ORDINANCE NO 2007-09

AN ORDINANCE OF GEM COUNTY, IDAHO, ADOPTING HIGHWAY AND STREET STANDARDS FOR DESIGN AND CONSTRUCTION.

1) BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF GEM COUNTY, IDAHO:

2) THAT the attached Exhibit A is hereby adopted to govern highway and street design and construction within the jurisdiction of Gem County. In the event any standard herein conflicts with other federal, state, or local laws and regulations, the stricter requirement shall apply.

3) THIS ORDINANCE SHALL BE IN FULL FORCE AND EFFECT UPON PASSAGE, APPROVAL, AND PUBLICATION ACCORDING TO LAW

4) REGULARLY PASSED AND ADOPTED By the Board of County Commissioners of Gem County, Idaho, on the 13th day of August, 2007.

BOARD OF COUNTY COMMISSIONERS OF GEM COUNTY

Michele Sherrer, Chair

Sharon Pratt, Commissioner

Lan Smith, Commissioner

ATTEST:

Shelly Gannon, Gem County Clerk

8-18-07
Date

INSTRU. NO 261654
PAGES 1 OF 37

Instrument # 261654
EMMETT, GEM, IDAHO
2007-08-24 01:41:00 No. of Pages: 37
Recorded for : BOARD OF COUNTY COMMISSIONERS
SHELLY GANNON Fee 0.00
Ex-Officio Recorder Deputy Judy Evans
Index to: ORDINANCE

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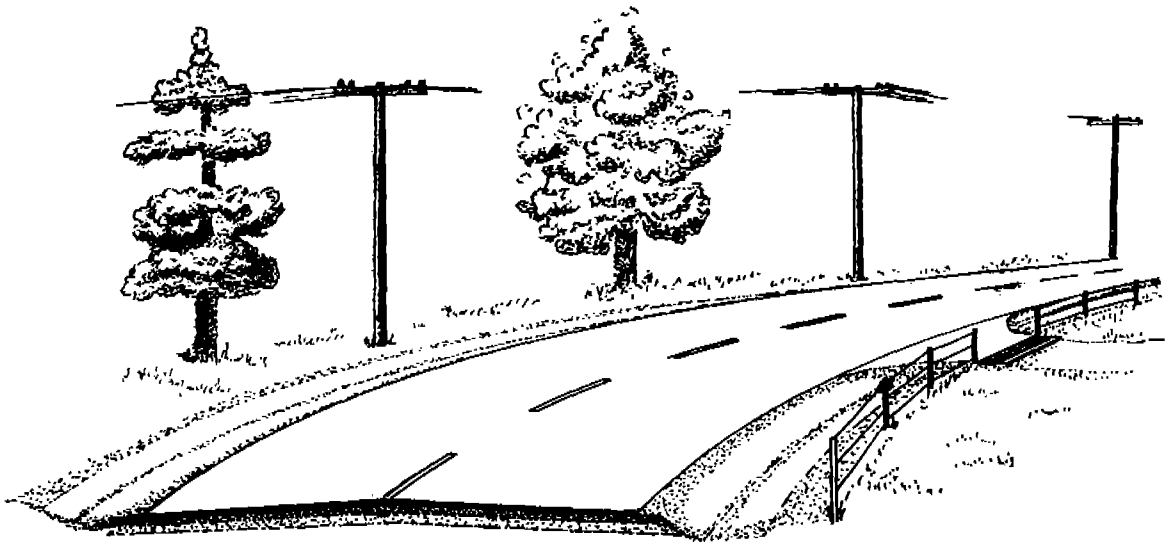
HIGHWAY & STREET

GUIDELINES FOR

DESIGN AND CONSTRUCTION



Local Highway Technical Assistance Council
3330 Grace St.
Boise, ID 83703
(208) 344-0565/1-800-259-6841

November 2001

Adopted and Amended by Gem County on 8-13-2007

HIGHWAY AND STREET GUIDELINES FOR

DESIGN AND CONSTRUCTION

TABLE OF CONTENTS

I. INTENT OF MANUAL

A. LOCAL HIGHWAY JURISDICTIONS, (LHJ)

1. A Local Highway Jurisdiction, (LHJ) is the city, county, or highway district having authority over the public rights-of-way in Idaho. This manual is prepared specifically for the consideration and use by LHJ's.

B. NEED FOR CONTROL AND UNIFORMITY

1. It is the intent of this manual to provide for a uniform roadway network at the local level throughout the state of Idaho. While each LHJ has its own system of street and highways, the need exists for general overall highway and street design and construction guidelines to better serve the public. The overall system is established on maps showing the Functional Highway Classification System in each of the LHJs. These maps are available through the Idaho Transportation Department's district office near your jurisdiction or from LHTAC, 1-800-259-6841 or 344-0565.

2. It is further the intent of these Guidelines to upgrade and maintain the safest highway system available to the LHJ. It is not the intent to put forward conflicting requirements that will detract from the safety of the traveling public.

3. The maintenance of the local highways is the responsibility of the Local Highway Jurisdictions, (LHJs) of Idaho. The intent of these Guidelines is to promote the construction of good streets and highways while reducing the maintenance and repair costs.

4. If any section, subsection, sentence, clause, phrase, or portion of these guidelines is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portions shall be deemed a separate, distinct, and independent provision and such holdings shall not affect the validity of the remaining portions thereof. In the event any standard herein conflicts with other federal, state, or local laws and regulations shall, the stricter requirement shall apply.

C. DISCLAIMER

Nothing herein shall be construed to impose a mandatory requirement or a duty upon the LHJ to construct, reconstruct, or improve existing public streets or highways to comply with these guidelines. The adoption or applications of these guidelines does not create a need for the LHJ's to necessarily upgrade existing roadways to their same level.

II. DEFINITION OF TERMS

- **Applicant** - Any person or persons making application to the Local Highway Jurisdiction, (LHJ).

- **Dedication** - The setting apart of land or interest in land for use by the public. Land becomes dedicated when accepted by the LHJ as a public dedication, either by ordinance, resolution, or entry in the official minutes or by the recording of a plat showing such dedication.

- **Easement** - A grant by the owner of the use of a parcel of land by the public, corporation, or persons for specified use and purposes.

- **Highway** - The entire width between the boundary lines of every way publicly maintained when any part is open to the use of the public for vehicular travel, with jurisdiction extending to the adjacent property line, including sidewalks, shoulders, berms and public rights-of-way not intended for motorized traffic. The terms "street" or "road" are interchangeable with highway.

- **Irrigation Facilities** - Includes canals, laterals, ditches, conduits, gates, wells, pumps, and allied equipment necessary for the supply, delivery, and drainage of irrigation water.

- **Local Highway Jurisdiction, (LHJ)** - The city, county, or highway district having jurisdiction over the public right-of-way. Sometimes referred to as the "Public Highway Agency."

- **Owner** - The person or persons holding title by deed to land or holding title as vendees under a land contract.

- **Plat** - A map of a subdivision:

  Preliminary Plat - A preliminary map, including supporting data, indicating a proposed subdivision development, prepared in accordance with LHJ ordinances and the Idaho Code.

  Final Plat - A map of all or part of a subdivision providing substantial conformance to an approved preliminary plat, prepared by a registered professional engineer or a registered land surveyor in accordance with LHJ ordinances and the Idaho Code.

  Recorded Plat - A final plat bearing all of the certificates of approval required by ordinance and duly recorded in the appropriate County Recorder's Office.

- **Public Right-of-Way** - A right-of-way open to the public and under the jurisdiction of a public highway agency, where the public highway agency has no obligation to construct or maintain said right-of-way for vehicular traffic. A term used to define a specific space.

- **Reserve Strip** - A strip of land between a dedicated street or partial street and adjacent property, in either case, reserved or held in public ownership for future street extension or widening.

- **Roadway** - That portion of a highway improved, designed or ordinarily used for vehicular travel, exclusive of sidewalks, shoulders, berms, and other portions of the public right-of-way.

  Arterial Route - A general term including expressways, and interstate, state or county highways having regional continuity.

  Collector Street or Highway - A street or highway that provides for traffic movement within neighborhoods of the LHJ and between major streets and local street.

  Local Street - A street that provides for direct access to residential, commercial, industrial, or other abutting land for local traffic movements and connects to collector.

