegetation and mulch are effective on moderate slopes. (See Chapter 6: Vegetation and Mulches for more information on successful revegetation techniques on flat areas and slopes). Mulches such as wood chips, pine needles, or river rock provide a good protective ground cover until vegetation becomes established. Temporary controls such as erosion control blankets can also help stabilize bare soil while vegetation gets established.

Steep Slopes (33%-50% slope): On steep slopes, more care is needed in selecting appropriate plants and the planting technique. If the plants chosen and methods used are appropriate, vegetation can provide excellent long-term erosion control. As plants develop, the roots will knit together and help



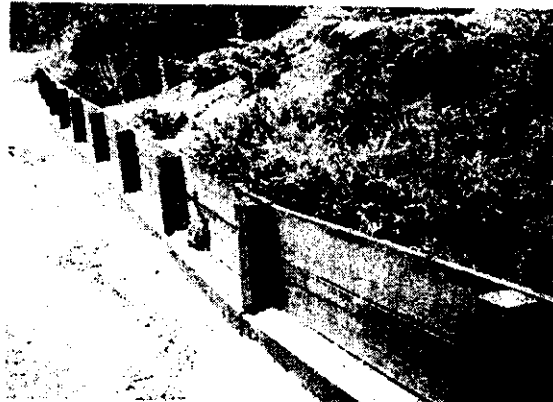
hold the soil in place. The leaves, needles and twigs will reduce the impact of rain and wind, and the added organic matter will improve water infiltration. Again, erosion control blankets and mats will help in preventing erosion while the vegetation develops and establishes a healthy community.



Other ways to stabilize slopes of over 50% include interlocking concrete blocks, wood retaining walls and riprap.

Extremely Steep Slopes (> 50% slope):

Combining erosion control practices is more effective on extremely steep slopes than applying a single practice. Terraces, wood retaining walls or rock retaining walls are usually necessary to stabilize the toe of these over steepened slopes in combination with either revegetation and mulching the area and/or applying biotechnical methods. The slope above and behind the retaining structures should be graded to as gentle a slope as possible to provide for revegetation. Use of native or adapted vegetation along the top and around the retaining structures increases their effectiveness. Retaining walls over four feet in height must be designed by an engineer and permitted by your local building department. A grading permit may be needed for slope stabilization work that disturbs between 3 and 7 cubic yards of soil, and is always needed for work that disturbs more than 20 cubic yards of soil. **Remember to call 1-800-227-2600 before you dig.**

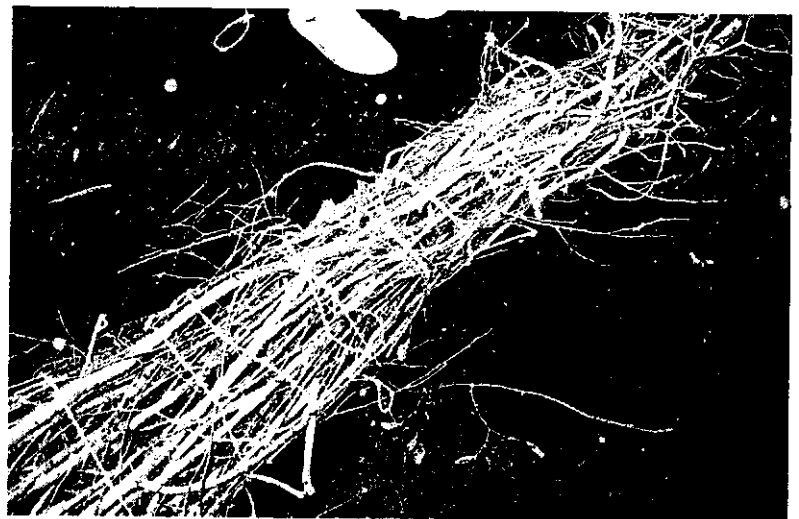


Terraces made with rock breastwalls, left, have created good areas for establishing plants. Below, bundles of dormant willows tied into a willow wattle ready for installation across a steep slope.



Methods for stabilizing slopes greater than 50% (30 degrees or 2:1)

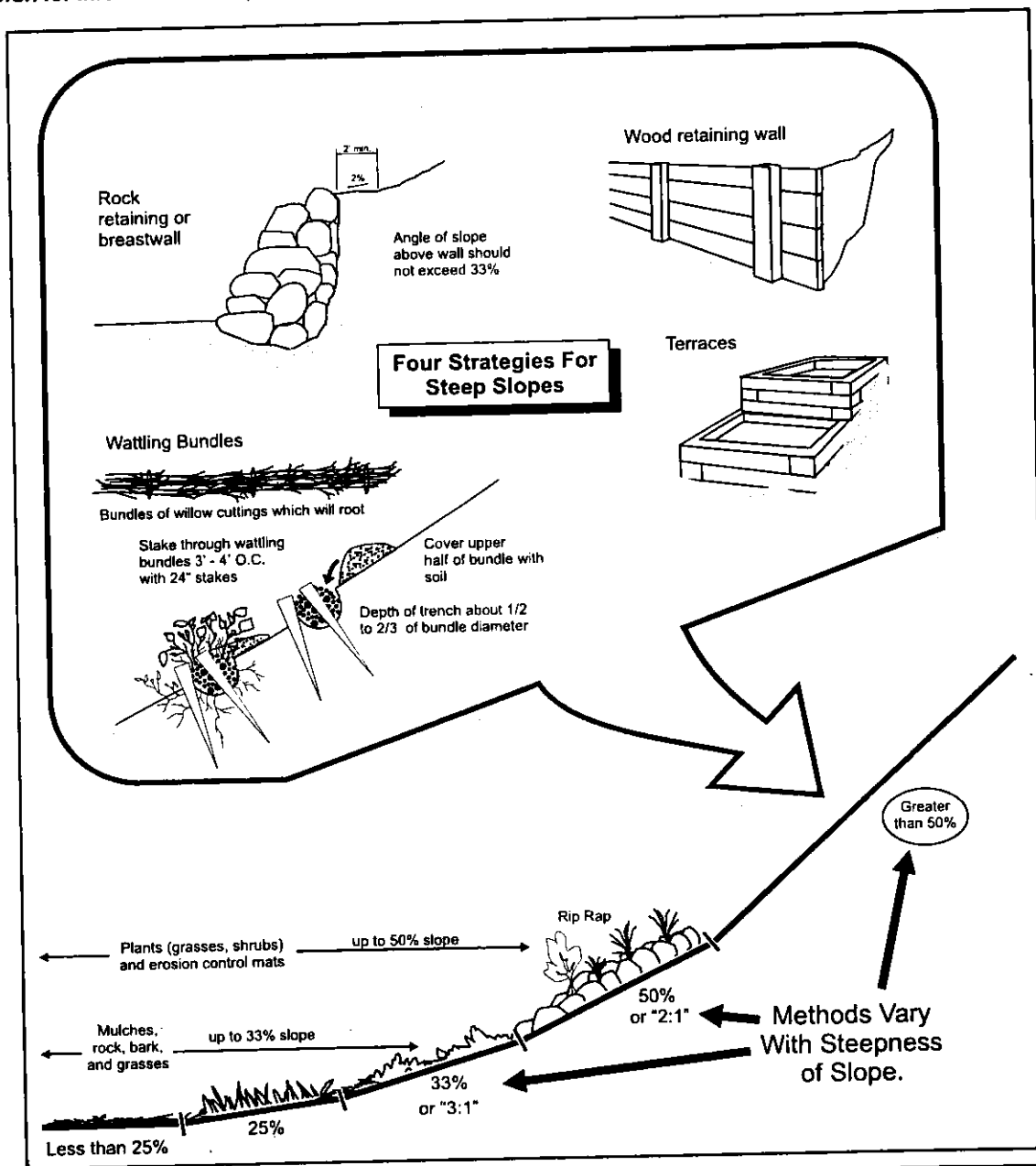
Willow Wattling - This practice, also called contour wattling, involves staking long bundles of fresh willow cuttings in shallow trenches that have been dug along the contour lines of cut or fill slopes. Once the bundles or wattles are staked into the slope and covered with stabilized, packed topsoil, they intercept runoff



from the slope above and help infiltrate it into the soil. If the site is carefully irrigated for the first few growing seasons, the willow branches will sprout and root, providing excellent vegetation cover and wildlife habitat. Other approved biotechnical BMPs for slopes over 50% include brush matting and brush layering.

