

Planning and Community
Development Department
2880 International Circle
Colorado Springs, Colorado 80910
Phone: 719.520.6300
Fax: 719.520.6695
Website www.elpasoco.com

DEVIATION REQUEST AND DECISION FORM

Updated: 6/26/2019

PROJECT INFORMATION

Project Name : Forest Heights Estates

Schedule No.(s) : 52090-00-050; 52090120; 52090-00-121 (*Exhibit 2*)

Legal Description :

FOREST HEIGHTS ESTATES

LEGAL DESCRIPTION

A Tract of land in the Southwest 1/4 of Section 9, Township 12 South, Range 65 West, of the 6th P.M. County of El Paso, State of Colorado, more specifically described as follows;

Commencing at the West 1/4 corner of Section 9,

Thence Along the North line of said Southwest 1/4, N89°55'03"E a distance of 1391.55 feet to the Point of Beginning of the parcel to be described hereby;

Thence continue along said North line, N89° 55'03"E a distance of 506.51 feet to the Northwest corner of that parcel described at Book 2318, Page 387, of the records of the El Paso County Clerk and Recorder;

Thence S00°03'25"W along the West line of said parcel a distance of 430.00 feet;

Thence N89°55'03"E parallel to said North line, a distance of 506.81 feet to the Northmost West line of the parcel described in Book 721, Page 970 of said records;

Thence S00°09'20"W a distance of 60.00 feet;

Thence S89°55'03"W along the line of said parcel 459.94 feet;

Thence S00°11'43"W along the West line of said parcel a distance of 829.70 feet;

Thence S89°54'44"W a distance of 1941.21 feet to a point on the East Right of Way line of Herring Road;

Thence N00°03'25"E" along said East line a distance of 327.80 feet to the South line of that parcel described in Book 2371 Page 388 of said records;

Thence N89°55'03"E along the South line of said parcel a distance of 434.00 feet;

Thence; N00°03'25"E along the East line of said parcel a distance of 501.84 feet to the South line of that parcel described in Book 2215 Page 559 of said records

Thence along said South line N89°55'03"E along said South line distance of 449.43 feet to the East line of said parcel;

Thence N00°03'25"E along said East line a distance of 60.00 feet;

Thence N89°55'03"E a distance of 506.51 feet,

Thence; N00°03'25"E a distance of 430.00 feet to the Point of Beginning, except that parcel described in Book 2645, Page 207.

EXCEPTION PARCEL: Book 2645, Page 207 of the records of El Paso County, Colorado

A tract of land in the Southwest 1/4 of Section 9, Township 12 South, Range 65 West of the 6th p.m. County of El Paso, State of Colorado more particularly described as follows;

Commencing at the West 1/4 corner of said Section 9,

Thence along the West line of Section 9, S00°03'25"W a distance of 490.00 feet;

Thence N89°55'03"E a distance of 1090.00 feet to the Point of Beginning of the tract described hereby;

Thence N89°55'03"E a distance of 610.00 feet;

Thence S00°03'25"W a distance of 325.00 feet;

Thence S89°55'03"W a distance of 610.00 feet;

Thence N00°03'25"E a distance of 325.00 feet to the Point of Beginning.

This description contains 34.528 acres (not including the exception parcel).

TRACT A

Tract in Northwest quarter of the Southwest quarter of Section 9, Township 12 South, Range 65 West, of the 6th P.M. County of El Paso, State of Colorado, described as follows:

Commencing at the West 1/4 corner of said Section 9, Thence along the west line of said Section 9 S00°03'25"W a distance of 430.00 feet;

Thence N89°55'03"E 30.00 feet to a point on the West Right of Way line of Herring Road and the Point Of Beginning (P.O.B.) of the Tract described hereby;

Thence N89°55'03"E a distance of 435.00 feet;

Thence S01°00'46"W a distance of 60.01 feet;

Thence S89°55'03"W a distance of 434.00 feet to a point on said West Right of Way line;

Thence N00°03'25"E a distance of 60.00 feet to the Point Of Beginning (POB).
Tract A contains 0.598 Acres, more or less.

THE TOTAL ACREAGE OF THIS SUBDIVISION PLAT IS 35.126 ACRES.

(See *Exhibit 3* for Plat Map)

APPLICANT INFORMATION

Company : NA

Name : Ms. Phyllis Ditleau

☒ Owner ☐ Consultant ☐ Contractor

Mailing Address : 8250 Forest Heights Circle
Colorado Spring, CO 80908

Phone Number : 719-44-1949

FAX Number : NA

Email Address : phyllis@pcisys.net

ENGINEER INFORMATION

Company : KCH Engineering Solutions, LLC

Name : Kenneth Harrison

Colorado P.E. Number : 0023635

Mailing Address : 5228 Cracker Barrel Circle
Colorado Springs, CO 80917

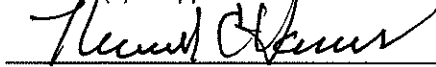
Phone Number : 719-246-4471

FAX Number : NA

Email Address : Ksharrison5228@msn.com

OWNER, APPLICANT, AND ENGINEER DECLARATION

To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review until corrections are made, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.