    Marginal Access Street - A minor street parallel and adjacent to an arterial route and intercepts local streets and controls access to an arterial route, sometimes referred to as a frontage road.

    Cul-de-sac Street - A local road or street having one end permanently terminated in a vehicular turnaround.

    Loop Street - A minor street with both terminal points on the same street of origin.

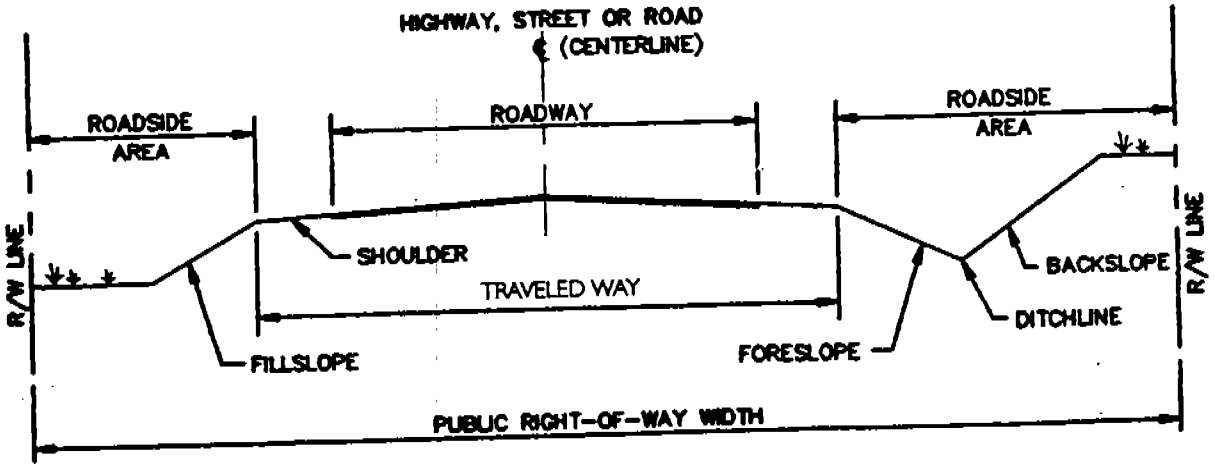
    Alley - A public way of limited use intended only to provide access to the rear or side of lots or buildings in urban districts.

- **Subdivider** - A subdivider shall be deemed to be the individual, firm, corporation, partnership, association, syndication, trust, or other legal entity having sufficient proprietary rights in the property to represent the owner, that submits the required subdivision

application and initiates proceedings for the subdivision of land in accordance with appropriate procedures.

- **Subdivision** – the definition shall be as set forth in the Gem County Subdivision Ordinance.

- **Traveled Way** - The portion of the roadway for the movement of vehicles, exclusive of ditches and roadside areas.



- **Utility Facilities** - Installations or facilities, underground or overhead, furnished for use by the public, including but not limited to: electricity, gas, steam, television, communications, water, drainage, irrigation, sewage disposal, or flood control, owned and operated by any person, firm, corporation, municipal department, or board duly authorized by state or municipal regulations. Utility or utilities as used herein may also refer to such persons, forms, corporations, departments, or boards, as applicable herein.

III. DESIGN CRITERIA

A. GENERAL DESIGN CRITERIA

1. These guidelines are based upon the American Association of State Highway and Transportation Officials, (AASHTO) Policy on Geometric Design of Highways and Streets, current edition. All design shall be based on these guidelines and the applicable design criteria set forth by AASHTO. Any variation from these design guidelines should be done on a detailed basis in conformance with sound engineering judgment and with the safety of the traveling public in mind.

B. ROADWAY CLASSIFICATION

1. All roadways within each LHJ are classified in accordance with the appropriate Federal Highway Administration legislation. All streets and highways are classified as arterials, collectors, or local roads and streets. It shall be the prerogative of each LHJ, having jurisdiction over the area to be developed, to define the roads within subdivisions and their classification as arterials, collectors, or local roads and streets. The system maps showing the classifications are on file with each LHJ or at the Idaho Transportation Department's six district offices.

C. PUBLIC HIGHWAY AND STREET RIGHT-OF-WAY

1. The width of the public highway and street right-of-way for each classification is as follows:

TYPE OF ROADWAY	MINIMUM WIDTH OF PUBLIC RIGHT-OF-WAY
Minor Arterial	100 - 120 feet
Major Collector	100 feet
Minor Collector	80 feet
Local Roads and Streets	60 feet

Additional widths may be required for accommodation of extreme cut or fill sections. Unless otherwise approved by the Board of County Commissioners, all cut and fill slopes and sections must be located within the right-of-way.

Table 1 - Recommended Right-of-Way Widths

2. Cul-de-sacs shall have a minimum right-of-way of a 70-foot radius with additional highway right-of-way as needed to accommodate unusual cut and fill sections. Cul-de-sacs of a temporary nature may be allowed, providing each public right-of-way is shown on the plans or plat and approved by the LHJ. A standard cul-de-sac layout is shown in Figure I.

3. All intersections of highway right-of-way lines at street and highway intersections and at cul-de-sac bulbs shall be connected by a curve having a minimum radius of twenty feet (20').

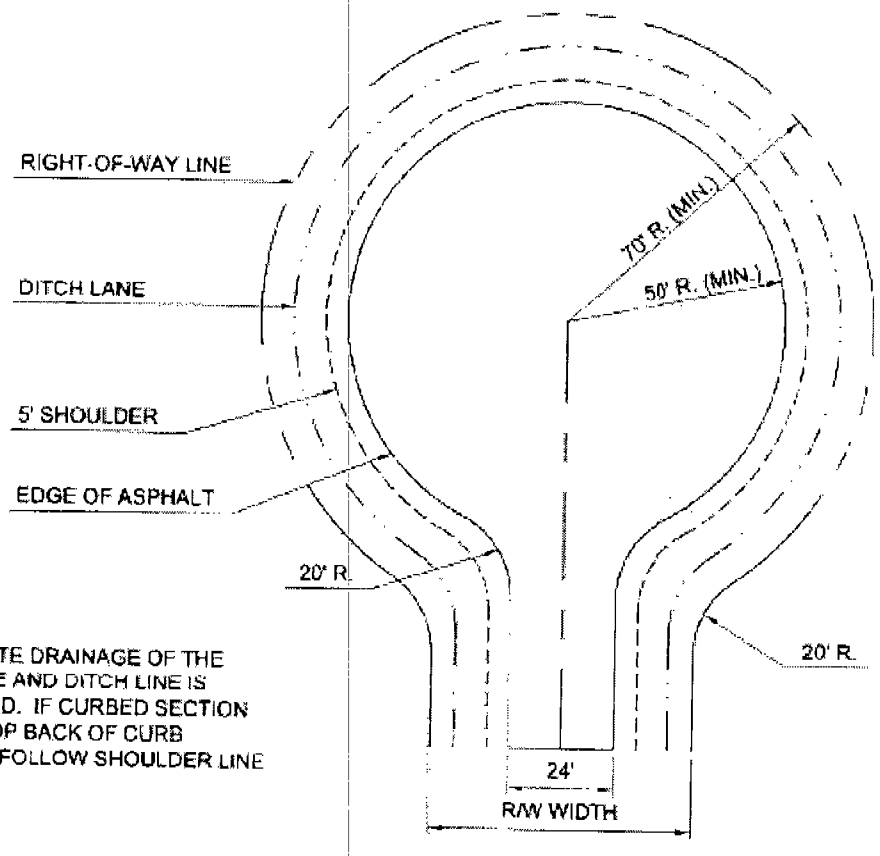
D. ALIGNMENT

1. The following table is intended to show the minimum and maximum values for various parameters used in design criteria for the three classes of streets and highways to be designed. Modification by the LHJ on an individual project by project basis may be accomplished under each jurisdiction's appropriate procedures.

