Forest Lakes Metropolitan District

STANDARD SPECIFICATIONS FOR CONSTRUCTION

MINIMUM ROAD STANDARDS

GENERAL

DESCRIPTION: These specifications include material specifications and construction requirements for minimum road construction and inspection procedures so that public roads can adequately and cost effectively serve the public needs road systems installed in the District right-of-way and in other areas under District jurisdiction or ownership. Developer/Contractor/Owner should also refer to Forest Lakes Metropolitan District Excavation Permit Requirements, Standard specifications for Construction of Water lines, Sanitary Sewers, and Storm Drainage Facilities, latest revision for addition information.

SPECIFICATION MODIFICATIONS: Portions of these specifications may be modified or deleted by appropriate items in the Special Conditions or notes on the contract drawings. The District's Engineer shall approve all modifications and deletions.

REVISIONS OF STANDARDS: When reference is made to a Standard Specification (ASTM, AWWA, AASHTO, etc.), the specifications referred to shall be understood to mean the latest revision.

PUBLIC SAFETY AND TRAFFIC ACCESS: The Developer/Owner/Contractor's operations shall not cause unnecessary inconvenience. The safety and access rights of the public shall be considered at all times.

Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods. If back fill has been completed to such an extent that safe access may be provided, and the road opened to local traffic, the Contractor shall immediately clear the road and driveways, provide, and maintain access.

The Contractor shall cooperate with the various parties involved in the delivery of mail and the collection and removal of trash and garbage to maintain existing schedules for these services.

BARRICADES AND WARNING SIGNS: All signs, barricades, flagmen, lights, and other devices necessary for the protection of work and safety of the public shall be the Contractor's responsibility. A traffic control plan shall be submitted and approved by the District prior to beginning construction where any construction activity will involve the use of public right-of-way. Neither District nor District's Engineer will review the adequacy of the Contractor's traffic control measures.

DEFINITIONS AND TERMS

ABC – Aggregate Base Course, 6-inch minus (Class 3), placed and compacted on the prepared sub grade and 3-inch minus (Class 2) placed and compacted on the prepared 6-inch minus (Class 3) base course.

ADDITIONAL RIGHT OF WAY REQUIREMENTS – For all classes of streets or roads, additional right of way (R.O.W.) width may be required when the design cut or fill is greater than the R.O.W. width available. The exception to this requirement is when the cut is through rock, then the excavated slope may, as approved by the District's Engineer, be as steep as ½:1. For all types of material other than rock, the cut and fill slopes may not be steeper than shown on the appropriate drawing for the class of road.

ARTERIAL STREET OR ROAD – A road that carries a relatively high traffic volume over longer distances in a direct manner. It requires an 80-foot R.O.W., 27 foot surfaced roadway, 7-inches of compacted 6-inch minus and 3-inches of compacted 3-inch minus ABC and 3-inches of compacted ASC.

ASC – Aggregate Surface Course, 3/4-inch minus (Class 6), placed and compacted on the prepared ABC. The term "surface" indicates the top layer of aggregate, not

necessarily the actual surface of the roadway.

COLLECTOR STREET OR ROAD – A road which collects and distributes traffic from one or more residential or population concentration areas to or from an Arterial Road or major highway. It requires a 60-foot R.O.W. W., 27 foot surfaced roadway, 6-inches of compacted 6-inch minus and 3-inches of compacted 3-inch minus ABC and 3-inches of compacted ASC.

CUL-DE-SEC – A turning place at the end of a road requiring a 100-foot diameter R.O.W., with an 80-foot diameter surfaced area. Construction specifications shall match those required for the roadway leading to the cul-de-sec.

DISCONTINUOUS STREET OR ROAD – A road, which does not extend from an existing District Approved Road, Federal or State highway, or to a District approved cul-de-sec.

DISTRICT – The Forest Lakes Metropolitan District Board of Directors or their designees.