Signature of owner (or authorized representative)
Kenneth C. Harrison, P.E.

8-28-20

Date

Engineer's Seal, Signature
And Date of Signature



DEVIATION REQUEST (Attach diagrams, figures, and other documentation to clarify request)

A deviation from the standards of or in Section 2-13, Figure 2-8 (*Exhibit 4*) and SD_2-10 (*Exhibit 4*) of the Engineering Criteria Manual (ECM) is requested.

Identify the specific ECM standard which a deviation is requested:

SD 2-10

Lane width = 12 ft
Shoulder width = 4ft
Foreslope = 6 to 1
Backslope = 3 to 1 max
5 ft public Improvements easement

State the reason for the requested deviation:

The road has been in service since the 1970s and has remained a private road since that time. The **Applicant**, Ms. Phyllis Ditleau, and the existing residents have no wish to install improvements to meet El Paso minimum criteria due to the additional cost. The road currently serves 7 occupied lots (*Exhibit 3*). Approximately 35.1 acres are owned by the Applicant. The **Applicant** plans to subdivide into 4 lots (*Exhibit 3*), all greater than 5 acres. Once subdivided the total number of lots to be serviced off of Forest Heights Circle will be 11 lots. In order to keep the lots reasonably priced it has been decided to limit the improvements to Forest Heights Circle. The **Applicant** has decided to keep the road privately owned and maintained. It has been decided to limit the improvements to those required by the Black Forest Fire Rescue Protection District (BFFD) in a letter dated May 4, 2020 addressed to Ms. Phyllis Ditleau (*Exhibit 5*) and the AASHTO Guidelines for Geometric Design of Low-Volume Roads, 2nd Edition. Copies of the pertinent sections are included with this Deviation Request.

Explain the proposed alternative and compare to the ECM standards (May provide applicable regional or national standards used as basis):

All of the following roadway characteristics are appropriate for rural roadways with low volumes. The criteria were obtained from AASHTO Geometric Guidelines for Very Low Volume Roads (*Exhibit 6*) and the May 4, 2020 letter from BFFD (*Exhibit 5*).

A concept plan and profile for the proposed roadway improvements was prepared for Forest Heights Circle improvements see attached). The Applicant proposes to utilize the "Design-Build" approach for the installation of the roadway improvements. A decision regarding the contractor who is to do the work has yet to be made.

The following criteria was used (*Exhibit 11*):

1. Lane width = 10 ft: (AASHTO recommends 9 ft as minimum for speed limits 15 mph to 25 mph for low volume roads
 - a. This also meets the minimum requirements of the BFFD.
2. Shoulder width = 2 ft for low volume roads (AASHTO)
 - a. Resulting total design width of the travel way is 12 ft.
3. Foreslope = 4 to 1 for low volume roads. The foreslope is a portion of the Clear Zone which is typically not a struct requirement for the proposed low speeds between 15 mph and 25 mph. According to AASHTO, A 3 to 1 slope is the steepest slope for vehicle recovery purposes.
4. Backslope = 3 to 1 max (meets El Paso County criteria)
5. Public Improvements Easement: not required or necessary.
 - a. Obtaining the additional 5-foot easement outside the existing right of way is problematic due to private property owners adjacent to the roadway

American Association of State Highways and transportation Officials, 2019, see *Exhibit 6* of the applicable excerpts.

LIMITS OF CONSIDERATION

(At least one of the conditions listed below must be met for this deviation request to be considered.)

- ☒ The ECM standard is inapplicable to the particular situation.
- ☒ Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.
- ☒ A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.

Provide justification:

1. The ECM standard is inapplicable to this particular situation...
 - a. This road is to be privately owned and maintained (*Exhibit 7*). Building it to ECM standard poses an undue hardship on the owners since the roadway services individual residences on lots with a minimum size of 5 acres and a number of the existing residents are hesitant to participate in cost sharing..
2. Topography, right of way,.....
 - a. The same objective in order to meet safety and maintenance can be met by modifying the cross section and thereby incurring substantially less cost.
 - b. The right of way is only 60 ft wide with different ownerships on each side. This is problematic in obtaining the additional 5-ft utility easement.
3. A change to a standard...
 - a. Adhering to the ECM standard will pose an undue hardship on the applicant since it is problematic in gaining financial support for sharing the construction costs. The majority of the cost for the installation of the roadway improvements will be their responsibility of the Applicant

CRITERIA FOR APPROVAL

Per ECM section 5.8.7 the request for a deviation may be considered if the request is **not based exclusively on financial considerations**. The deviation must not be detrimental to public safety or surrounding property. The applicant must include supporting information demonstrating compliance with **all of the following criteria**:

The deviation will achieve the intended result with a comparable or superior design and quality of improvement.