DESIGN PARAMETER	ARTERIAL	COLLECTOR	LOCAL ROADS AND STREETS
Vertical Grades*	Minimum 0.5% Maximum 6%	Minimum 0.5% Maximum 6%	Minimum 0.5% Maximum 6%****
Horizontal Curvature	7° Min. Radius 839 Ft.**	11.5° Min. Radius 510 Ft.**	25° Min. Radius 250 Ft.**
Design Speed	35 - 60 mph	35 - 45 mph	25 - 35 mph
Super Elevations	Max 0.06 ft. per foot	Max 0.06 ft. per foot	Max. 0.06 ft. per foot
Min. Runoff Length	150 Ft. ***	120 ft.***	110 ft. ***
Angles of Intersection	80 - 90°	80 - 90°	70 - 90°

* Roadways constructed using curb and gutter sections may have a minimum grade of 0.35%
** Radius measured to centerline of roadway
*** Runoff length dimension from full superelevation to full crown section
**** May be increased to 10% for emergency access purposes

Table 2 - Geometric Design Criteria



NOTE:
ADEQUATE DRAINAGE OF THE SURFACE AND DITCH LINE IS REQUIRED. IF CURBED SECTION USED, TOP BACK OF CURB SHOULD FOLLOW SHOULDER LINE SHOWN.

STANDARD CUL-DE-SAC LAYOUT

Figure I

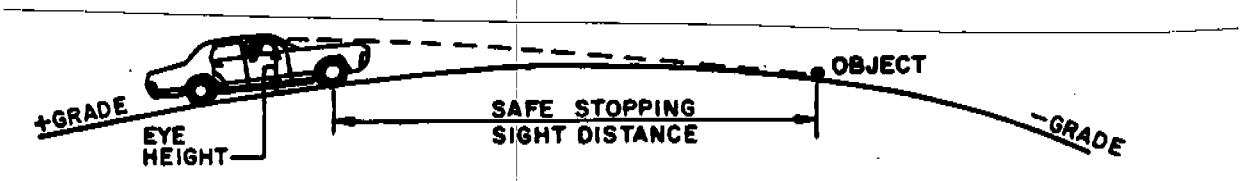
E. STOPPING AND PASSING SIGHT DISTANCE

1. The stopping and passing sight distances shall be at least the minimum shown in the following table for the design speed used on the roadways.

MINIMUM SIGHT DISTANCES IN FEET							
Design speed MPH	20	25	30	35	40	50	55
Stopping sight distance: **Stopping distance, feet:** **AASHTO figure 3.1, page 112**	115	155	200	250	305	425	495
K value for: * **Crest vertical curve** **Sag vertical curve**	7 17	12 26	19 37	29 49	44 64	84 79	114 96
Passing sight distance: **Passing distance, ft.** **2-lane** **AASHTO page 124**	710	900	1090	1280	1470	1625	1835
K value for: * **Crest vertical curve**	180	289	424	585	772	943	1203

*Note: K value is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Table 3 - Minimum Sight Distances



Height of Eye = 3.50' above road surface
Object Height = 2.0' (tail light of a passenger car)

Figure II - Sight Distance Measurement

F. ROADWAY CROSS-SECTION

1. The typical roadway details are included in Figures, III, IV, V, and VI of these guidelines which show the cross-section characteristics required for roadways within the LHJ. The details are for both rural and urban situations.

2. For industrial type subdivisions, the typical curb and gutter section shall be used with a forty-foot (40') face to face of vertical curb and gutter. The asphalt thickness shall be at least four (4) inches in depth.

3. The typical curb and gutter section shown on the typical roadway details shall be required on subdivisions having density of one home per acre or greater.

4. Approaches shall be in conformance with the Manual for Use of Public Right-of-Way Standard Approach Policy, LHTAC, current edition.

5. All irrigation facilities shall be removed and maintained outside the public right-of-way. Highway ditches may not be used for conveying irrigation water of any type.

6. The roadway cross-section outside the paved area and inside the remaining public right-of-way shall follow the general guidelines of the Roadside Design Guide, published by AASHTO, current edition. This Guide shall be used to determine safety characteristics for any appurtenance such as signing, rock outcrops, or general hazards to the traveling public.

G. DRAINAGE

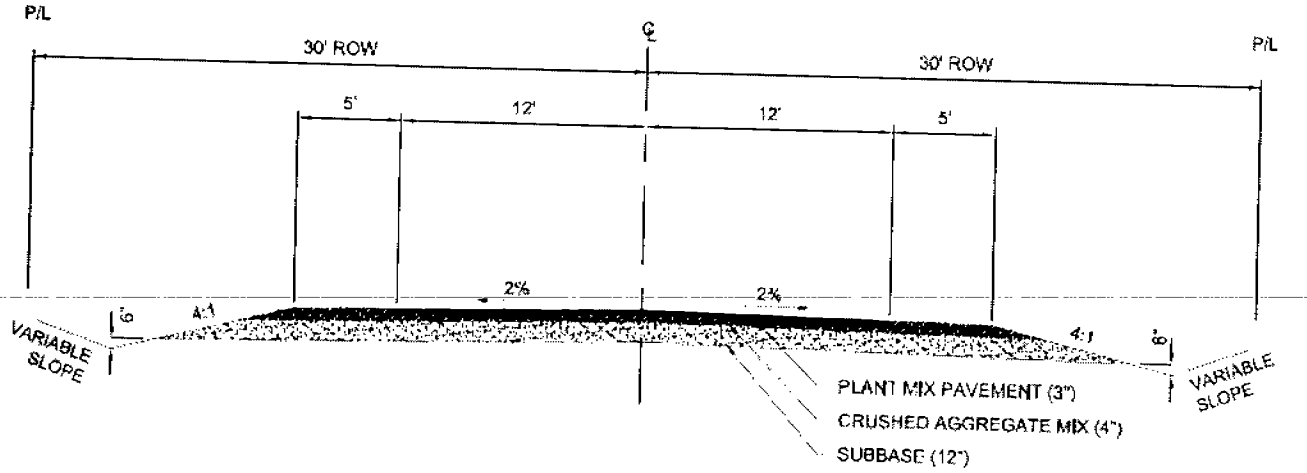
1. All drainage facilities for the project shall be designed by a registered professional engineer and approved by the LHJ in conjunction with the roadway plans. The design shall be based on the Idaho Transportation Department's publication, Urban Storm Sewer Design for Idaho Highways, latest edition, or procedures as set forth by the LHJ. The design storm return period shall be at least ten (10) years. Any disruption of the normal drainage pattern of the area to be developed must have special consideration to accommodate future drainage.

TABLE 4

CLASS OF ROADS	SUBBASE OR BALLAST	BASE COURSE	PLANT MIX PAVEMENT	PAVEMENT WIDTH	RIGHT OF WAY WIDTH (FT)
LOCAL ROADS	12"	4"	3"	24'	60'
MINOR COLLECTOR	16"	4"	3"	30'	80'
MAJOR COLLECTOR	18"	4"	4"	36'	100'
MINOR ARTERIAL	24"	4"	4"	36'	100'

ROAD STRUCTURE SECTIONS MAY VARY FOR POOR SOIL CONDITIONS. CHANGES TO THESE SECTION REQUIREMENTS WILL BE BASED ON A GEOTECHNICAL REPORT PREPARED BY A REGISTERED PROFESSIONAL ENGINEER OR GEOLOGIST.

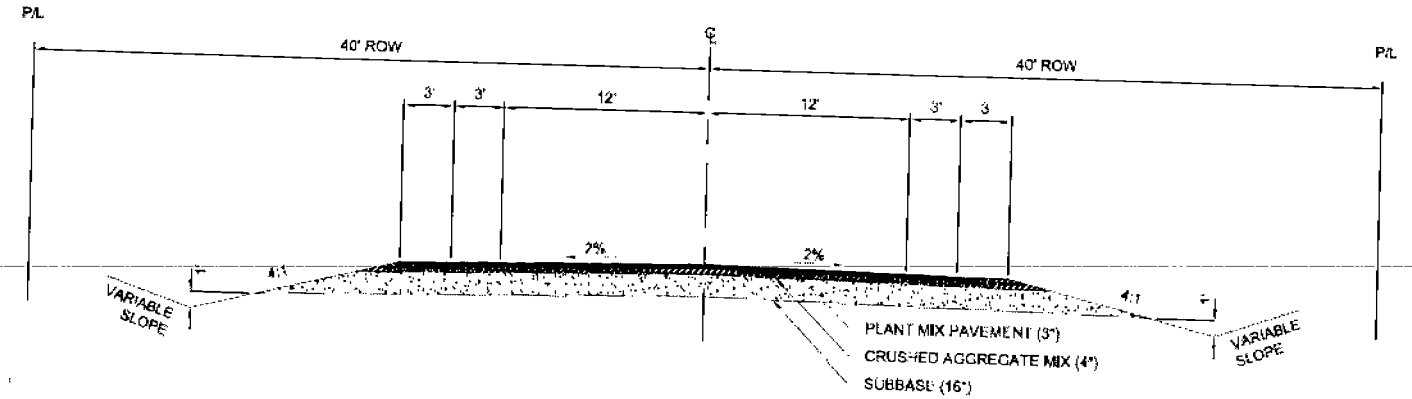
GEM COUNTY ROAD STRUCTURE SCHEDULE



GEM COUNTY - 2 LANE LOCAL ROAD SECTION

N.T.S.