Terraces - The steepness of the slope will dictate the height of the terraces. The terraces should be high enough to allow the soil behind them to be graded to an almost level surface. Terrace walls, like any retaining walls, need to be engineered if over 4 feet in height. Do-it-yourselfers can create a series of terrace steps using walls less than 4 feet high. Materials used for building terraces include recycled plastic

This diagram illustrates how methods used to control erosion vary with the steepness of the slope. While plants and mulch work well on moderate slopes, steeper sites generally require structural strategies as well. See Chapter 4: Vegetation and Mulch for information on specifics of vegetation.



products, treated wood, rock and interlocking concrete blocks. Ensure that the terrace material is strong and anchored well to stay in place. Large terraces should be tied securely into the slope and properly drained.

Wood Retaining Walls - Six-inch by six-inch posts set in concrete two feet below the ground generally make a sound anchor for wood retaining walls, but need to be engineered if the wall is over four feet in height. Vegetation should be established on the slope above the wall. Wood retaining walls are most often located between the base of a slope and an adjacent road, driveway or drainage way. Permanent structures should not be installed in the right-of-way.

Rock Retaining Wall - Rock retaining walls are an alternative to wood retaining walls and are often used next to a roadway or drainage way. As opposed to rock riprap, which armors the ground, rock retaining walls support the slope and are built from rock 10 inches to 2 feet in diameter. A footing trench is dug along the toe of the slope and the largest boulders are placed in the trench. Subsequent rocks are laid with three or more bearing points on previously laid rocks. The external face of the wall should incline slightly uphill. Since the slope above the wall will be flatter than before, it should be easier to establish vegetation above the wall. *(Note: make the slope above the wall as flat as possible—never more than 25%.)* A concrete retaining wall can be made to look like a rock retaining wall by covering it with rock and mortar (see photo this page).

Erosion control blankets and geotextiles

Purpose: Erosion control blankets or mats are biodegradable products that are used for temporary or permanent stabilization of disturbed soils.



Above, a rock-faced retaining wall adjacent to a driveway.

Erosion control blankets:

- ☛ Accelerate vegetative development while decomposing over time and becoming part of the soil.
- ☛ Protect disturbed or bare soil from rain and surface runoff.
- ☛ Increase infiltration.
- ☛ Decrease soil compaction and crusting.
- ☛ Protect seeds from impact and predators.
- ☛ Moderate soil temperature.
- ☛ Increase soil moisture retention.

Applications: Erosion control blankets are most effective when used for the following:

- ☛ Slopes and disturbed soils where mulch must be anchored and other methods such as crimping or tackifying are not feasible or adequate.
- ☛ Steep slopes, generally steeper than 3:1.
- ☛ Slopes where erosion hazard is high.
- ☛ Critical slopes adjacent to sensitive areas such as streams, wetlands, or other highly valued resources.
- ☛ Disturbed soils where plants are slow to develop protective cover.
- ☛ Channels intended to be vegetated where the flow velocity is low.

Limitation: Erosion control blankets are not suitable for rocky sites or areas where final vegetation will be mowed. Proper site preparation is necessary to ensure adequate contact of the blanket/matting with the soil.

Installation: Follow manufacturer's recommendations for installation. Please compare the instructions below with the illustration on the next page.

- 1. Prepare and smooth soil on slope. Plant seeds if desired.
- 2. Begin at the top of the slope and anchor the blanket in a 6 inch deep by 6 inch wide trench. Backfill trench and tap earth firmly.
- 3. Unroll blanket down slope in the direction of water flow, not horizontally.
- 4. Overlap the edges of adjacent parallel rolls 3 inches and staple every 3 feet.
- 5. Use wire staples No. 11 gauge or heavier, or follow the manufacturer's instructions. The "U" shaped staples shall be 6" to 10" long with a 1" crown. Use longer staples in loose or sandy soils.
- 6. When blankets must be spliced, place blankets end over end (shingle style) with 6 inches of overlap. Staple through overlap areas, approximately 12 inches apart.

Lay blankets loosely and maintain direct contact with the soil – do not stretch. If the blanket is not in intimate contact with the soil, water will be able to run down the soil beneath the blanket.

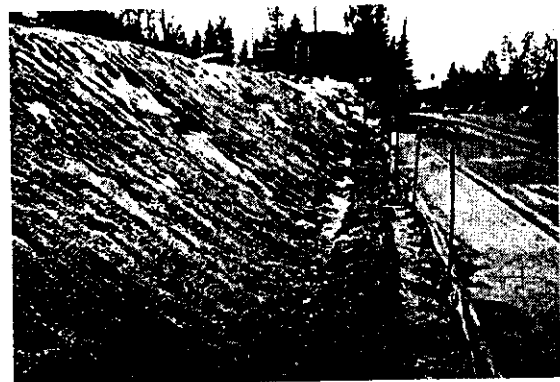
- 7. Staple blankets sufficiently to ensure that materials will remain in direct contact with the soil.

Inspection and Maintenance: Erosion control blankets, if properly installed, require little maintenance. However, periodic inspections, especially in the late fall and early spring, and while the vegetation becomes established will keep the erosion control blanket effective. When inspecting an erosion control blanket, be sure to note the following:

- 1. Vegetate and mulch the blanket according to design.
- 2. Inspect blankets and mats before and after significant rain events for erosion and undermining. Repair failures immediately.
- 3. If washout or breakages occur, re-install or re-anchor materials only after repairing damage to the slope or channel (rills, gullies, etc.).

Note how the erosion on the bare slope (left) has deposited a fan of sediment at the bottom.

This will be prevented on the slope with the erosion control blanket (right).