Since Forest Heights Circle is a low volume road in that it serves only 11 lots, installation of improvements to meet ECM standards is not necessary to meet safety issues. The posted speed limit on this road will be 15 to 20 mph. Revised Roadway cross section: the proposed typical section for the roadway meets the AASHTO standard (*Exhibit 6*) for the design of low volume roadways (see attached)

A concept plan and profile for the proposed roadway improvements was prepared for Forest Heights Circle improvements (*Exhibit 8*). The **Applicant** proposes to utilize the "Design-Build" approach for the installation of the roadway improvements. A decision regarding the contractor who is to do the work has yet to be made.

The deviation will not adversely affect safety or operations.

This deviation will not adversely affect the safety of operations of the residents or the maintenance of the roadway. Since the speed limit is to 15 mph or 25 mph and the side slopes of the borrow ditches are 4 to 1 the Clear Zone is typically not considered a critical factor in the design of the roadway.

Pullouts according to the request of the BFFD (*Exhibit 5*) are shown as required on the plan and profile drawing (*Exhibit 8*). The plan and profile is only a concept design since it is the intent of the **Applicant** to utilize the "Design Build" method for installing the improvements.

The deviation will not adversely affect maintenance and its associated cost.

The deviation is anticipated to reduce the maintenance cost of the roadway:

1. The proposed cross section and borrow ditches will route the drainage away from the road section and not within the traveled way.
2. The borrow ditches are designed with a depth to help prevent stormwater runoff from entering the base course of the roadway (see Drainage Report, separate submittal)
3. The speed limit is to be between 15 mph and 25 mph

The deviation will not adversely affect aesthetic appearance.

The deviation will improve the aesthetic appearance of the area by providing a reasonably stable roadway cross section where unsightly wide-spread pot-holing and erosion are limited due to the design function of the borrow ditches.

The deviation meets the design intent and purpose of the ECM standards.

The deviation meets the design intent and purpose of the ECM standards as demonstrated above.

The deviation meets the control measure requirements of Part I.E.3 and Part I.E.4 of the County's MS4 permit, as applicable.

Temporary measures are proposed to be installed in the roadside borrow ditches and at the culvert inlets as shown on the Grading and Erosion Control Plan (*Exhibit 9*) until such time that natural vegetation has been reestablished. These measures include erosion control straw check dams (*Exhibit 10*) in the borrow ditches and staked hay bales (*Exhibit 10*) at the entrance to the culverts.

Permanent erosion control measures are proposed in the borrow ditches in steep sections where erosive velocities are anticipated. These measures are described as Rock Check Dams (*Exhibit 10*).

REVIEW AND RECOMMENDATION:

Approved by the ECM Administrator

This request has been determined to have met the criteria for approval. A deviation from Section _____ of the ECM is hereby granted based on the justification provided.

Γ

1

L

J

Denied by the ECM Administrator

This request has been determined not to have met criteria for approval. A deviation from Section _____ of the ECM is hereby denied.

Γ

1

L

J

ECM ADMINISTRATOR COMMENTS/CONDITIONS:

1.1. PURPOSE

The purpose of this resource is to provide a form for documenting the findings and decision by the ECM Administrator concerning a deviation request. The form is used to document the review and decision concerning a requested deviation. The request and decision concerning each deviation from a specific section of the ECM shall be recorded on a separate form.

1.2. BACKGROUND

A deviation is a critical aspect of the review process and needs to be documented to ensure that the deviations granted are applied to a specific development application in conformance with the criteria for approval and that the action is documented as such requests can point to potential needed revisions to the ECM.

1.3. APPLICABLE STATUTES AND REGULATIONS

Section 5.8 of the ECM establishes a mechanism whereby an engineering design standard can be modified when if strictly adhered to, would cause unnecessary hardship or unsafe design because of topographical or other conditions particular to the site, and that a departure may be made without destroying the intent of such provision.

1.4. APPLICABILITY

All provisions of the ECM are subject to deviation by the ECM Administrator provided that one of the following conditions is met:

- The ECM standard is inapplicable to a particular situation.
- Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.
- A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.

1.5. TECHNICAL GUIDANCE

The review shall ensure all criteria for approval are adequately considered and that justification for the deviation is properly documented.