DISTRICT ACCEPTANCE – A District accepted road is one that has been accepted for future maintenance by the District.

DISTRICT APPROVAL – A District approved road is one that has been constructed in compliance with the requirements of the Forest Lakes Metropolitan District road specifications.

DISTRICT'S ENGINEER – A professional engineer, licensed in the State of Colorado, designated by the District to inspect and evaluate work on behalf of the District.

LOCAL STREET OR ROAD – A road that carries slow speed local traffic from residential areas to or from a Collector road. It requires a 60-foot R.O.W., 26-foot surfaced roadway, 6-inches of compacted 6-inch minus and 3-inches of compacted 3-inch minus ABC and 3-inches of compacted ASC.

OWNER – The subdivider, developer or any other person who is obligated or responsible to perform work which is to be District Approved or Accepted.

STREET AND ROAD – These terms are synonymous in these specifications.

STUB STREET OR ROAD – A short road used for access to a maximum of six single-family units and not over 800-feet in length. This road section may be used only when there is no possibility of lengthening the roadway in the future. It requires 60-foot R.O.W., 24-foot surfaced roadway, 6-inches of compacted 6-inch minus and 3-inches of compacted 3-inch minus ABC and 3-inches of compacted ASC. Use of this road specification shall be at the discretion of the District.

SUB GRADE – The natural or suitable fill soil of the proposed roadway to be prepared for placement of the ABC.

TECHNICIAN – A qualified material tester under the supervision of, or approved by, the District's engineer.

TEMPORARY CUL-DE-SEC – A cul-de-sec approved by the District to be used at the end of a road, which is shown on the final plat to be extended in the future.

CONTROL OF WORK

SCOPE OF WORK – All work not covered in these Specifications shall be done in accordance with the "Standard Specifications for Road and Bridge Construction", Colorado Department of Transportation, current edition.

INSPECTION OF WORK – At least 14 working days prior to the commencement of construction with the District R.O.W., the developer/contractor/owner must notify the District of intent, obtain a District Excavation Permit, along with a submittal of a proposed schedule of construction activities. The developer/contractor/owner shall notify the District of any changes in scheduling. The District, and/or the District's engineer shall inspect the work throughout the construction period to verify that work complies with District standards, specifications, rules, and regulations. Inspection requests for road

construction during inclement weather shall be postponed until acceptable weather conditions prevail. Failure to notify the District may cause removal of material, at the developer/contractor/owner's expense to allow inspection of previous work. If, in the opinion of the District, the work is not being performed in a satisfactory manner, the developer/contractor/owner will be notified of deficiencies in writing. Failure to receive such notification does not relieve any developer/contractor/owner responsibilities of compliance with these specifications. All work shall be done to the District's satisfaction.

APPROVAL OF COMPLETED WORK – The developer/contractor/owner shall notify the District in writing of the completion of roadwork and that Approval is now requested. Payment of the inspections and testing must be made before Approval is requested. The developer/contractor/owner shall provide to the District written certification by a Colorado Registered Land Surveyor that the roadway is within the platted, deeded or monumented R.O.W. It is recommended that the survey be done at the time the sub grade is ready for the aggregate base course so that problems encountered may be dealt with before further construction takes placed. The District will not consider Approval of discontinuous roads.

After review of the developer/contractor/owner's request, engineer's inspection report, the test results reports, and the surveyor's certification, the District will, within 30 days, notify the developer/contractor/owner in writing of provisional Approval or Rejection. If rejected, the District will give reasons for rejection and set forth what is required to make the work acceptable. Once the reasons for rejection have been corrected, the develop/contractor/owner may submit another request in writing to the District.

After developer/contractor/owner has been notified of a provisional approval, the developer/contractor/owner shall provide a bond or other assurance (if not previously provided), acceptable to the District in an amount to be determined by the District, warranting that any engineering or construction defects or inadequacies that show up within two years will be corrected or repaired by the developer/contractor/owner at their expense. Upon receipt of acceptable bond, or other assurance, the warranty period will begin and the work will be considered complete for purposes of Approval and, if applicable, release of any road improvements agreement.