Erosion Control Blanket

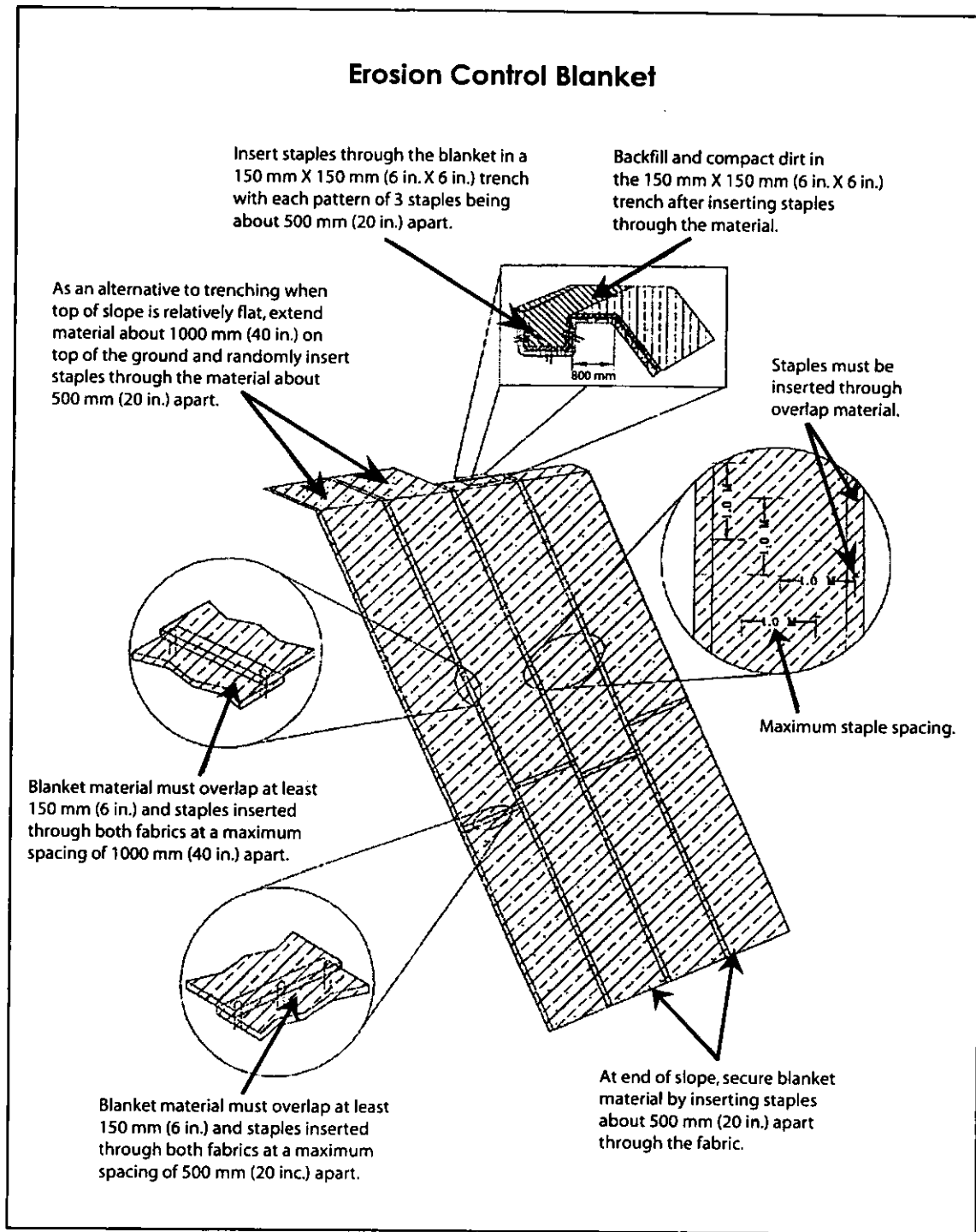


Illustration of installing an erosion control blanket on a hillside (From "Designing for Effective Sediment and Erosion Control on Construction Sites")

Resources: www.cabmphandbooks.com

Notes:

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Chapter 4

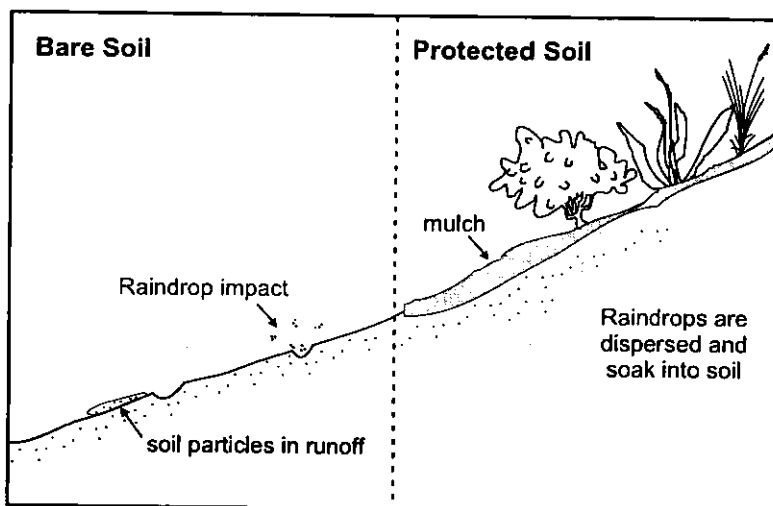
Vegetation and Mulch

En erosion prevention plan requires that "vegetated or mulch provided on all bare soil areas." When water is unable to infiltrate into the soil due to soil compaction or the presence of impervious surfaces, it accumulates on the surface, creating runoff. This runoff erodes bare soil and carries it and attached nutrients directly to streams and eventually into lakes. New research indicates that the most cost-effective way to protect rivers and lakes is to keep soil in place on the landscape by protecting bare soil. (See diagram at right.)

Vegetation and mulch can effectively stabilize soil and infiltrate runoff from developed areas, reducing erosion and effectively filtering sediment. Robust vegetation depends on healthy soil with adequate nutrients of the appropriate type. Healthy soil allows roots to penetrate deeply and water to infiltrate as if it were a sponge.

In order to create a successful revegetation project, one must first consider the soil. Plants get their nutrition from the soil, so if nutrients are lacking, the vegetation will not flourish. Organic matter provides most of the nutrition in natural, undisturbed settings. In trying to develop a good plant

community, using natural organic materials is likely to produce the best results with the least potential for pollution (however, do not use fresh manure). Compost and slow release organic fertilizers are the most trouble-free and dependable type of organic matter that can be added to poor soil. If your vegetation is failing, consider calling a Natural Resources Conservation Service (NRCS) soil scientist or local nursery who can help you test your soil, determine what is lacking and make suggestions for appropriate soil amendments.



Because bare soil is extremely vulnerable to raindrop impact and soil loss by wind or water, it is especially important to protect bare soil areas with vegetation and mulch.

Truckee suggests that you choose native and adapted plants for landscaping. Native plants were here prior to the arrival of European-American settlers, while adapted plants originated elsewhere, but are also well suited to Truckee's climate. Once established, native and adapted plants need little to no fertilization or irrigation unless it is a drought year or the plant is not suited for its site. Look for perennials rather than annuals when shopping for native and adapted plants at your local nursery. While annuals provide pretty color, they should be used sparingly as they provide a short-term solution to a very large problem — erosion. There are a great many native plants that are available for landscaping that are colorful and require little care once established.

When choosing plants, be sure to select species that are considered to have a low fire hazard. (See 'Resources' for suggestions). This will help reduce the chance of fire spreading from the wild land to your structures.

Be careful not to choose plants considered invasive or noxious. These are

plants which out-compete native species and decrease biological diversity. **Some common invasive and noxious weeds that pose a threat to the Tahoe Basin include tall whitetop (also known as perennial pepperweed), Scotch broom, oxeye daisy, Eurasian watermilfoil, Russian knapweed, spotted knapweed, Canada thistle, bull thistle, yellow starthistle, dalmatian toadflax, yellow toadflax, and diffuse knapweed.** For more information on invasive and noxious weeds, visit the California Department of Agriculture's Weed Encyclopedia at www.cdffa.ca.gov/weedinfo.

A flat vegetated and mulched area is shown below.



Reasons for creating a vegetated landscape using native and adapted plants in Truckee


- **Protects against Erosion**
- **Requires Less Water and Fertilizer**
- **Minimizes Maintenance**
- **Adapted to Truckee climate**
- **Attracts Wildlife**
- **Improves Aesthetics & Property Value**


All completed BMP site evaluations direct property owners to "vegetate and mulch all bare soil areas." The Building Department will not issue a final or certificate of occupancy for the property if bare soil is evident. A combination of vegetation (native and adapted ground covers, shrubs, trees, grasses) and mulch (pine needles, chipped wood, bark mulch, stones or gravel) are most effective. Depth of the mulch should be between 1 ½ to 3 inches, except in the case of pine needle mulch, which should only be 1 to 2 inches deep. See the section on mulches below for effective depths and considerations regarding pine needle mulch and defensible space.


When bare soil exists on slopes, erosion risks increase, and extra measures are required. If slopes are over 50% in steepness, mechanical


structures like terraces and retaining walls are required in addition to vegetation and mulch. (See Chapter 3 for details.)


Steps to a successful revegetation project


 **Test Soils.** First you need to determine whether your soil has adequate nutrition for revegetation. Contact a NRCS soil scientist for assistance.