1.6. LIMITS OF APPROVAL

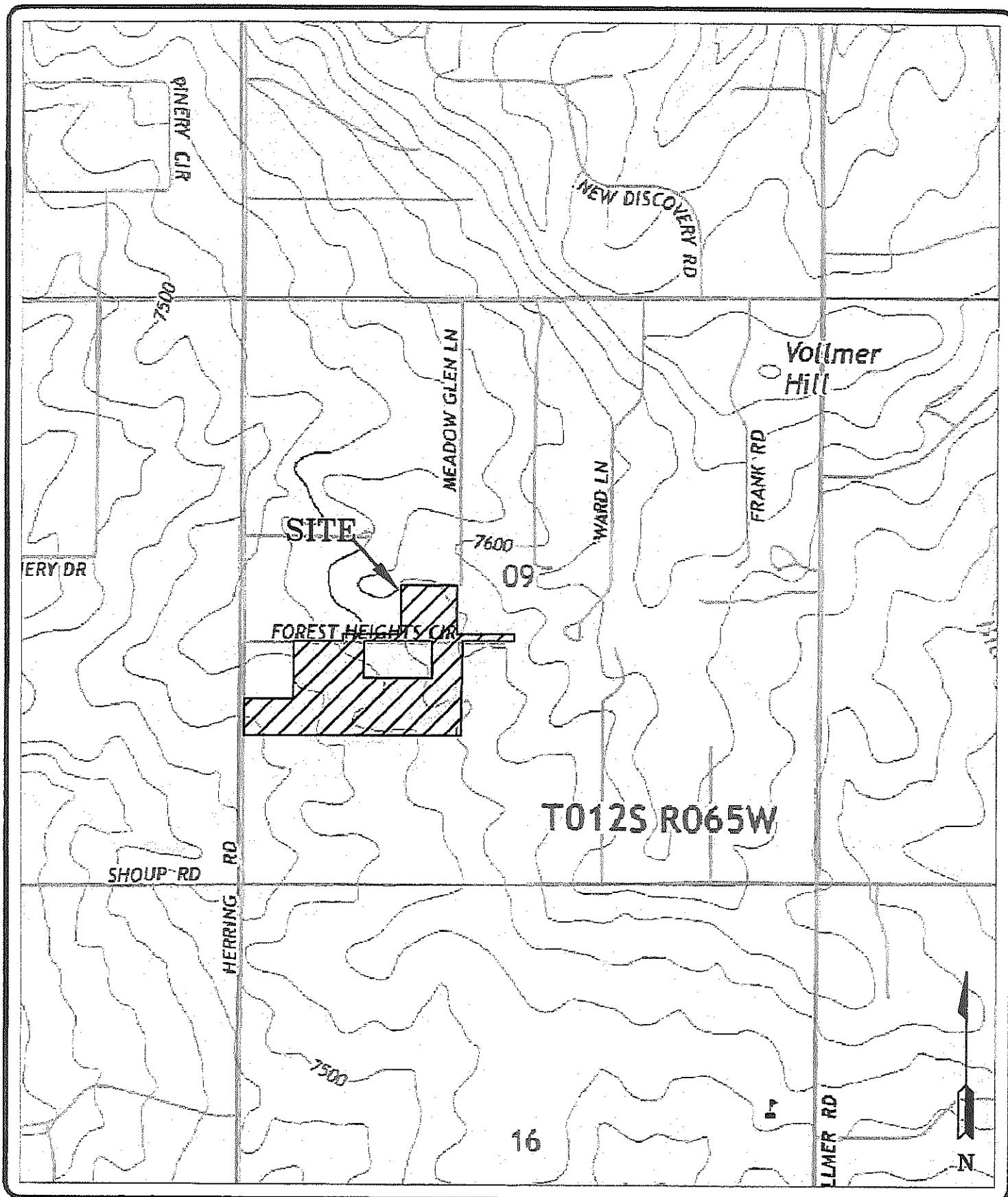
Whether a request for deviation is approved as proposed or with conditions, the approval is for project-specific use and shall not constitute a precedent or general deviation from these Standards.

1.7. REVIEW FEES

A Deviation Review Fee shall be paid in full at the time of submission of a request for deviation. The fee for Deviation Review shall be as determined by resolution of the BoCC.

EXHIBITS

1. SITE MAP



ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-3599

USGS MAP
DITLEAU SUBDIVISION
HERRING ROAD & FOREST HEIGHTS CIRCLE
PASO COUNTY, CO.
FOR: LDC, INC.