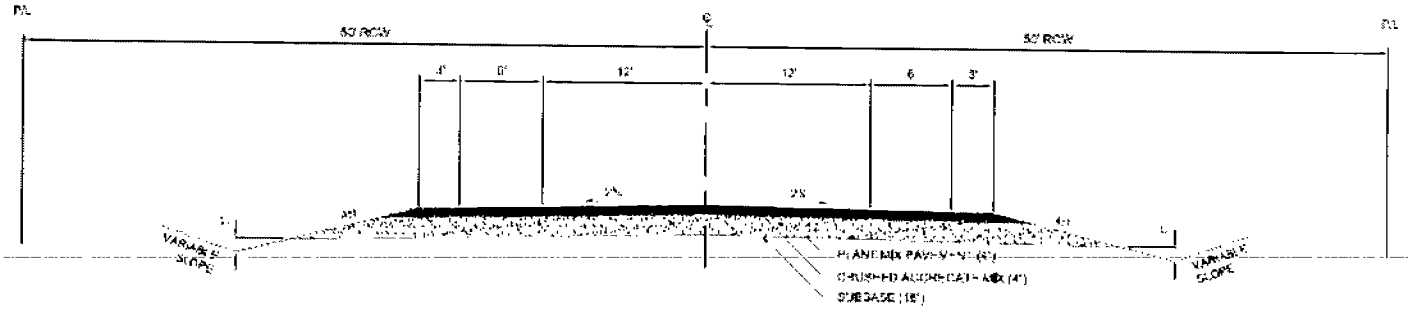
FIGURE III



GEM COUNTY - 2 LANE MINOR COLLECTOR SECTION

N.T.S.

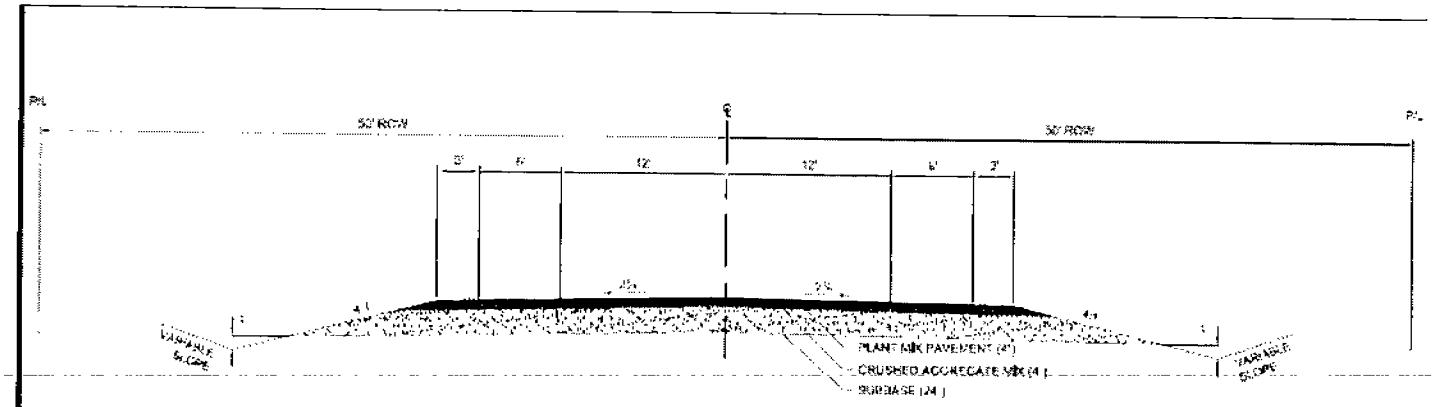
FIGURE IV



GEM COUNTY - 2 LANE MAJOR COLLECTOR SECTION

N.T.S.

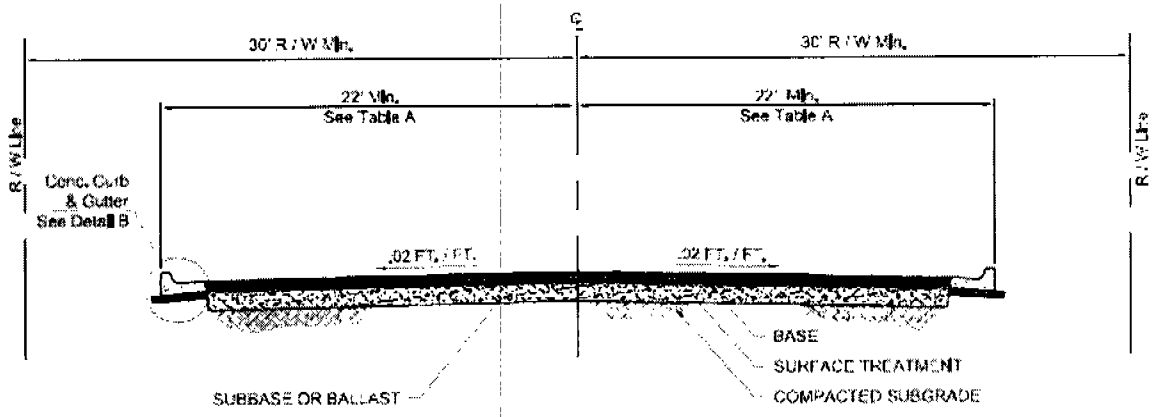
FIGURE V



GEM COUNTY CIP PLAN - 2 LANE MINOR ARTERIAL SECTION

N.T.S.

FIGURE VI



RECOMMENDED TYPICAL URBAN CURB & GUTTER SECTION

N.T.S.

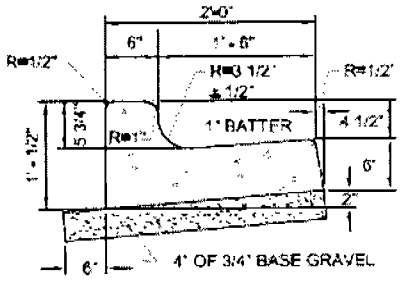
TABLE A

CLASS OF ROAD	ROAD WIDTH BACK TO BACK OF CURB	RIGHT OF WAY WIDTH (FT)	CURB TYPE
LOCAL RESIDENTIAL	44' - 0'	60'	ROLLED OR VERTICAL
MINOR COLLECTOR	44' - 0'	80'	VERTICAL
MAJOR COLLECTOR	44' - 0'	100'	VERTICAL
MINOR ARTERIAL	60'	120'	VERTICAL

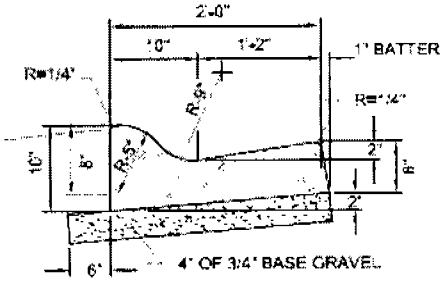
THICKNESS OF MATERIALS SAME AS RURAL SECTION, SEE STANDARD DWG. _____

DETAIL B

N.T.S.



VERTICAL CURB



ROLLED CURB
(LOCAL ROADS ONLY)

FIGURE VII

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G. DRAINAGE, continued...

2. Culverts used for drainage purposes shall be of corrugated steel or concrete with the thickness and cover over the top of the pipe being in conformance with the following table (other types of materials may be used when approved by the LHJ):

DIAMETER INCHES	STEEL THICKNESS INCHES ***	CONCRETE CLASS**	COVER REQUIRED *
12" through 36"	0.064	V	12" minimum

* Cover may be reduced to six inches (6") on residential driveways.