After expiration of the warranty period and completion of any required corrections or repairs, which shall take place within 30 days of post warranty period, upon acceptable inspection by District, the bond or other assurance will be released.

CLEARING AND GRUBBING

The centerline of the proposed road shall lie on the centerline of the R.O.W. where possible. The R.O.W. shall be cleared to a width of 5-feet outside the embankment toe line or the excavation cut line. Clearing shall consist of removal of trees, brush, grass, weeds, and all organic material. In areas of embankment, stump holes, and any other excavation for root removal shall be back-filled and compacted prior to starting embankment construction.

MUD AND EARTH TRACKING ON PUBLIC STREETS: The developer/contractor/owner shall conduct their operations so as not to have the equipment tracking mud and earth onto the adjacent public roads after surface treatments have been applied. Upon notification by the District or District's Engineer, the Contractor will clean from the public roads mud and/or earth tracked by their equipment or that of their material suppliers to the project

EXCAVATION AND EMBANKMENT

Excavation and placing embankments shall be done by generally accepted methods of the industry. Benching shall be required on steep slopes and embankments shall be placed in lifts not to exceed 8-inches, and then shall be compacted as specified. In rocky areas where fill material consist predominately of rock too large to be placed in 8-inch lifts, material may be placed in maximum lifts of 24-inches, providing any boulders are scattered out within the fill and are compacted around them. Suitable fill shall comply with specifications stated herein.

Compaction of 93% of maximum dry density, as determined by AASHTO T99 or ASTM D698, shall be required for all embankment lifts and 8-inches of the sub grade surface.

The District will require compaction tests to be made by the developer/contractor/owner using a District approved engineer or technician on all lifts and sub grade surface to assure the work complies with specifications. All testing shall be at the developer/contractor/owner's expense.

CULVERTS AND STRUCTURES

Trenches for culverts and other structures shall be excavated in reasonable close tolerance to established grades. Corrugated metal pipe (CMP) culverts shall be installed with some camber in the center to assure there will be ponding in the culvert. Excavation for culverts and other structures shall be wide enough to permit taping equipment to work on all sides. When rock, either broken or solid, is encountered at the flow line, the trench shall be over excavated a minimum of 6-inches and backfill placed and compacted to provide a cushion for the pipe. This bedding shall be fine-grained material, well graded to provide uniform support for the entire length of the culvert.

Suitable material free of wood and other organic debris shall be used for backfilling and any necessary fills. Backfill material for CMP culverts shall contain no rock larger than 1-inch within 1`-foot of the culvert. The moisture content of the backfill or fill material shall be near optimum moisture before it is placed in 8-inch lifts for compaction.

Compaction requirements are 93% of maximum dry density as determined by AASHTO T99 or ASTM D698. All testing shall be at the Owner's expense.

Cross Drainage Structures may be CMP or any other District approved material. The size (diameter or box dimension) shall be determined from drainage area, runoff factor, etc. Manufactures of CMP have design criteria in their handbooks. The District may require approval of culvert sizes prior to construction. No culvert less than 18-inches in diameter will be permitted. Minimum gage of CMP is as follows:

DIAMETER	GAGE#
18 to 21-inch	16
24 to 36-inch	14
42 to 54-inch	12
60 to 72-inch	10
over 72-inch	8

Cross drainage structures shall be located at all low points to prevent ponding along the road. Maximum distance for ditch flow parallel to the roadway is 800 feet. Minimum cover over cross drainage structures shall be 1-foot for CMP's up to 36-inches in diameter, and 1.5-feet for CMP's over 36-inches.

Bridges and other structures that are not pre-fabricated shall be constructed in accordance with plans stamped by a professional Colorado engineer and approved by District.