DRAWN:
LLL

DATE:
2/28/20

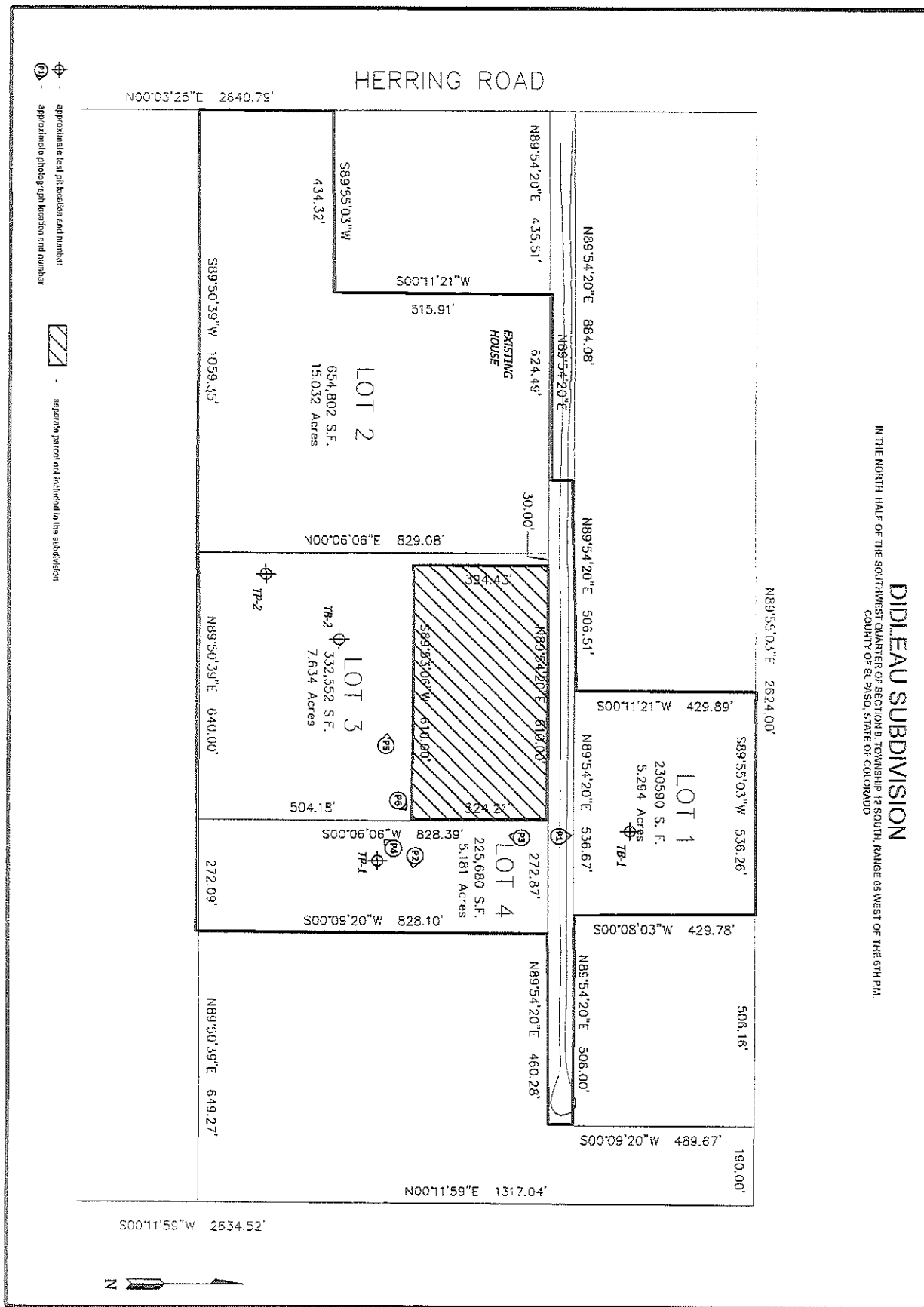
CHECKED:

DATE:

JOB NO.:
192115

FIG NO.:
2

DIDLEAU SUBDIVISION
IN THE NORTH HALF OF THE SOUTHWEST QUARTER OF SECTION 9, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH PM
COUNTY OF EL PASO, STATE OF COLORADO



DATE	10/18/00
BY	AS/REVIEW
3	

SITE PLAN/TESTING LOCATION MAP
DIDLEAU SUBDIVISION
HERRING ROAD & FOREST HEIGHTS
CIRCLECOLORADO SPRINGS, CO.
FOR: LDC, INC.

ENTECH
ENGINEERING, INC.

505 PATTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

REVISION BY	

Herring Rd

Location D

SITE

Forest Heights Cir

ellco Manufacturing

Herring Rd

Shoup Rd

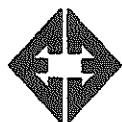
Shoup Rd

Shoup Rd

ish Pile

Colorado

N



ENTECH
ENGINEERING, INC.

565 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
DIDLEAU SUBDIVISION
HERRING ROAD & FOREST HEIGHTS CIRCLE
EL PASO COUNTY, CO.
FOR: LDC, INC.

DRAWN:
LLL

DATE:
2/28/20

CHECKED:

DATE:

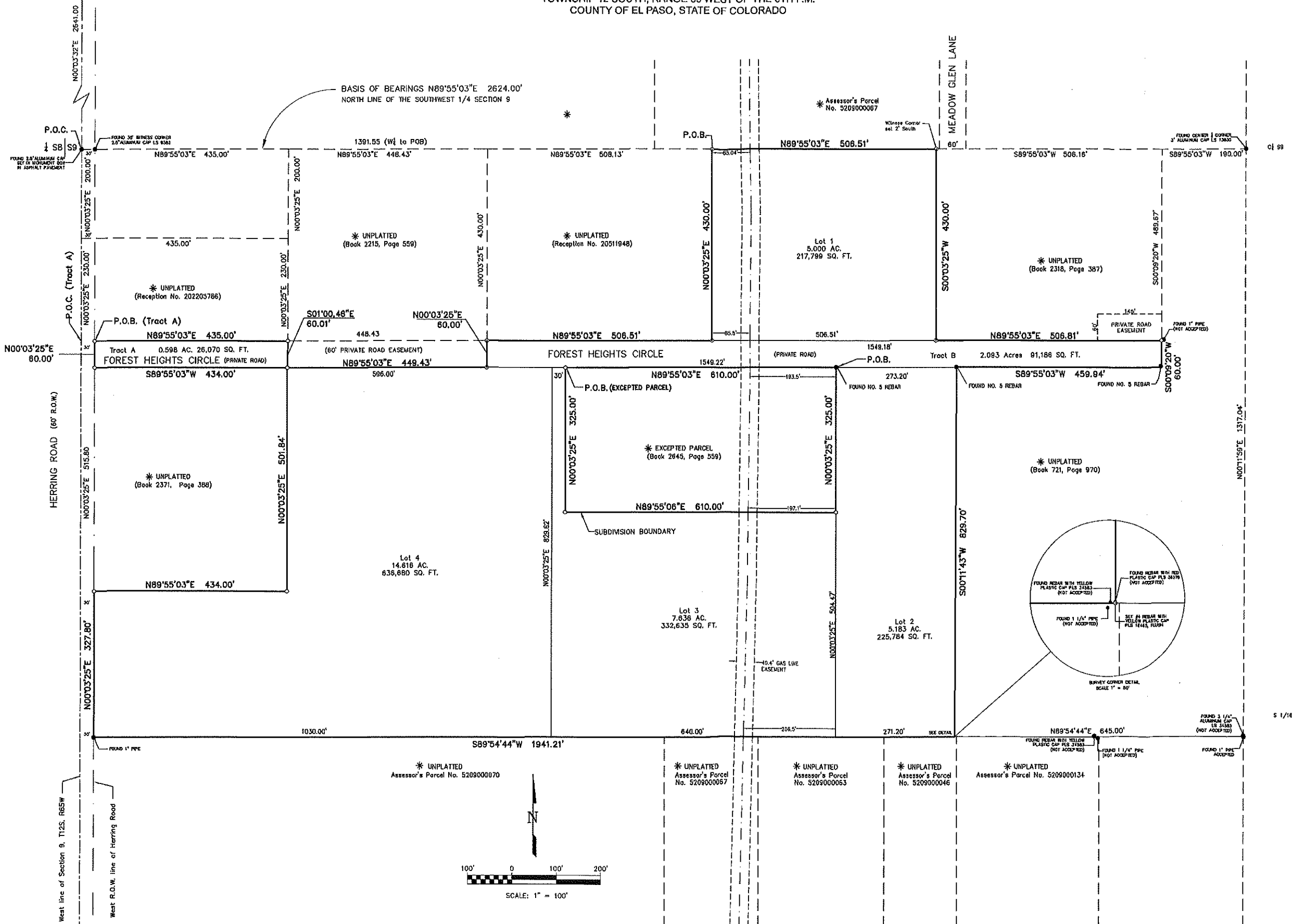
JOB NO.:
192115

FIG NO.:
1

2. ASSESSOR'S MAP

FOREST HEIGHTS ESTATES

FINAL PLAT
PART OF THE SOUTHWEST 1/4 OF SECTION 9
TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO



NOTICE: According to Colorado law you must commence any action to enforce this plat within three years after you first discover such defect. In no event may any action based on this survey be commenced more than ten years from the date of the certification.

CALL BEFORE YOU DIG ...
811
DIAL 811
AS REQUIRED BY YOUR LOCAL UTILITY LOCATOR, WHEN YOU ARE DIGGING, CALL 811 AND WAIT FOR THE UTILITY LOCATOR TO LOCATE THE UTILITIES.

REVISIONS	Description	By	Date
No.			

H Scale: 1"=100'
V Scale: N/A
Designed By: N/A
Drawn By: JLS
Checked By: DLK
Date: 5/17/2020

Land Development Consultants, Inc.
PLANNING • SURVEYING
www.landdev.com • TEL: (718) 628-6133 • FAX: (718) 628-6944
3835 MAZELAND ROAD • COLORADO SPRINGS, CO 80909