 **Apply soil amendments.** Amendments will usually consist of compost and a slow-release organic fertilizer, but depend on the results of the soil tests. Fresh manure should not be used as a soil amendment.

 **Incorporate soil amendments into soil.** Tilling soil amendments into the soil to a depth of 6 to 8 inches gets the nutrients to the plant roots and breaks up any soil compaction that may exist.

 **Select appropriate plant species.** This selection will depend on the goals of the project but needs to consist of native and adapted plants appropriate for the site's characteristics.

 **Apply long-lasting mulch.** Pine needles and wood chips provide long lasting mulch in many cases. Plants usually take 2 to 5 years to provide enough organic material to provide their own protective mulch. The mulch that you apply should last until plants are producing their own. Wood chips aren't appropriate for slopes greater than 33% because they will migrate off the slope.

 **Tackify mulch.** In some cases and especially for steeper slopes, mulch needs to be stabilized with an organic tackifier, which is a glue that holds mulch in place until plants are established.

 **Irrigate carefully.** Irrigation will allow seeds to germinate quickly and will help transplanted seedlings survive. Since the soil has been adequately amended and mulched, irrigation should be applied slowly and carefully, so that the root zone is wetted without causing any runoff. During the first season, the soil should be kept moist. If seed or seedlings dry out, they die. Do not over water. Gradually wean the plants to less frequent watering in late summer. By the second season, watering plants every 2-3 weeks during summer is usually sufficient. Plants should be well enough established after two growing seasons to not need irrigation.

Special considerations for planting beds near structures

A **vegetated dripline** is the area below the roof dripline (where water drips from your roof onto the ground) that contains mature, established vegetation. A clear example of this (see page 13) is a dripline covered with a thick mat of grass or other vegetation. If you design a flowerbed for the dripline, you must address the following:

Border the planting bed. Use landscape edging tall enough to retain all of the soil in the event of an extreme precipitation event. Place filter fabric along the inside edge of the border to retain fine sediment.

Protect the foundation from mold. The planting bed should be at least 4 feet wide and graded so that water drains away from the structure. An impermeable membrane can be installed along the foundation as well. Use only drip irrigation to minimize the amount of water applied to the planting bed and to ensure that the foundation is not being sprayed.

Employ mulching techniques that minimize fire hazards. Although the vegetation will help infiltrate water and reduce raindrop impact during a storm event, bare soil is still vulnerable to wind erosion, and requires mulch to help it stay in place. For the first five feet out from the foundation, apply a layer of inorganic mulch such as gravel or rocks to reduce fire hazard. Outside the first five feet, you can install 1-2" of pine needle mulch or 2-4 inches of wood or bark mulch such as fir, redwood or cedar.

Employ planting techniques that minimize fire hazards. Use only herbaceous (not woody) plant species with an airy stem spread such as columbine and bleeding heart. Total canopy cover at maturity should not exceed 50%.

If you choose to install planting beds to prevent erosion under driplines, a fire hazard may be presented. Vegetation and wood mulches close to structures have the potential to carry wildfire to the building. Do not use high fire hazard plants. Drip systems are recommended to maintain adequate moisture levels close to structures. It is also important to remove dead or dying vegetation during the growing season. For example, native grass and other perennials should be mowed once they dry out. These measures will not eliminate the fire hazards but will help to minimize them.

Vegetated infiltration swales and basins. Vegetation and mulch are very useful and attractive when employed in above-ground infiltration systems (Chapter 1, pp 3-4). Property owners can make shallow, bermed basins for storage and infiltration of snow and snowmelt. If planted with hardy perennials and mulched, these become attractive "rain gardens" in summertime. Careful consideration of appropriate vegetation is crucial to create a low maintenance, effective system.

Soil amendments vs. mulch

Soil Amendment

Organic material added to the soil will promote healthy soil and plants. Add compost to the top 4 to 6 inches and mix it in with your native or disturbed soil. Do not use fresh manure. An organic soil amendment will help keep moisture in the soil for a longer period of time, increase infiltration and provide essential nutrients to your vegetation resulting in increased plant growth. Soil amendments are more effective than fertilizers because they help to create a healthy soil for the long term, while fertilizers only provide instant food for the plants and tend to wash through the soil profile quickly, polluting groundwater.

Aerate/Till Soil

Many soils become compacted when repeatedly walked or driven over. Compacted soils no longer infiltrate water and contribute runoff that carries nutrient-laden soil particles to rivers and lakes. Compacted soil makes it difficult to establish healthy vegetation because the roots are not able to penetrate the soil. Before revegetating compacted areas, be sure to till soil amendments into the soil to a depth of 6 to 8 inches. It is helpful to start with a rototiller for severely compacted sites. A shovel will also do a good job, but will take extra effort to get to the depth needed for a healthy root system.

Mulch covers the soil surface

The term "mulch" is used to describe a loose ground cover that protects the soil surface from wind and water erosion. Mulch also prevents moisture loss from the soil, reduces weed growth, adds nutrients to the soil, and helps insulate the soil from extreme temperature changes. Inorganic mulches such as gravel do not provide as many benefits as organic mulches, but can be beneficial when used appropriately and work well to reduce wildfire threats near structures.



Shown above, a combination of organic mulch (bark) and inorganic mulch (rock).

Organic mulches include pine needles (below) and bark or wood chips.



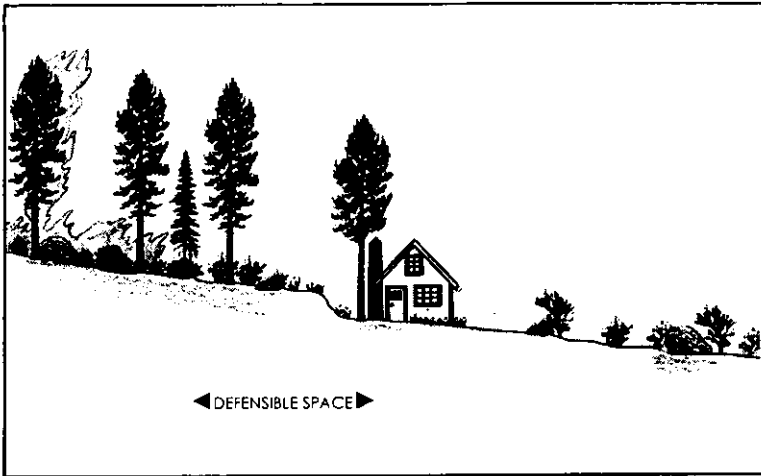
Mulch Depth

When required on a residential property, properly installed organic mulch is effective at reducing erosion potential and fire hazards. Wood or bark chips should be from 1 ½ to 3 inches deep, and pine needle mulch should be between 1 and 2 inches deep. Inorganic mulch (i.e. gravel) should be at least 3 inches deep in all cases. The deeper the mulch, the more effective it will be at keeping out weeds, holding in and absorbing moisture, and protecting the soil against heavy rain or wind. However, if too much mulch is applied, it may hinder the revegetation success of seeds for the same reason it hinders weed growth: the sprouts cannot penetrate the thick mulch. Thicker layers of organic mulch may also present an increased fire risk.

Mulch Maintenance

Because of their ability to decompose into the soil, organic mulches need to be maintained yearly to be effective. The best maintenance method is to apply mulch in the spring after the snow has melted, and then supplement with some more mulch before the snow falls

to help protect your plants. If you use pine or fir needles as mulch over bare soil and have conifers on your property, you face the challenge each summer of raking off excess needles that have fallen since the snowpack has melted. Those needles that have been matted down by snow for one or more winters often knit together as they decompose, creating good erosion control cover and adding organic matter to your topsoil as the old needles decay. Only newly fallen needles should be removed, and only when needle thickness exceeds 2 inches. **Never rake down to bare soil.** (See next section.)