DRAINAGE AND EROSION

Roadside ditch depth – All roads shall have a minimum roadside ditch depth of 2-feet. Ditch slopes shall be no steeper than 2:1 unless prior approval is obtained in writing from the District's Engineer. Riprap and gabions may be required in certain areas to prevent erosion.

Borrow Areas – Any borrow areas utilized for construction material shall be sloped and graded to provide adequate drainage.

Seeding of Slopes – Both excavation, embankment and borrow areas with a District approved mix at a time that will allow revegetation to occur prior to expiration of the warranty period.

AGGREGATE BASE AND SURFACE COURSES

Gravel road surfacing shall consist of a base course and a surface course, although the term "surface" does not necessarily refer to the actual finished surface of the road if the surface is to be paved. Compacted thickness of each course is given in the definitions of these specifications and in typical drawings for each type of road. The base may be either pit run river gravel or crushed stone. If river gravel is used, the oversized material must be removed. Prior to placing any gravel, the roadway sub grade shall be shaped and compacted ensuring adequate crown is in the finished roadway. Written approve by the District's engineer of the sub grade shall be acquired prior to allaying any gravel.

Gradation requirements for aggregate are as follows:

PERCENT PASSING BY WEIGHT

Base Course	Sieve Size	Surface Course

100%	4”	-
65-90%	3”	-
40-75%	¾”	100%
22-45%	#4	30-65%
16-34%	#8	25-55%
3-15%	#200	3-12%

Other requirements for ABC and ASC are:

Plasticity Index (PI) not to exceed 6 for either Base or Surface Course Aggregate.

COMPACTION - The Base Course shall be placed in two equal lifts except in the case of Stub Roads on which a single lift may be placed. The material shall be near optimum moisture when laid and compacted. Compaction shall initiate at the outer edges, progressing towards the center until the ABC is thoroughly compacted and conforms to the lines, grades, and thickness required. Written approval from the District’s engineer of base course compliance shall be acquired prior to laying any surface aggregate.

The Surface Course shall be placed and compacted in one lift when the material is near optimum moisture content. Compaction shall be accomplished with a vibratory smooth steel drum roller or other approved type weighing not less than 5 tons. The method shall be the same as specified for the ABC. Compaction of 95%, AASHTO T180 and ASTM D1557, is required.

TESTING

1. Gradation and P.I. test on aggregate shall be made by the engineer or technician as follows:
    a. An initial test will be made immediately after gravel production starts. This requirement also applies to a stockpiled material before hauling begins.
    b. A minimum of one test will be made for each 2000 cubic yards of material produced thereafter or hauled from a stockpile.
    c. Other tests may be required if the source rock appears to be too soft.
2. Proctors should be run prior to construction in order to avoid delays in the inspection process.
3. All other testing and inspection shall comply with the schedule set forth in the Colorado Department of Transportation “Field Materials Manual”, latest edition.
4. Depth checks of materials shall be made at the same rate as density testing.
5. The District may require additional test to be performed if, in the opinion of the District, the test results show the material or work not to comply with these specifications.

MISCELLANEOUS

MAXIMUM GRADE on any road shall be 8%. For Local and Stub Roads, a request for grades up to 10% for short pitches not over 300-feet in length may be considered by District. Request must include sufficient engineering data to prove that the 8% grade could not be obtained by additional cut or fill, or replacement.

PAVING STANDARDS for either bituminous or concrete are not included in these specifications. “Standard Specifications for Road and Bridge Construction”, a publication of the Colorado Department of Transportation, latest edition shall be the guide. Specific plans, stamped by a Colorado registered engineer of any proposed paving shall be submitted to the District for review and approval prior to commencing of any work.

STREET SIGNS shall be installed at all intersections so that they are visible from all traffic directions. Signs and post shall be made of District approved materials, mounted, installed and conform to the Manual of Uniform Traffic Control Devices, latest edition at the developer/contractor/owner’s expense. The locations and configurations of all signs shall be District approved prior to installation.