** Other classes of concrete pipe may be used if proper cover is provided in accordance with manufacturer's recommendations.

*** Using corrugated metal pipe with 2 2/3" x 1/2" corrugations. Culverts or mutiplate installations larger than 36" in diameter or any structure under extreme fills shall have special consideration.

Table 4 - Culvert Requirements

3. Culverts across the roadways shall be a minimum of twelve inches (12") diameter or the size necessary to take care of the design volume of water, whichever is greater. Culverts under approach roads or driveways shall have a minimum diameter of 12", a minimum length of thirty feet (30'), and shall meet the requirements of Section G,2. Combined irrigation/drainage culverts crossing roadways shall have clean-out boxes on each end at the edge of the public right-of-way.

4. All necessary drainage easements for accommodating drainage structures shall be shown and recorded on the plans or the plat as a part of the approved plans or plat. Drainage easements necessary for draining storm water across private property shall be shown on the plans or plat and recorded with the LHJ by a letter from the Applicant describing the areas containing the easements such as lot lines, blocks, etc.

5. Disruption of natural drainage ditches and subsequent use of the roadway ditch to convey the natural drainage should not be acceptable.

6. Dry wells may be used in special circumstances where all other possibilities of taking care of storm water drainage have been explored and there is no feasible alternate to dry well installation. Should drywells be necessary, they shall be designed by a registered professional engineer, licensed in Idaho.

7. When a curb and gutter roadway section is proposed, a complete storm sewer system must be designed and constructed under the review of a registered professional engineer. Storm water disposal and maintenance thereof may be the responsibility of the developer or a homeowner's association.

H. STRUCTURES

1. Bridge structures shall be designed by a professional engineer, registered in the state of Idaho, in accordance with AASHTO Standard Specifications for Highway Bridges, latest edition.

   The design vehicle for bridge design shall be a minimum HS-20 truck.

   The minimum width of a bridge structure from the face-to-face of curb or the face-to-face of the guardrail or bridge rail shall be the full width of the approach roadway including pavement width and shoulder width, plus two feet eight inches (2'-8").

   The vertical clearance above waterways shall be two feet above the 50 year flood, and sixteen feet (16') over other roadway surfaces.

   Only structures of steel, steel and concrete, or treated wood shall be used. The Local Highway Jurisdictions may approve other materials.

2. Retaining walls shall be either reinforced concrete, bin walls, reinforced earth, or concrete crib walls. All retaining wall structures shall be designed by a registered professional engineer and shall be approved by the applicable LHJ prior to their construction.

I. SIGNING

1. All traffic control devices (signing, pavement markings, and traffic signals) shall be shown on any design plans. The traffic control devices and their application shall conform to the Uniform Manual of Traffic Control devices as adopted in Idaho.

All signs shall be installed by the Applicant prior to the acceptance of the project by the LHJ, unless approved otherwise by the LHJ.

2. All temporary traffic control shall conform to the MUTCD, latest edition.

J. GUARDRAIL

1. Guardrail may be necessary in certain areas depending upon the need for protection of the traveling public. The LHJ reserves the right to determine the need for guardrail under each separate circumstance. The guidelines of the AASHTO Roadside Design Guide, latest edition shall be used when developing appropriate and cost effective roadside safety provisions.

2. The type of guardrail to be installed shall be determined by each LHJ based on need, location and maintenance considerations.

K. STRIPING OR PAVEMENT MARKINGS

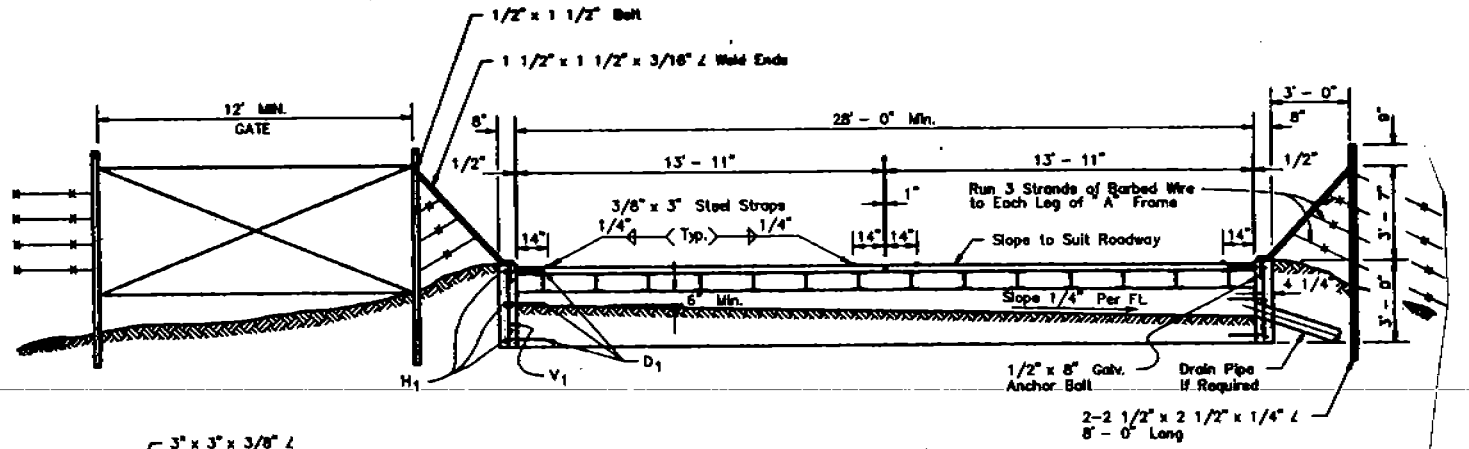
The LHJ shall determine pavement marking requirements subject to MUTCD requirements. The color, pattern and dimensions of marking shall be in conformance with the MUTCD, latest edition. Paint quality shall be the same as that used by the Idaho Transportation Department for their pavement markings.

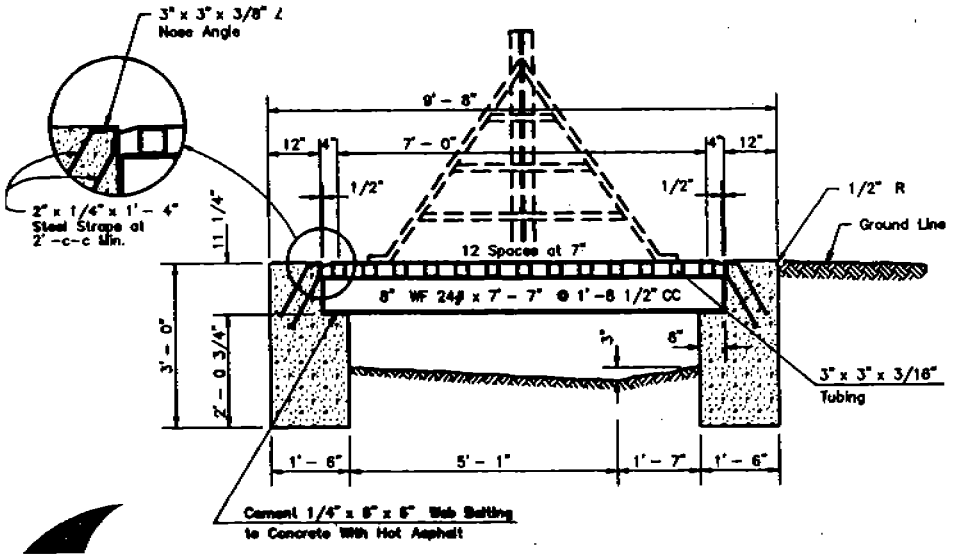
L. CATTLE GUARDS

1. Cattle guards shall be constructed in conformance with, Figure – VIII. Other types of cattle guards may be approved by the various LHJs as appropriate from their individual experience.

   Section 40-2310, Idaho Code, regulates the installation of cattle guards on local highways and shall be referenced when the question arises. Cattle guards shall be placed on private property when necessary on private approaches.

   Section 40-203(5), Idaho Code, speaks to obstruction of the public right-of-way and the misdemeanor offense involved.