A note on fire safety and defensible space

Because we live in an urban forest environment, there is a definite threat from wildfire. Follow these simple guidelines to reduce the risk on your property. If vegetation is properly maintained, wildfire threat can be substantially reduced.

Guidelines for fire defensible space for residential properties

- Choose less flammable vegetation and inorganic mulch near your home.
- Cut down dead trees and shrubs but leave the roots in place. *
Eliminate low-lying branches and stems.
Move firewood piles away from the house.
Cut back dried grass.
Break up dense vegetation. *
- Pick up fallen branches and pinecones, leaving pine needles to decompose and create mulch.

***Contact USFS for tree cutting/limbing and vegetation removal permits and restrictions.**

Pine Needle Do's

DO place "inorganic mulch" (gravel or stone) next to wooden or flammable structures and under decks.

DO rake up needles accumulating on hard surfaces such as pavement, decks, rooftops and gravel-covered surfaces

DO revegetate and mulch an area if you have removed all pine needles to bare soil.

DO leave 2 inches of the dark, organic layer of decaying plant matter such as leaves and needles known as the duff layer.

Pine Needle Don'ts

DON'T rake ALL pine needles, leaving bare, unvegetated and non-mulched soil.

DON'T rake pine needles after the beginning of autumn rains. The snow pack helps pine needles decompose into natural mulch.

DON'T apply pine needles within five feet of any structures. Use non-flammable, inorganic (gravel or stone) mulch or hard surface in these areas.

Irrigation

If you are creating a native or 'natural' landscape and have amended the soil and added adequate mulch, your irrigation output will be substantially reduced.

The main principle in these types of landscapes is to add water slowly and penetrate to the root zone and below. According to the USDA/Natural Resources Conservation Service (NRCS), most soils can only hold ½ inch of water in the top 12 inches of soil. Therefore, by testing your irrigation system, you can determine how long it takes to deliver a ½ inch of water to the revegetation project and only irrigate for that amount of time.

If ponding or runoff occurs before you have applied ½ inch of water, program your systems to run "on," until ponding or runoff begins, and then "off," for a couple of hours, and then "on" for the same on time as before. Continue the "on/off" cycled irrigation until you have applied approximately ½ inch of water. The wait time is very important. It allows the water to move through the soil profile before more is added. This prevents runoff and allows for deeper watering, which also encourages deeper rooting.

These are the basic principles you need to know in order to optimize your lawn watering.

- How much water your sprinkler system applies.
- How much water your soil can hold.
- Where grass roots absorb most of their water.
- How much water your grass uses at different times of the year.

Good watering and lawn care tips

- Water early in the morning, preferably before 7AM.
- Know your public utility district rules for watering landscapes.
- Keep your irrigation schedule flexible for periods of rain or excessive heat.
- Use automatic controllers to improve water conservation.

Just measure how long it takes your sprinkler system to apply a ½ inch of water, then water your lawn for that amount of time:

- 2 times a week beginning in April and mid-September.
- 3 times a week, where needed, May through mid-September.

Fertilizers, soil amendments

As a rule of thumb, apply fertilizer only when it is needed in spring and fall, and then sparingly—at about half to three quarters the recommended rate found on the label. Be sure to water slowly and deeply following the application. Watering moves the fertilizer into the root zone of the soil so the plant can use it. Secondly, without water, the fertilizer may burn the plants wherever it contacts tissue.

Note: Never fertilize in the shorezone or near a stream

Resources

Books:

Home Landscaping Guide for Lake Tahoe and Vicinity. Revised 2002.

University of Nevada Cooperative Extension.

Sunset Western Garden Book

Lane Publishing Co., Menlo Park, CA.

Available at most bookstores and home centers. Detailed information on plants suited to the western climate, and specific to climate zones.

A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California

Great for contractors looking to reduce costs associated with over watering. This book is free by contacting the Department of Water Resources at (916) 653-1097.

Weeds of the West

The Western Society of Weed Science in Cooperation with the Western United States Land Grant Universities Cooperative Extension Services. Revised 1992.

Botanical and Demonstration Gardens:

Lake Tahoe Community College
BMP Demo and Native Plant Garden,
One College Drive, South Lake Tahoe, CA

North Lake Tahoe Demonstration Garden
Incline Village, NV
www.ivgid.org/pw/wastenot/dgarden.asp

Northern Nevada Native Plant Society Garden
Department of Wildlife
1100 Valley Rd. Reno, NV

Seed Sources:

Comstock Seed
Locally collected seed source
Gardnerville, NV

Sierra Valley Farms
Attn: Gary Romano
1329 County Road A-23
Beckworth, CA 96129
(530) 832-0114
www.comstockseed.com
(775) 746-3681

Applewood Seed Co.
Arvada, CO
www.applewoodseed.com
(303) 431-7333

Cornflower Farms Inc.
California Native and Water Wise Plants
Elk Grove, CA
natives@cornflowerfarms.com
(916) 689-1015

Stepables
Resilient Perennials for Pathways and Borders
Oregon
www.STEPABLES.com

Educational Classes:

Truckee Meadows Community College: (775) 829-9010
(offers Irrigation Management classes and other related courses.)

Lake Tahoe Community College: (530) 541-4660
(offers Landscape Architecture classes and other related courses.)

Websites:

CalFlora Database
<http://galaxy.cs.berkeley.edu/calflora>

California Native Plant Society
<http://cnps.org/conservatio/exotics.htm>

California Department of Agriculture, Weed Encyclopedia <http://www.cdfa.ca.gov/weedinfo3>

Appendix B: The Temporary BMP Hall of Shame, or How NOT to Install Temporary BMPs

Tree protection fencing is required to be fenced around the fullest extent of the tree's dripline.



The straw bales pictured are not preventing sediment from entering the drop inlet. Furthermore, straw bales are no longer recommended for erosion control in the Lake Tahoe Basin.



This silt fence is not properly keyed in to a depth of at least 6 inches to prevent runoff from leaving the disturbed area.



Appendix B: The Temporary BMP Hall of Shame, or How NOT to Install Temporary BMPs



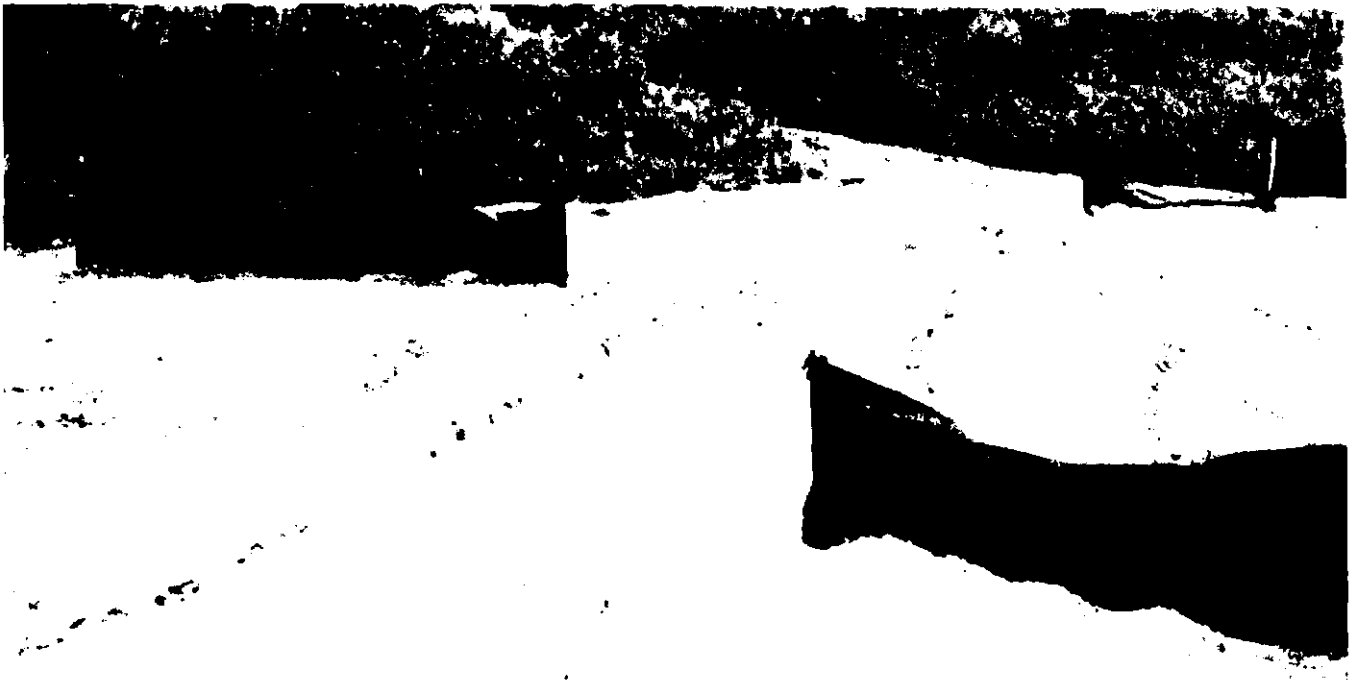
Prevent this kind of erosion by keying the silt fence at least 6 inches into the soil at the toe of the slope.