Regulatory and Cautionary signs shall be furnished, installed and conform to the Manual of Uniform Traffic Control Devices, latest edition at developer/contract/owner’s expense. The locations and configurations of all signs shall be District approved prior to installation.

MAGNESIUM CHLORIDE shall be applied to all ASC before final compaction. Application procedures shall be as follows:

a. Apply water until the full depth of the ASC aggregate reaches optimum moisture, just so that the gravel is damp (not to the point where water is standing or the fines turn to mud).
b. Apply magnesium chloride with a sprayer at a rate of ½ gallon per square yard.
c. All magnesium chloride to penetrate the gravel.
d. Compact, preferably with a flat vibratory compactor, in accordance with the compaction section of these specifications.

PRIVATE DRIVEWAY ACCESS SPECIFICATIONS

The District is not responsible for the construction or maintenance of any private driveways. A District Excavation Permit is required for any driveway intersecting a District road. Permit forms and additional driveway specifications are available from the District offices. Driveway accesses must meet the following criteria:

1. A driveway interchange is defined as that portion of driveway located in the District right-of-way between the roadway edge and the property line, which is designed and used for the interchange of traffic between the roadway and the abutting property.

2. Paving of the driveway interchange portion is not allowed and shall **terminate at the property line**. District accepts no liability to paving damage that is located on District right-of-way and owners will be billed for damages to District equipment. Paving that impedes District maintenance operations will be removed at owner's expense.

3. All entrances and exists of the driveway shall be located and constructed so that vehicles approaching or using them will be able to obtain adequate sight in both directions along the road in order to maneuver safely and without interfering with traffic.

4. Driveway locations for ingress and egress must be reasonable from the viewpoint of the traveling public in that no unusual hazard to pedestrians or motorists shall be create, nor shall the driveway invite or compel vehicular movements in directions or locations contrary to those for which the road was designed. Driveways shall not invite or compel illegal or unsafe traffic movement.

5. No entrance or approach shall be located or constructed to interfere with, or prevent the proper location of functioning of any traffic-regulating device. No private signs, structures or display materials, either fixed or moveable shall be permitted on, or extend over any portion of the District R.O.W.

6. Generally, no more than one approach shall be allowed any lot, of which the frontage is less than 100-feet. Additional entrances or exits for lots having frontage in excess of 100-feet may be permitted only after demonstrating a necessity or hardship.

7. All driveways shall be so located that the flared portion adjacent to the traveled roadway will not encroach upon adjoining property. The flare section shall have a minimum radius of 5-feet for a non-commercial property, and 10-feet for a commercial property.

8. No commercial driveway shall have a width greater than 30-feet measured at right angles to the centerline of the driveway, except as increased by permissible radii. No non-commercial driveway shall have a width greater than 20-feet measured at right angles to the centerline of the driveway, except as increased by permissible radii.

9. The axis of an approach to the District road may be at a right angle to the centerline of the roadway and of any angle between 90° and 60° but shall not be less than 60°. Adjustments will be made according to the type of traffic to be served and other physical conditions.

10. Construction of parking or servicing areas on District R.O.W. is specifically prohibited. Off road, parking facilities shall be provided by property owners and commercial establishments on their lots for themselves and their customers.

11. All driveways and approaches shall be so constructed that they shall not interfere with the drainage system of the street or roadway. Property owners are required to provide, at their expense, drainage structures at entrances and exits which will

become an integral part of the existing drainage system. The dimensions of all drainage structures must be specified and approved by the District, prior to installation. Minimum culvert size is 12-inches in diameter. Minimum cover over culverts is 6-inches with 1.5:1 side slopes at the culvert ends. Minimum length of culvert is 20-feet.

12. The property owner assumes responsibility for the removal or clearance of snow, ice, or sleet upon any portion of the driveway approach even though it may be deposited in the course of the District snow removal operations. Removal or clearance operations by property owner shall not return snow, ice or sleet to the District roadway.