REINFORCEMENT STEEL				
MARK	LOCATION	SIZE NO.	TOTAL LENGTH	NO. REQ'D
V_1	END WALLS	4	2' - 8"	18
H_1	END WALLS	6	9' - 4"	6
D_1	DOWELS	4	1' - 4"	24
80 L.F. NO. 4 BARS AT .668 LB./FT.= 53 LB.				
56 L.F. NO. 6 BARS AT 1.502 LB./FT.= 85 LB.				

SEE I.T.D. STD. DWG. F-1-A FOR FURTHER DETAILS.

CATTLE GUARD

N.T.S.

Figure VIII

IV. CONSTRUCTION SPECIFICATIONS

A. CLEARING AND GRUBBING

1. Clearing and grubbing shall consist of the removal and disposal of all organic and other deleterious material from the public right-of-way. All material removed under clearing shall be disposed of off of the public right-of-way.

B. SUBGRADE

1. The subgrade shall consist of the natural materials remaining after all topsoil and duff, (organic material) have been removed and good construction material is remaining. The determination of the extent to which topsoil shall be removed shall be left to the discretion of the LHJ, who may require soil and compaction test results to document the acceptability for construction.

2. In solid rock excavation, the solid rock shall be excavated to six inches (6") below the finished subgrade elevation and back-filled with approved granular materials.

3. Unstable subgrade conditions shall be remedied by sub-excavation and back-filling with approved granular material under the direction of the LHJ representative. Geotextile material may be required.

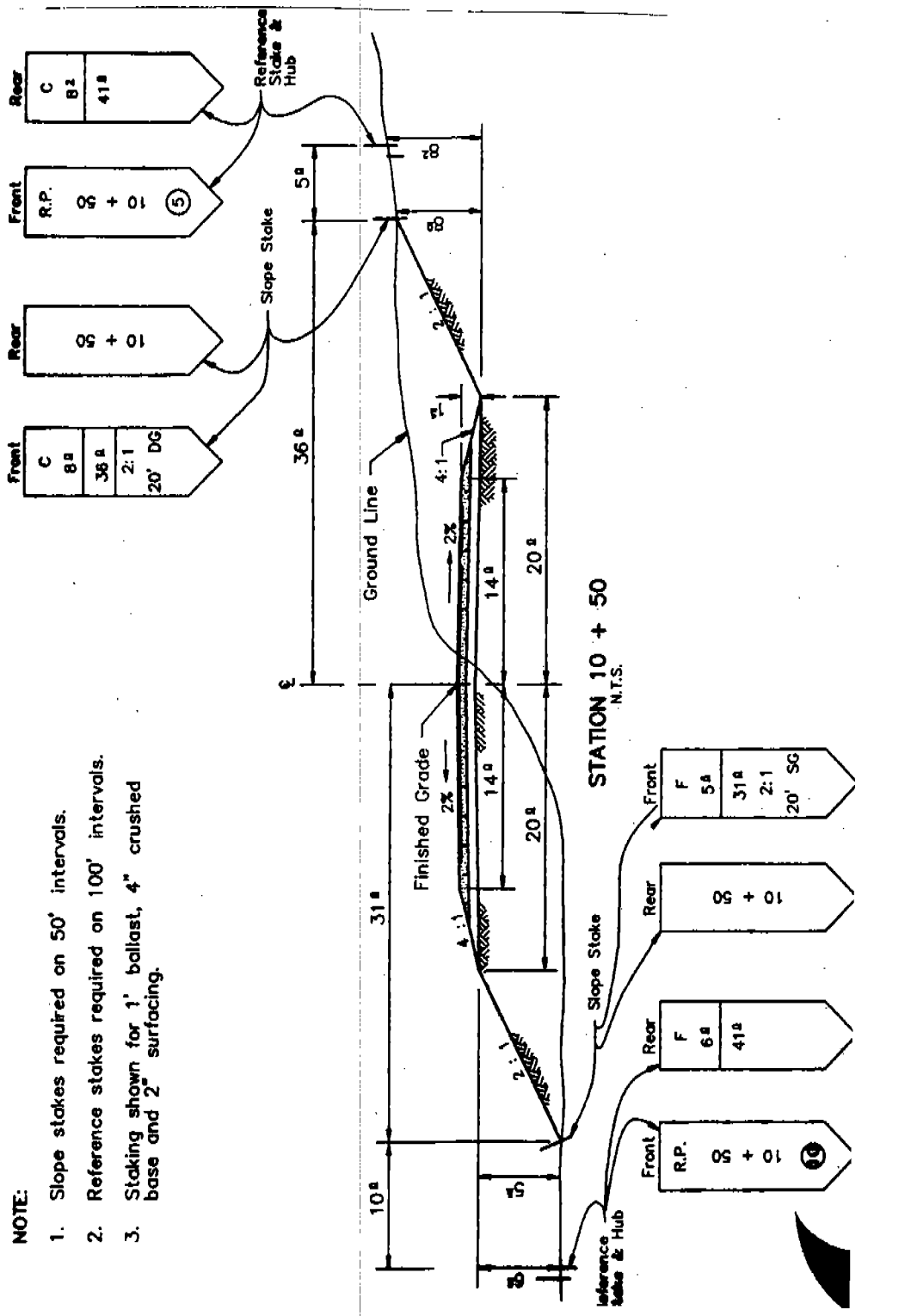
4. All construction shall be controlled by slope stakes or grade stakes that have been placed by a professional engineer or professional surveyor licensed in the State of Idaho prior to the construction operations. Said slope stakes shall conform to the Typical Slope Stake Installation Method, Figure IX.

5. Subgrade shall be compacted to a density no less than ninety-five percent, (95%) of the AASHTO T-99 Proctor Density.

6. The subgrade shall be observed by the LHJ representative prior to placing any ballast on the subgrade. The LHJ must have at least twenty-four (24) hours notice prior to the need for observation. Such 24 hours notice shall be given so that the observation can be made during the LHJ's normal working hours and work week.

Figure IX

Note: The slope for the finished grade shall be ____ and ____



Prior to requesting observation of the finished subgrade, grade stakes set to finished subgrade elevation shall be in place on fifty foot (50') stationing at centerline and shoulders or ditch, unless a variance is granted.

C. SUB-BASE OR BALLAST

1. Approved pit run material shall be used for the ballast course which shall be placed to a minimum of twelve inches (12") in thickness. The material shall be durable, have a sand equivalent not less that 30, and shall meet the following gradations:

SIEVE SIZE	% PASSING
6"	100
3"	98-100
2"	75-100
1"	40-80
#4	25-60
#200	5-12

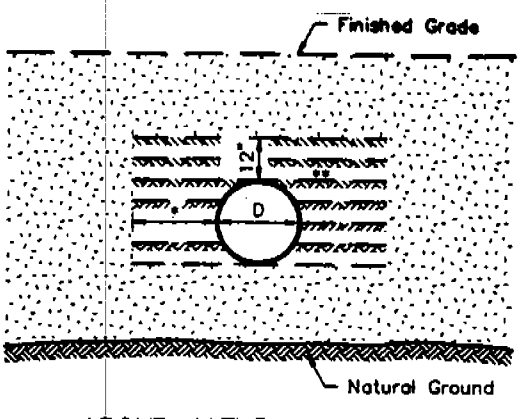
Table 5 - Sub-base or Ballast Gradations

2. The ballast material shall be constructed in layers not to exceed eight inches (8") in thickness and shall be compacted using mechanical methods to at least ninety-five percent, (95%) of the AASHTO T-99 Proctor Density.

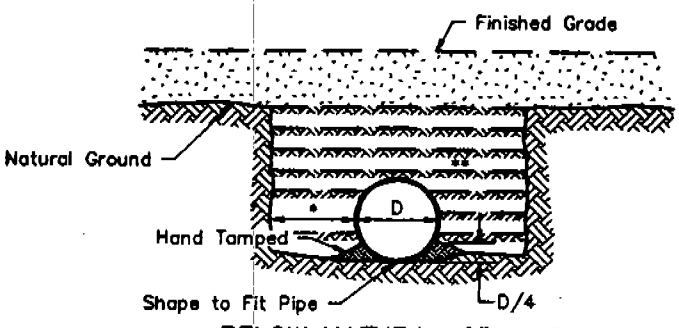
3. Observation of the ballast is necessary by the LHJ prior to the placing of base material. The LHJ must have at least twenty-four (24) hours notice prior to the need for the observation. Such 24 hours notice shall be given so that the observation can be made during the appropriate LHJ's normal working hours and work week.