Concentrated flow should not be directed onto exposed, vulnerable slopes. More than one BMP is needed here.



Tree protection fencing is not a substitute for tightly woven silt fence fabric.





APPENDIX: I

Water Quality Monitoring Requirements form LRWQCB



California Regional Water Quality Control Board Lahontan Region



Linda S. Adams
Secretary for
Environmental Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
(530) 542-5400 • Fax (530) 544-2271
www.waterboards.ca.gov/lahontan

Arnold Schwarzenegger
Governor

JUL 03 2007

Tony Lashbrook, Town Manager
Town of Truckee
10183 Truckee Airport Road
Truckee, CA 96161-3306

ORDER TO SUBMIT TECHNICAL REPORT IN ACCORDANCE WITH SECTION 13267 OF THE CALIFORNIA WATER CODE – TOWN OF TRUCKEE

Background

On December 27, 2006, the Lahontan Regional Water Quality Control Board (Water Board) designated the Town of Truckee (Town) as a regulated Small Municipal Separate Storm Sewer System (MS4) and required it to obtain coverage under a general National Pollutant Discharge Elimination System (NPDES) permit for storm water discharges. The area of coverage includes the entire area of the Town's jurisdiction.

The Town was designated as a regulated MS4 based on criteria established by the State Water Resources Control Board. As a regulated MS4, the Town must prepare a Storm Water Management Program (SWMP) in accordance with NPDES General Permit No. CAS000004. Section F of the permit includes a standard set of reporting requirements and a provision for the Water Board to impose additional monitoring requirements. The Water Board has determined that additional monitoring and reporting requirements are necessary to demonstrate that implementation of the SWMP is adequately protecting the water quality of the Truckee River Hydrologic Unit.

Findings

Pursuant to California Water Code section 13267, subdivision (a), the Water Board may investigate the quality of any waters of the state within its region "in connection with any action relating to any plan or requirement authorized by this division." The need for a technical report pursuant to California Water Code section 13267, subdivision (b) must bear a reasonable relationship to the benefits to be obtained from the report. In compliance with California Water Code section 13267, subdivision (b), the Water Board is required to provide a written explanation with regard to the need for the report and shall identify the evidence that supports the request. In light of the following facts, the Water Board has identified the evidence that supports its request for a technical report in this particular situation.

California Environmental Protection Agency



Recycled Paper

1. The Town controls and operates a system of storm water conveyances and discharge points that contribute pollutants to the Truckee River Hydrologic Unit (HU). The area under the jurisdiction of the Town is being rapidly urbanized and such development discharges pollutants in storm water runoff that has caused, or is threatening to cause, adverse effects on the beneficial uses of the waters in the Truckee River HU.
2. The Middle Truckee River (from Tahoe City to the California State line) is listed as impaired for sediment on the Clean Water Act Section 303(d) list and Water Board staff is developing a Total Maximum Daily Load (TMDL) for sediment reductions to restore and protect the beneficial uses of the river. The Town will be a responsible party for implementing pollution control measures required by the TMDLs and the NPDES permit for storm water discharges.
3. The Water Board requires information on the location and operation of the storm water discharge system, the water quality characteristics of the discharges, include pollutant loading, and the effects the discharges may have on receiving water quality. The Town must use the information to develop and implement a plan to control pollutant loading and adverse impacts to beneficial uses of surface waters.

Requirement for Comprehensive Storm Water Discharge Monitoring Plan

Pursuant to Section 13267 of the California Water Code (see enclosed Fact Sheet), you are directed to submit a comprehensive storm water monitoring plan and implementation schedule. The plan must include a detailed description of the storm water drainage system, identify significant source areas, and describe the monitoring needed to evaluate discharges and receiving waters effects. In developing the plan, the Town must consider the elements presented in the enclosed table and provide justification if the elements are not included in the plan.

The comprehensive monitoring plan and implementation schedule must be submitted by **December 14, 2007**.

Since the Town and Placer County have similar requirements to develop monitoring plans, we encourage the Town to work with Placer County to develop integrated monitoring plans that avoid duplication.

You may contact Dale Payne, Environmental Scientist at (530) 542-5464 or Alan Miller, Senior Water Resource Control Engineer at (530) 542-5430 if you have any questions.



HAROLD J. SINGER
EXECUTIVE OFFICER

Tony Lashbrook

- 3 -

- Enclosures: 1. Table of Storm Water Discharge Monitoring Elements
2. Fact Sheet for Submitting Technical Reports Under Section 13267

cc (w/enclosure 1): Dan Wilkins, Town of Truckee
Bob Costa, Placer County
Lisa Wallace, Truckee River Watershed Council
Karl Dreher, Caltrans District 3

Disk: U:/Town of Truckee 13267 Monitoring Requirements06_12_07 DYP.doc
{File Under: Town of Truckee MS4 }

Table 1
Storm Water Discharge Monitoring Plan Elements

Category	Parameter or Type	Location(s)	Rationale	Comments
Facilities Inventory	Mapping	Watershed Jurisdiction	Need map and inventory of storm water related facilities and pollutant sources to establish effective monitoring plan.	Required to develop monitoring plan. Include major collection points, conveyances, and discharge points. Establish initial list of restoration opportunities such as inadequate stream crossings, fill sites in flood plains, and relic land disturbances. Set process to update list on a routine basis.
Source Area Management	Dry and wet season inspection of storm water facilities and construction sites. May include turbidity field sampling for additional numeric information.	As determined by discharge based on facilities mapping and watershed activities	Provides real-time information for source monitoring and pollution control. Provides information for taking corrective actions as necessary.	Should be incorporated into a grading permit system in which appropriate BMPs are required at construction sites and inspected by County officials. May also be used to update opportunities for restoration work.
	Near continuous (autoprobes/dataloggers) for turbidity, pH, EC, temp, stage.	A few selected tributaries that represent conditions associated with major developments.	Track turbidity patterns to assess effectiveness of pre- and post-construction BMPs and cumulative effects from land development.	Provides a full record of discharge conditions, including high-flow periods where most sediment is released. Could be used to evaluate relationships to land use activities and compare between sub-watersheds. May identify potential source areas or demonstrate BMP effectiveness.
Cumulative Effects/ Compliance Assessment	Monthly grab sampling for key numeric water quality objectives set for Truckee River HJ (see Basin Plan). Should also include SSC and flow. Other pollutants such as petroleum hydrocarbons, pesticides, etc. should be considered.	Selected sites based on the 13 locations set in (B). Selection criteria should consider where development has/ is occurring and represent cumulative development effects. Consolidate with other discharge sampling (e.g. TTSA, Siller, other) where possible to avoid duplication.	Data to be compared to existing WDOs.	WDOs are set as MCMA, period of record. May need to evaluate data on annual average basis or other statistical approach. Need to assess data completion and management requirements and coordinate with RB.
	Pre- and post-project bioassessments.	New development projects.	Provides baseline for new development projects and assessment of longer-term potential impacts.	No regulatory comparison value. Have suggested IBI for tributaries, but nothing for TR. Variability is high and trends are extremely difficult to discern. Do not have set protocol established yet.
	DWR continuous sampling with periodic grab sampling	Fernd, Near Truckee, Bridge 3, and Tahoe City	Continuous monitoring with good baseline since 2002. Downstream trends apparent.	Need to coordinate with Department of Water Resources and evaluate more secure funding to maintain/enhance system.