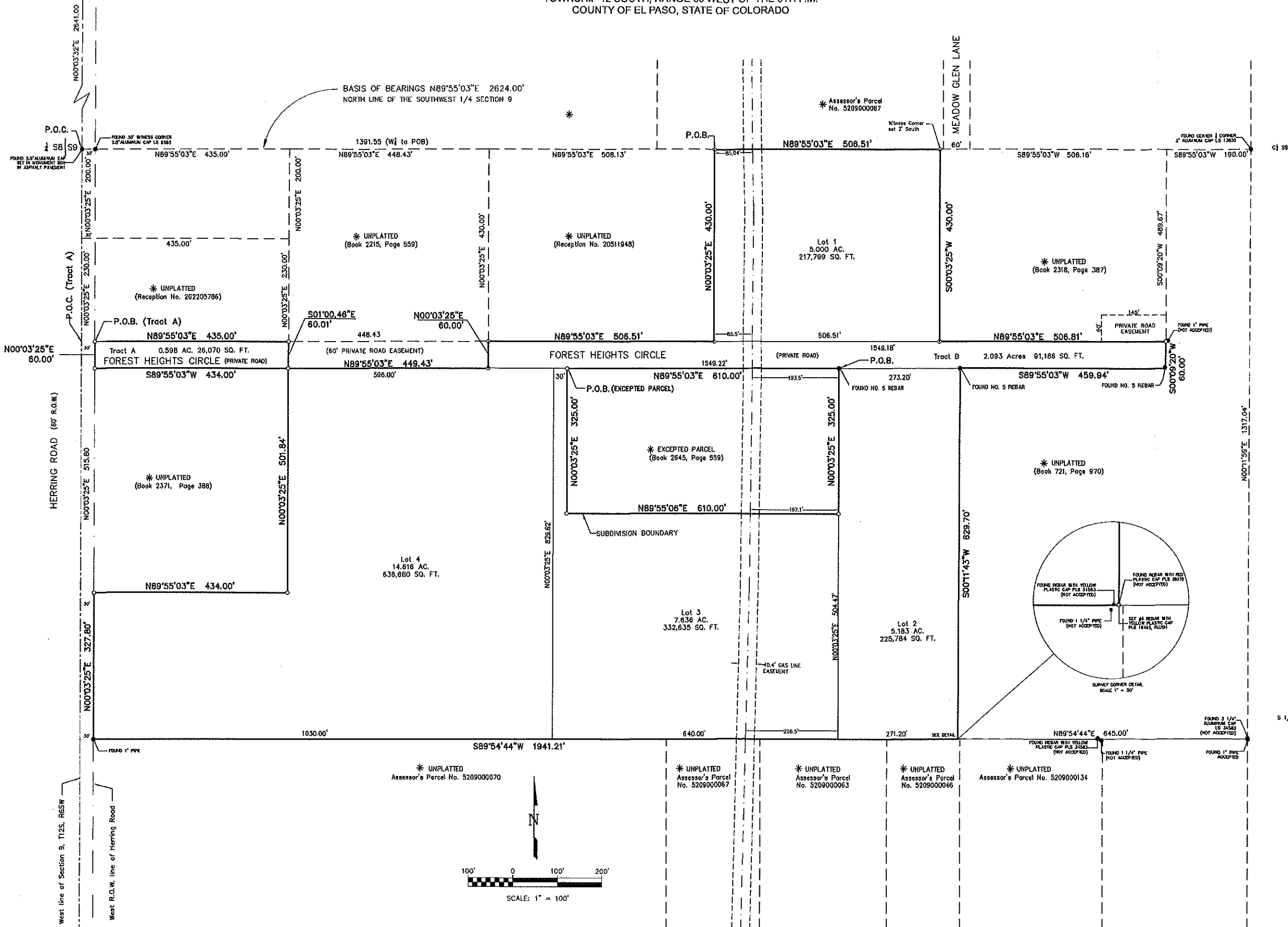
FOREST HEIGHTS ESTATES
FINAL PLAT
PART OF SW 1/4, SEC. 9, T12S, R65W, 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

Project No.: 18070
Sheet: 2 of 2

3. PLAT MAP

FOREST HEIGHTS ESTATES

FINAL PLAT
PART OF THE SOUTHWEST 1/4 OF SECTION 9
TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO



NOTICE: According to Colorado law you must commence any action to enforce this survey within three years after you first discover such defect. In no event may any action be commenced more than ten years from the date of the certification.

CALL BEFORE YOU DIG ...
811
DIAL 811
44 RESOURCES: BEFORE YOU DIG CALL UTILITY LOCATORS
FOR GAS, WATER, AND SEWER

REVISIONS		By		Date	
No.	Description				

H Scale:	1"=100'	N/A
V Scale:		
Designed By:		N/A
Drawn By:		JLG
Checked By:		DLK
Date:		5/01/2020

Land Development Consultants, Inc.
PLANNING - SURVEYING
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3885 MARZLAND ROAD • COLORADO SPRINGS CO 80909

FOREST HEIGHTS ESTATES
FINAL PLAT
PART OF SW 1/4, SEC. 9, T12S, R65W, 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