   Prior to requesting observation of the finished ballast, red top stakes set to finished ballast elevation, shall be in place on fifty foot (50') stationing at centerline and shoulders.

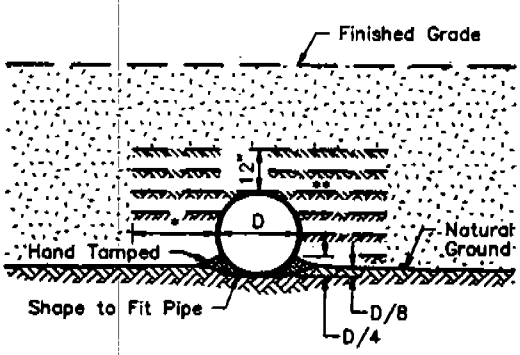
4. All culvert installations crossing the highway or street shall be installed before any base material is placed. Installation shall conform to Figure X.



ABOVE NATURAL GROUND



BELOW NATURAL GROUND



ON NATURAL GROUND

NOTE: * D or 12" whichever is greater

** Mechanical compacted backfill. Place in 6" layers. Each LHS shall specify the type of material to be used for backfill.

TYPICAL CULVERT INSTALLATION

N T S

Figure X

D. BASE MATERIAL

1. The crushed aggregate for the base course shall be four inches (4") in depth after it has been compacted and shall comply with the following gradations:

SIEVE SIZE	% PASSING
1"	100
3/4"	90-100
#4	40-65
#8	30-50
#200	3-9

Table 6 - Base Material Gradation

The crushed aggregate base shall not show more than a loss of thirty-five percent (35%) under the Los Angeles Abrasion Test and the sand equivalent shall not be less than 30.

2. The material shall be laid in one or more layers to develop the compacted depth of four inches (4") minimum. Material shall be mechanically compacted by rolling to ninety-five percent (95%) of the AASHTO T-99 Proctor Density. Care shall be taken to see that the aggregate is placed in such a manner that it will have uniform mixture throughout.

3. The finished base material must be observed and approved by the LHJ prior to placing the surface course. The notification for the observation must be twenty-four (24) hours prior to the observation and must be requested for observation during the appropriate LHJ's normal working hours and work week.

   Prior to requesting observation of the finished base material, blue top stakes will be set to finished base elevations at fifty foot (50') stationing on curves and one hundred foot (100') stationing on tangents at centerline and shoulders.

   The surface of any base course, when finished, shall be such that when tested with a ten foot (10') straightedge placed on the surface with its centerline parallel to and perpendicular to the centerline of the street, the maximum deviation from the surface of the edge of the straight edge shall nowhere exceed 0.04 of a foot. In addition, the finished grade shall not deviate more that 0.05 of a foot at any point from the staked elevation.

If asphalt concrete surfacing is to be placed on the base course, no portion of the complete surface of the base course shall be more than 0.04 of a foot below the edge of a straight ten feet (10') in length laid parallel to and perpendicular to the centerline of the roadway. In addition, the finished grade shall not deviate more that 0.03 of a foot at any point from the staked elevation.

Should patching of the base course be necessary in order to meet the above tolerances, it shall be performed using methods and aggregates approved by the LHJ or designated representative.

E. SURFACING

1. The surface type shall be approved by the applicable LHJ, but can generally be considered one of four types: the hot mix asphalt concrete; the three shot asphalt chip surface; the emulsion type treatment with chip seal; and, cutback asphalt cold mix with chip seal. The LHJs may choose to only allow one type and thickness of surfacing throughout the Gem County highway system.

2. Equipment used for asphalt construction, regardless of the type of surface treatment, shall meet the following criteria for each type of equipment.

   a) The bituminous mixture hauling trucks shall be pneumatic tired and equipped with a smooth-lined tight dump body free from cracks, holes or deep dents capable of hauling material without loss during transit. Dump body and gate shall be capable of control discharge onto the road bed or into approved spreaders or pavers when required. The dump body shall be constructed or equipped to retain the heat of the mixture above the minimum specified for lay-down.

   b) Motor graders shall be a pneumatic tired, self-propelled machine with sufficient power and traction and adequate wheel base to efficiently perform the work.

   c) Bituminous pavers shall be self-contained, power propelled units provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of bituminous plant mix

material in lane widths applicable to the specified typical section in thickness as shown on the plans. The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed. The screed or strike-off assembly shall effectively produce a finished surface of the required smoothness and texture without tearing, shoving or gouging the mixture. The paver shall be capable of being operated when laying mixtures at forward speeds consistent with satisfactory laying of the mixture. The paver shall be in good working order and subject to the review of the applicable LHJ.

d) Rollers shall be of the pneumatic-tired, steel-wheeled or vibratory steel-wheeled type and shall be in good working order.

(1) The pneumatic tired roller shall be of between 30-40 ton capacity, have seven wheels as a minimum with pneumatic tires of equal size and ply. Tires shall be uniformly inflated so that the air pressure of the several tires will not vary by more that five pounds per square inch. The rollers may be operated with tire inflation pressures and wheel needs within the range of the manufacturer's recommendations on the size and ply of tire being used. The wheels shall be staggered on the front and rear axles to provide complete coverage of the area on which the rollers travel. Rollers shall be capable of starting, stopping and reversing directions smoothly without jerking or backlash, and shall be equipped with positive accurate steering control. Wobble wheel rollers will not be permitted for the compaction of paver-laid base or the final rolling of the last bituminous mixed course. When used to compact paver-laid asphalt, the rollers shall be equipped with smooth tread tires close fitting scrapers for each wheel and a system for uniformly washing the wheels without excessive water. Power units shall have adequate power and traction to move the roller at variable speeds under normal rolling conditions. The roller shall have an effective rolling width of not less than sixty inches (60").

(2) A smooth-faced steel wheel roller shall be of a two axle or three axle tandem design and when fully ballasted shall have a gross weight of eight tons or more, with no specified contact pressure. All smooth faced steel wheel rollers shall be self-propelled and capable of starting, stopping, and reversing directions smoothly without jerking or backlash. Rollers shall be equipped with positive accurate steering control. The face of all rollers shall be smooth and free from defects which will mar the surface of the material being compacted. Each wheel or roller shall be equipped with adjustable spring scrapers and a system shall be provided for uniformly moistening the full width of each roller or wheel without an excess of water. No diesel fuel is allowed on roller surfaces.

(3) Vibratory compactors of the roller type shall have a minimum width of sixty inches (60"), a minimum static load of sixty (60) pounds per inch of width and generate a minimum centrifugal force of 250 pounds per inch of width based on the manufacturer's rating. Compactors shall be operated in accordance with the manufacturer's recommendations at a speed of two to five miles per hour.

e) The asphalt distributor must be in good working order and shall be designed and operated so a uniform application of asphalt can be applied. It must include a tachometer showing the feet per minute and the number of feet covered, a tank thermometer, and a gauge to measure the quantity of the asphalt in the distributor.

f) The aggregate spreader shall be a self-propelled machine independent of the truck, supported by at least two axles and four wheels with pneumatic tires and equipped with a means of applying cover material with positive controls so material will be uniformly deposited over the full width of the asphalt application.