APPENDIX: J

Basin Plan Section

Table 3-11
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-5	Surface Waters	Objective (mg/L except as noted) ^{1,2}								
		TDS	Cl	SO ₄	P	B	NO ₃ -N	N	TKN	Fe
	1 Truckee River at Stateline	75	8.0	5.0	0.05	1.0	0.08	0.40	0.32	0.30
*	2 Truckee River below Little Truckee River	75	9.0	5.0	0.05	-	0.10	0.40	0.30	0.30
*	3 Truckee River below Prosser Creek	75	10.0	5.0	0.05	-	0.14	0.40	0.26	0.30
*	4 Truckee River below Martis Creek	80	10.0	5.0	0.05	-	0.20	0.40	0.20	0.29
*	5 Truckee River below Donner Creek	70	3.0	3.5	0.05	-	0.06	0.41	0.35	0.29
*	6 Martis Creek at Mouth	150	25.0	8.0	0.05	-	1.00	1.45	0.45	0.40
*	7 Trout Creek at Mouth	70	3.0	3.5	0.04	-	0.05	0.15	0.10	0.18
	8 Squaw Creek at Mouth	85	3.0	25.0	0.02	-	0.05	0.18	0.13	0.13
	9 Truckee River above Squaw Creek	65	2.0	2.0	0.03	-	0.06	0.22	0.16	0.13
	10 Truckee River below Bear Cr.	65	2.0	2.0	0.03	-	0.05	0.21	0.16	0.13
	11 Bear Creek at Mouth	65	2.0	2.0	0.02	-	0.05	0.15	0.10	0.10
	continued...									

* Located in Town of Truckee Limits
 Possible locations for future water quality monitoring
 to be verified after outfall mapping

Ch. 3, WATER QUALITY OBJECTIVES

Table 3-11 (continued)
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT

See Fig. 3-5	Surface Waters	Objective (mg/L except as noted) ^{1,2}								
		TDS	Cl	SO ₄	P	B	NO ₃ -N	N	TKN	Fe
12	Truckee River above Bear Creek	65	2.0	2.0	0.02	-	0.04	0.19	0.15	0.10
13	Truckee River at Lake Tahoe Outlet	65	2.0	2.0	0.01	-	0.02	0.12	0.10	0.03

¹ Values shown are mean of monthly mean for the period of record.

² Objectives are as mg/L and are defined as follows:

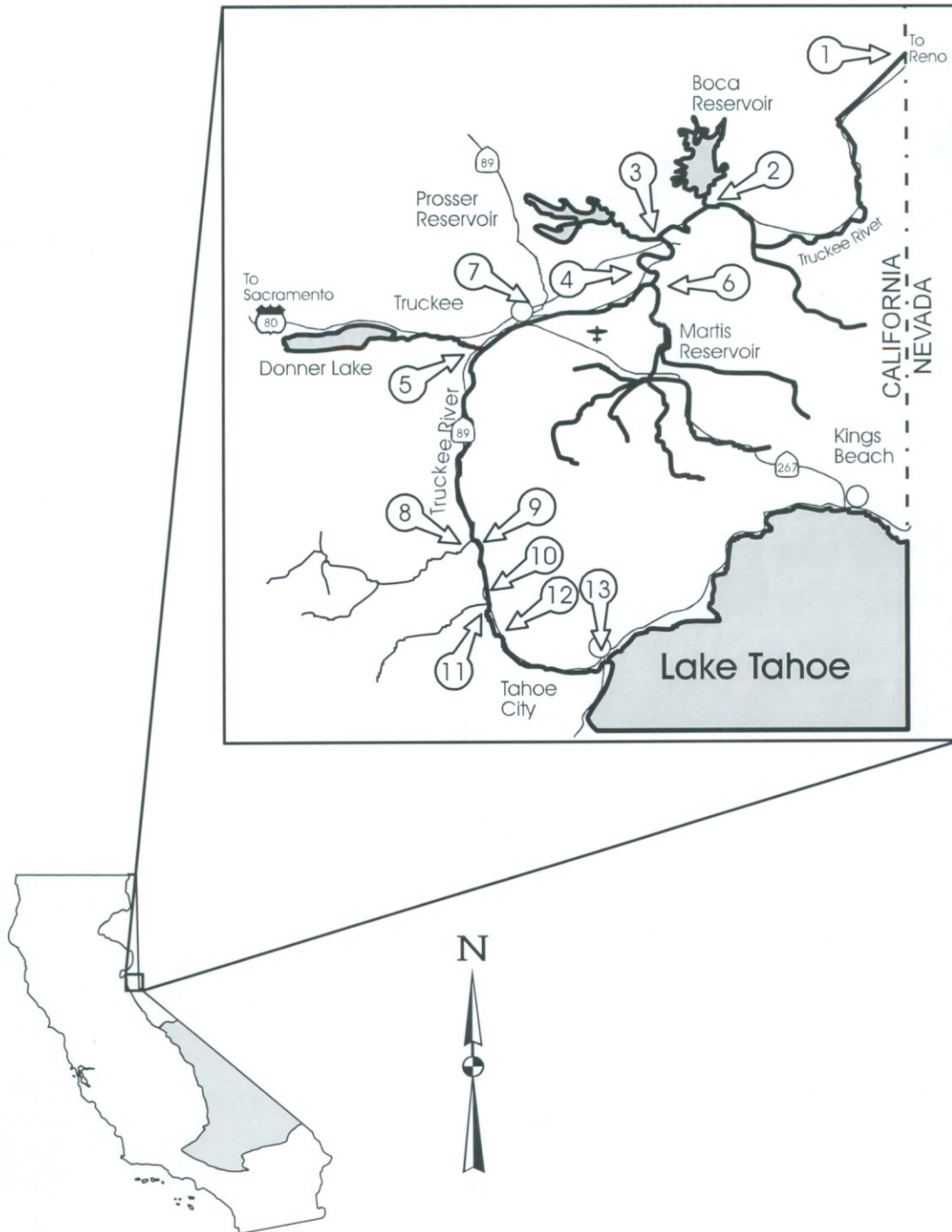
- B Boron
- Cl Chloride
- N Nitrogen, Total
- NO₃-N Nitrogen as Nitrate
- TKN Nitrogen, Total Kjeldahl
- P Phosphorus, Total
- % Na Sodium, Percent:

$$\frac{(Na \times 100)}{Na + Ca + Mg + K} = \% Na$$

Na, Ca, Mg, and K expressed as milliequivalents per liter (meq/L) concentrations.

- SO₄ Sulfate
- TDS Total Dissolved Solids (Total Filterable Residue)

Figure 3-5
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
TRUCKEE RIVER HYDROLOGIC UNIT



APPENDIX: K

Attachment 4 of the NPDES General Permit No. CAS000004

Areas subject to high growth or serving a population of at least 50,000 must comply with the following provisions (for counties this threshold population applies to the population within the permit area).