13. All driveways shall have a top grade level 8-inches lower than the District roadway shoulder at a point 15 –feet back from the roadway shoulder. Drainage from driveway shall not be allowed onto District roadway at any time.

14. Driveways shall not be constructed so that resulting drainage presents any type of hazard to adjacent property or improvements on that property.

15. Cutting or filling of roadway to match driveway interchange portion is prohibited.

16. The District reserves the right to discontinue water service to the property until an excavation permit is issued, approved and installation is accepted.

UTILITY INSTALLATION IN DISTRICT R.O.W. OR EASEMENTS

These standards will serve as a guide to all utility work within road right-if-way or easements of the District. The coordination and enforcement of these installations will be exercised by the District under an excavation permit process. Permits are available from the District. These standards will apply to all new utility installations and will be adhered to wherever practical for repair or replacement of existing facilities. District's excavation permit system is an integral part of this standard and should be referred to for additional information.

The locations of existing utilities if shown on the construction drawings are approximate only. The Permitee shall be responsible for the exact locations, damage to and protection of all utilities encountered.

In the event of a break in an existing water main, gas main, sewer, or underground cable, the Permitee shall immediately notify the responsible official of the organization operating the utility interrupted and shall lend all possible assistance in restoring services as quickly as possible.

1. All underground installations shall be initially installed beneath the surface of the right-of-way at a minimum depth of 6' (six feet) except telephone and TV lines, which shall be at a minimum depth of 18" (eighteen inches) and gas, and power lines, which shall be at a minimum depth of 30" (thirty inches). Any disturbed portion of the roadway shall be restored to its original condition. Backfilling shall be made in 6" (six inch) lifts, mechanically tamped, and packed and the last 12" (twelve inches) of backfill shall be of crushed rock or gravel. In those areas where it is necessary to cut bituminous pavement, the backfilling must be squared with an asphalt spade and tacked with a bituminous material. A hot mix bituminous compound shall be applied to the patch area to a depth of al least the thickness of the original mat, but in all cases no less than two inches. The material shall be placed so that before compaction it is approximately ½ inch above the adjacent mat and then rolled with a steel wheel or rubber-tired roller until a smooth uniform surface is achieved.

2. Where the installation crosses the roadway, the crossing shall be nearly perpendicular to the roadway as physically possible.

3. At the discretion of the District, where the installation crosses any ditches, canals, or water carrying structures, wherever possible it shall be pushed through and beneath in a pipe or large diameter. In no case shall the flow of water ever be impaired or interrupted.

4. If the District so requires, the installation shall be marked with marker acceptable to the District at locations designated by the District.

5. No cleated or tracked equipment will be allowed to work on or over asphalt or magnesium chloride treated surfaces without mats, no pads on excavating equipment

will rest directly on asphalt surfaces but shall be padded to protect the roadway surfaces.

6. The backfilling and surface treatment including asphalt/magnesium chloride procedures shall be guaranteed for one year after completion by the permitee.

7. At the discretion of the District, an as built plan may be required.

8. Inspections by the District Superintendent shall be at any time during the construction. The Contractor shall notify the District Superintendent before and at the time backfilling, procedures are to begin.

9. Surety bonds are required on all work performed in District right-of-ways or easements. Requirements are those stated in the District Excavation Permit system, latest revision.

10. All utilities are to be installed before any surfacing is placed.

11. All water and sewer lines to be separated by a minimum of 10’ (ten foot), horizontal.

12. A minimum of 3’ (three foot) separation must be maintained horizontally for any utility in any road right-of-way.

13. Minimum depths of utilities in borrow areas or ditches shall be 36” (thirty six inches).

14. All power lines shall be encased in an approved conduit. Primary power lines perpendicular to the roadway shall be further encased in a steel pipe sleeve.

15. Fiber optic lines shall be installed in accordance with Exhibit E - Minimum Construction Requirements for the Installation of Fiber Optic Cable of the Forest Lakes Metropolitan District Rules and Regulations, latest edition.