3. Hot Mix Asphalt Concrete:

a) The hot mix asphalt concrete surfacing may be used providing it meets the following requirements and is constructed under the direction of the applicable LHJ.

b) The mix used for the hot mix asphalt concrete must be an approved asphalt mix design. Mix design characteristics must be submitted and approved by the applicable LHJ prior to its use.

c) The aggregate used in the asphalt concrete mix must meet the following gradation:

SIEVE SIZE	% PASSING
3/4"	100
1/2"	95-100
3/8"	75-90
#4	50-75
#8	35-60
#30	15-35
#50	10-35
#200	4-8

Table 7 - Hot Mix Aggregate Gradation

It must have a Los Angeles Wear showing not greater than 30% loss, a Sand Equivalent greater than 40, and not have over 2% absorption. Not less than 60% by weight of the aggregate particles retained on the No. 4 sieve shall have at least two fractured face.

d) The asphalt shall be an 85/100 type penetration or the equivalent AC-10. Performance based asphalt grades may be used if approved by the LHJ.

e) The asphalt mix shall be laid only when the ambient air temperature is greater than 55 degrees Fahrenheit and rising and the mix is at a temperature not less than 235 degrees, nor more that 280 degrees Fahrenheit.

f) After lay-down by a paving machine, the mixture shall be thoroughly and uniformly compacted with power rollers. Rolling of the mix shall begin as soon after spreading as it will bear the roller without undue displacement or hairline cracking. Initial rolling shall be done longitudinally. The rollers shall overlap on successive trips. Alternate trips of the roller shall be slightly different lengths. Unless otherwise directed, the initial or

breakdown rolling shall consist of one complete coverage of the paving mixture performed with a two-axle tandem roller. Initial breakdown rolling shall be followed by three complete coverage's with a pneumatic-tired roller while the temperature of the mixture is at, or above 140 degrees Fahrenheit. The final rolling shall be performed by a three-axle steel-wheeled tandem roller. Rolling shall be performed in such a manner that cracking, shaving, or displacement shall be avoided. Final rolling shall be completed the same day the pavement is placed. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until all rolling marks are eliminated, and the surface is of uniform texture and true to grade and cross section. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened. Excessive water will not be permitted on the roller surfaces. The use of diesel fuel on the roller surfaces is strictly prohibited.

The final mat thickness after compaction shall be no less than the depth prescribed by the LHJ.

The completed Hot Mix asphalt concrete surface course shall have a field density equal to or greater than the percentages shown below:

1. Residential street section shall be a minimum of 95%.

2. Industrial, arterial, or collector streets shall be 97%.

In residential street sections when utilizing a correlated nuclear densitometer used in the backscatter mode, the allowable tolerance ranges shall be:

1. A minimum of 92% at any test location.

2. A minimum of 94% running average for any three consecutive tests.

3. Three consecutive tests in the tolerance range will require corrective action.

4. The average for all density tests for any residential street project will be 95%.

In arterial, collectors, and industrial sections, when utilizing a correlated nuclear densitometer in the backscatter mode, the allowable tolerance ranges will be:

1. A minimum of 93% at any test location.

2. A minimum of 96% running average for any three consecutive tests.

3. Three consecutive tests in the tolerance range will require corrective action.

4. The average for all tests on any arterial, collector or industrial section of street or project shall be 97%.

The final surface shall be of a uniform texture and shall conform to line and grade shown on the plans. Before final acceptance of the project or during the progress of the work, the thickness of all courses will be determined by the LHJ. Core samples of the completed asphalt will be provided by the applicant or contractor. All unsatisfactory work shall be repaired, replaced, or corrected.

Both density and thickness shall be carefully controlled during construction and shall be in full compliance with plans and specifications.

For the purpose of testing the surface on all courses, a ten foot (10') straightedge shall be used.

The straightedge shall be held in successive positions parallel and perpendicular to the street centerline in contact with the surface, and the entire areas checked from one side to the other. Advances along the pavement shall be in successive stages of not more than half the length of the straightedge.

Irregularities which may develop before the completion of rolling shall be remedied by loosening the surface mix and removing or adding materials as may be required. Any irregularities or defects which are found after the final rolling, which vary more than 0.02 of a foot in ten feet for surface courses, shall be corrected. All minor surface projections, joints, and minor honey-combed surfaces shall be repaired smooth to grade, as may be directed by the LHJ.

4. Triple Shot Asphalt Chip Surface

   a) The triple shot asphalt and chip course shall be constructed under the direction of the applicable LHJ and shall consist of an application of penetration asphalt followed by two applications of chip seal coats.

b) The previously placed base material shall be shaped and rolled using a tandem steel wheel roller prior to the application of the asphalt penetration coat. The ambient air temperature shall be at least 80 degrees Fahrenheit and rising at the time of the application of the penetration shot.

c) The type of asphalt to be used for the penetration shot shall be specified by the applicable LHJ. The asphalt material shall be heated to its upper range for spraying temperature as recommended by the Asphalt Institute prior to application. The application rate shall be 0.50 gallons per square yard. The time allowed for the oil to penetrate between the application of the oil and the application of the cover material shall be specified by the LHJ representative.

The cover coat material shall meet the requirements of the applicable LHJ. The application rate for the cover coat shall be approximately 25-30 pounds per square yard and shall be rolled with a pneumatic wheel roller. Twenty four (24) hours following the penetration application, the mat shall be rolled with a steel wheel roller.

d) Curing of the penetration course shall require thirty (30) days of ambient air temperature above 80 degrees Fahrenheit before placing the first seal coat or until approved by the LHJ.

e) Prior to the first seal coat the roadway shall be power broomed and/or flushed to remove all loose materials and dust. The type of liquid asphalt shall be specified by the applicable LHJ. Application rate shall be 0.50 gallons per square yard. Approved chips shall be applied with a chip spreader and rolled with a pneumatic wheel roller immediately behind the distributor. Application rate for chips shall be 25 - 30 pounds per square yard.

f) If this treatment is used, a second chip seal shall be placed on the roadway the following year using the same specification listed on IV 4-e. Also, the use of this arrangement will require an extension of or a second performance bond to be supplied to the LHJ for covering the year's work.

5. Asphalt Emulsion Surface Treatment With Chip Seal

a) The asphalt emulsion surface treatment may be used, provided it meets the following requirements and is constructed under the observation of the LHJ representative.

The mixture may be prepared either in a stationary pug mill or blended on the road bed using the windrow and motor patrol process.

b) The cover coat aggregate used in the asphalt emulsion surface must meet the requirements of the applicable LHJ.

The composite aggregate shall be free of clay, all vegetable matter, and other extraneous matter occurring either free or as a coating on the particles. Not less than seventy percent (70%) by weight of the coarse aggregate retained on the No. 4 Sieve shall be particles having at least one fractured face. In addition, the aggregate must show a Los Angeles Wear for not greater than thirty percent (30%) loss and Sand Equivalent of greater than thirty (30).

c) The emulsion used for this mixture shall be either CMS-2S or CMS-2S-R as approved by the LHJ. Generally, the CMS-2S-R shall be used for the coarser gradations of aggregate. The asphalt content shall have a range of between five percent (5%) and seven percent (7%) with the optimum being between six percent (6%) and six and one half percent (6-1/2%) by weight. The asphalt emulsions shall be used in a temperature range of 140 degrees Fahrenheit minimum to 180 degrees Fahrenheit and, under no circumstances, shall the temperature of the emulsion be allowed to exceed 180 degrees Fahrenheit.

d) The aggregate and emulsion mixture shall be placed on the prepared base and windrowed to a uniform mixture. The mixture shall be processed for drying purposes until ready for the final layout of the mixture at which time the contractor is to blade it to its final grade as shown by the appropriate grade stakes at centerline and shoulder line. At the contractor's option, the bituminous mixture may be placed by using a conventional paving machine or base paver.

During placing and laying operations, the ambient air temperature must be a least 80 degrees Fahrenheit and rising.

e) Immediately following spreading or laying, material shall be compacted by rolling. Initial rolling shall be performed with a steel tandem or three-wheel roller followed by rolling with a pneumatic tire roller. Final rolling shall be performed sufficient to eliminate any roller marks or other irregularities. Transverse joints shall be rolled first, then longitudinal joints, then the entire mat. Rolling of the layer shall be longitudinal and commence at the outer edge of the road and progress towards the center except that on super-elevated curves rolling shall progress form the lower to the upper edge. Rolling shall continue until the surfacing is of uniform texture and degree of compaction and is true to grade and cross section. Areas inaccessible to rollers shall be compacted with mechanical tampers. The final compacted mat shall be no less than two inches (2") in thickness.

f) Compaction of the mixture shall be to 95 percent of the AASHTO T-99 Proctor Density.

g) A single layer chip seal conforming to Paragraph IV 4-e shall be applied to the competed emulsion surface treatment under the observation of the LHJ.

F. OBSERVATION AND TESTING

1. All required observation shall be done by the LHJ. All testing required in these standards or required by the LHJ will be done at the expense of the applicant or contractor.