A. RECEIVING WATER LIMITATIONS

1. Discharges shall not cause or contribute to an exceedance of water quality standards contained in a Statewide Water Quality Control Plan, the California Toxics Rule (CTR), or in the applicable RWQCB Basin Plan.
2. The permittees shall comply with Receiving Water Limitations A.1 through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications. The SWMP shall be designed to achieve compliance with Receiving Water Limitations A.1. If exceedance(s) of water quality objectives or water quality standards (collectively, WQS) persist notwithstanding implementation of the SWMP and other requirements of this permit, the permittees shall assure compliance with Receiving Water Limitations A.1 by complying with the following procedure:
 - a. Upon a determination by either the permittees or the RWQCB that discharges are causing or contributing to an exceedance of an applicable WQS, the permittees shall promptly notify and thereafter submit a report to the RWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQs. The report may be incorporated in the annual update to the SWMP unless the RWQCB directs an earlier submittal. The report shall include an implementation schedule. The RWQCB may require modifications to the report.
 - b. Submit any modifications to the report required by the RWQCB within 30 days of notification.
 - c. Within 30 days following approval of the report described above by the RWQCB, the permittees shall revise the SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, implementation schedule, and any additional monitoring required.
 - d. Implement the revised SWMP and monitoring program in accordance with the approved schedule.

So long as the permittees have complied with the procedures set forth above and are implementing the revised SWMP, the permittees do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the RWQCB to develop additional BMPs.

B. DESIGN STANDARDS

Regulated Small MS4s subject to this requirement must adopt an ordinance or other document to ensure implementation of the Design Standards included herein or a functionally equivalent program that is acceptable to the appropriate RWQCB. The ordinance or other document must be adopted and effective prior to the expiration of this General Permit or, for Small MS4s designated subsequent to the Permit adoption, within five years of designation as a regulated Small MS4.

All discretionary development and redevelopment projects that fall into one of the following categories are subject to these Design Standards. These categories are:

- Single-Family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 or more housing units
- Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

1. Conflicts With Local Practices

Where provisions of the Design Standards conflict with established local codes or other regulatory mechanism, (e.g., specific language of signage used on storm drain stenciling), the Permittee may continue the local practice and modify the Design Standards to be consistent with the code or other regulatory mechanism, except that to the extent that the standards in the Design Standards are more stringent than those under local codes or other regulatory mechanism, such more stringent standards shall apply.

2. Design Standards Applicable to All Categories

a. Peak Storm Water Runoff Discharge Rates

Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

b. Conserve Natural Areas

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- 1) Concentrate or cluster Development on portions of a site while leaving the remaining land in a natural undisturbed condition.
- 2) Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- 3) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- 4) Promote natural vegetation by using parking lot islands and other landscaped areas.
- 5) Preserve riparian areas and wetlands.

c. Minimize Storm Water Pollutants of Concern

Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm water conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, “minimization of the pollutants of concern” will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the *California Storm Water Best Management Practices Handbooks*; *Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide*; *Manual for Storm Water Management in Washington State*; *The Maryland Stormwater Design Manual*; *Florida Development Manual: A Guide to Sound Land and Water Management*; *Denver Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices and Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, USEPA Report No. EPA-840-B-92-002, as “likely to have significant impact” beneficial to water quality for targeted pollutants that are of concern at the site in question. However, it is possible that a combination of BMPs not so designated, may in a particular circumstance, be better suited to maximize the reduction of the pollutants.

d. Protect Slopes and Channels

Project plans must include BMPs consistent with local codes, ordinances, or other regulatory mechanism and the Design Standards to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

- 1) Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
- 2) Utilize natural drainage systems to the maximum extent practicable.
- 3) Stabilize permanent channel crossings.
- 4) Vegetate slopes with native or drought tolerant vegetation, as appropriate.
- 5) Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies

with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.

- e. **Provide Storm Drain System Stenciling and Signage**
Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil contains a brief statement that prohibits the dumping of improper materials into the storm water conveyance system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: “NO DUMPING – DRAINS TO OCEAN”) and/or graphical icons to discourage illegal dumping. Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area. Legibility of stencils and signs must be maintained.

- f. **Properly Design Outdoor Material Storage Areas**
Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system, the following Structural or Treatment BMPs are required:
 - 1) Materials with the potential to contaminate storm water must be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.
 - 2) The storage area must be paved and sufficiently impervious to contain leaks and spills.
 - 3) The storage area must have a roof or awning to minimize collection of storm water within the secondary containment area.

- g. **Properly Design Trash Storage Areas**
A trash storage area refers to an area where a trash receptacle or receptacles (**dumpsters**) are located for use as a repository for solid wastes. Loose trash and debris can be easily transported by the forces of water or wind into nearby storm drain inlets, channels, and/or creeks. All trash container areas must meet the following Structural or Treatment Control BMP requirements (individual single family residences are exempt from these requirements):
 - 1) Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).
 - 2) Trash container areas must be screened or walled to prevent off-site transport of trash.

- h. **Provide Proof of Ongoing BMP Maintenance**

**Attachment 4
To WQO 2003-0005-DWQ**

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. As part of project review, if a project applicant has included or is required to include, Structural or Treatment Control BMPs in project plans, the Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County or other appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation.

- i. Design Standards for Structural or Treatment Control BMPs
The Permittees shall require that post-construction treatment control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:
 - 1) Volumetric Treatment Control BMP

- a) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998); or
 - b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/ Commercial, (2003); or
 - c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for “treatment” that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.
- 2) Flow Based Treatment Control BMP
- a) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or
 - b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Limited Exclusion

Restaurants and Retail Gasoline Outlets, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical Structural or Treatment Control BMP design standard requirement only.

3. Provisions Applicable to Individual Priority Project Categories

a. 100,000 Square Foot Commercial Developments

1) Properly Design Loading/Unloading Dock Areas

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2) Properly Design Repair/Maintenance Bays

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runoff or contact with storm water runoff.
- b) Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas

The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. The area in the site design must be:

- a) Self-contained and/ or covered, equipped with a clarifier, or other pretreatment facility, and
- b) Properly connected to a sanitary sewer or other appropriately permitted disposal facility.

b. Restaurants

1) Properly Design Equipment/Accessory Wash Areas

The activity of outdoor equipment/accessory washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for the washing/steam cleaning of equipment and accessories. This area must be:

- a) Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
- b) If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer or other appropriately permitted disposal facility.

c. Retail Gasoline Outlets

1) Properly Design Fueling Area

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. The project plans must include the following BMPs:

- a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.

- b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- c) The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
- d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

d. Automotive Repair Shops

1) Properly Design Fueling Area

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. Therefore, design plans, which include fueling areas, must contain the following BMPs:

- a. The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
- b. The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- c. The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
- d. At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2) Properly Design Repair/Maintenance Bays

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.
- b) Design a repair/maintenance bay drainage system to capture all wash-water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is

prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas

The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. This area must be:

- a) Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or other appropriately permitted disposal facility.

4) Properly Design Loading/Unloading Dock Areas

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

e. Parking Lots

1) Properly Design Parking Area

Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

- a) Reduce impervious land coverage of parking areas.
- b) Infiltrate or treat runoff.

2) Properly Design To Limit Oil Contamination and Perform Maintenance

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks:

- a) Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores).
- b) Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.

4. Waiver

A Permittee may, through adoption of an ordinance, code, or other regulatory mechanism incorporating the treatment requirements of the Design Standards, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the appropriate RWQCB for consideration. The RWQCB may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the RWQCB EO. The supplementary waiver justification becomes recognized and effective only after approval by the RWQCB or the RWQCB EO. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the RWQCB EO for cause and with proper notice upon petition.

5. Limitation on Use of Infiltration BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994)*.

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Site specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs for areas of industrial activity or areas subject to high vehicular traffic [25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway]. In some cases pretreatment may be necessary.

6. Alternative Certification for Storm Water Treatment Mitigation

In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMP adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets

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the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.