Project No.: 18070
Sheet: 2 of 2

4. EL PASO COUNTY CRITERIA

Table 2-7. Roadway Design Standards for Urban Collectors and Locals

Criteria	Collectors		Local	
	Non-Residential	Residential	Local	Local ⁴ (low volume)
Design Speed / Posted Speed (MPH)	40 / 35	40 / 35	25 / 25	20 / 20
Clear Zone	14'	14'	12'	7'
Minimum Centerline Curve Radius	565'	565'	200'	100'
Number of Through Lanes	2	2	2	2
Lane Width	12'	12'	12'	12'
Right-of-Way	80'	60'	60' ³	60' ³
Paved Width (Excluding Gutter Pan)	48'	36'	30'	24'
Median Width (Including Curb & Gutter)	12'	n/a	n/a	n/a
Shoulder Width (Ext., Excluding Gutter)	6'	6'	n/a	n/a
Shoulder Width (Int., Excluding Gutter)	n/a	n/a	n/a	n/a
Required Curb/ Gutter Type (Vertical)	6"	6"	6" (or ramp)	6" (or ramp)
Sidewalk Width (@ FL)	5' detached	5' detached	5' attached	5' attached
Design ADT	20,000	10,000	3,000	300
Design Vehicle	WB-50	WB-50	WB-50	SU-30
Bike Lanes Permitted	No	Yes	No	No
Access Permitted	No ⁵	No ⁵	Yes	Yes
Access Spacing	See Table 2-35	See Table 2-35	Frontage	Frontage
Intersection Spacing	660' ²	660' ²	175'	150'
Parking Permitted	No	No	Yes	Yes
Minimum Flowline Grade of Curb	.50%	.50%	.50%	.50%
Centerline Grade (Min.-Max.)	0.5-6% ¹	0.5-8% ¹	0.5-8% ¹	0.5-8% ¹
Intersection Grades (Min.-Max.)	0.5-4%	0.5-4%	0.5-4%	0.5-4%

¹ 10% maximum grade permitted at the discretion of the ECM Administrator
² 330 feet when intersecting local roadways
³ 50-foot right-of-way plus two 5-foot Public Improvements Easements granted to El Paso County
⁴ Section can be used for cul-de-sacs, or roads with two ways out having a maximum of 300 ADT and a maximum length of 1,200 feet
⁵ Where no local public or private roadway can provide access, temporary or partial turn movement parcel access may be permitted

2.3.3 Horizontal Alignment

A. General Criteria

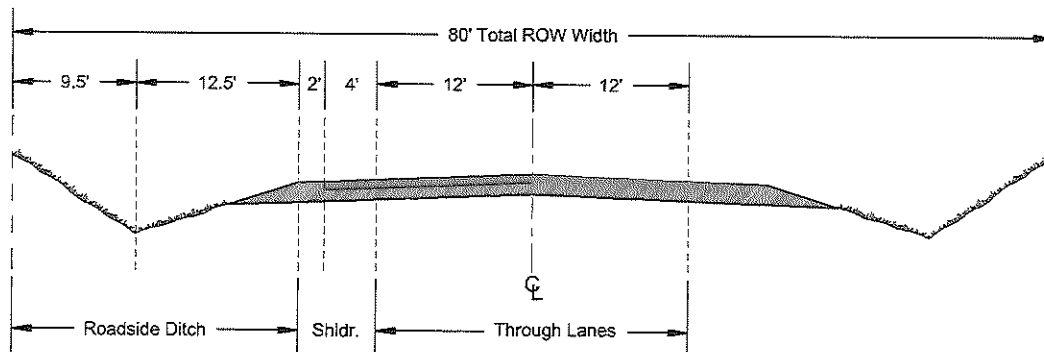
Proper roadway alignment provides for safe and continuous operation at a uniform design speed. Proposed road layouts shall have a logical relationship to existing or platted roads and fit within the overall transportation plan.

Centerline Grade (Min.-Max.)	1-5%	1-5%	1-5%	1-5%	1-6%
Intersection Grades (Min.-Max.)	1-2%	1-2%	1-3%	1-3%	1-4%
¹ Assumes 4% superelevation, 6% for 70 MPH design speeds					
² Pavement width in each direction for divided roadways					

Table 2-5. Roadway Design Standards for Rural Collectors and Locals

Criteria	Collectors		Local	
	Major	Minor	Local	Gravel
Design Speed / Posted Speed (MPH)	50 / 45	40 / 35	30 / 30	50/45
Clear Zone	20'	14'	7'	12'
Minimum Centerline Curve Radius	930' ²	565'	300'	As Approved
Number of Through Lanes	2	2	2	2
Lane Width	12'	12'	12'	12'
Right of Way	90'	80'	70' ³	70' ³
Paved Width	32'	32'	28'	n/a
Median Width	n/a	n/a	n/a	n/a
Outside Shoulder Width (paved/gravel)	8'(4'/4')	6'(4'/2')	4'(2'/2')	4'(0'/4')
Inside Shoulder Width (paved/gravel)	n/a	n/a	n/a	n/a
Design ADT	3,000	1,500	750	200
Design Vehicle	WB-67	WB-67	WB-50	WB-50
Access Permitted	No	Yes	Yes	Yes
Access Spacing	n/a	Frontage	Frontage	Frontage
Intersection Spacing	¼ mile	660'	330'	330'
Parking Permitted	No	Yes	Yes	No
Minimum Flowline Grade	1%	1%	1%	1%
Centerline Grade (Min.-Max.)	1-8% ¹	1-8% ¹	1-8% ¹	1-8%
Intersection Grades (Min.-Max.)	1-4%	1-4%	1-4%	1-4%
¹ 10% maximum grade permitted at the discretion of the ECM Administrator				
² Assumes 4% superelevation, 6% for 70 MPH design speeds				
³ 60-foot right-of-way plus two 5-foot Public Improvements Easements granted to El Paso County				

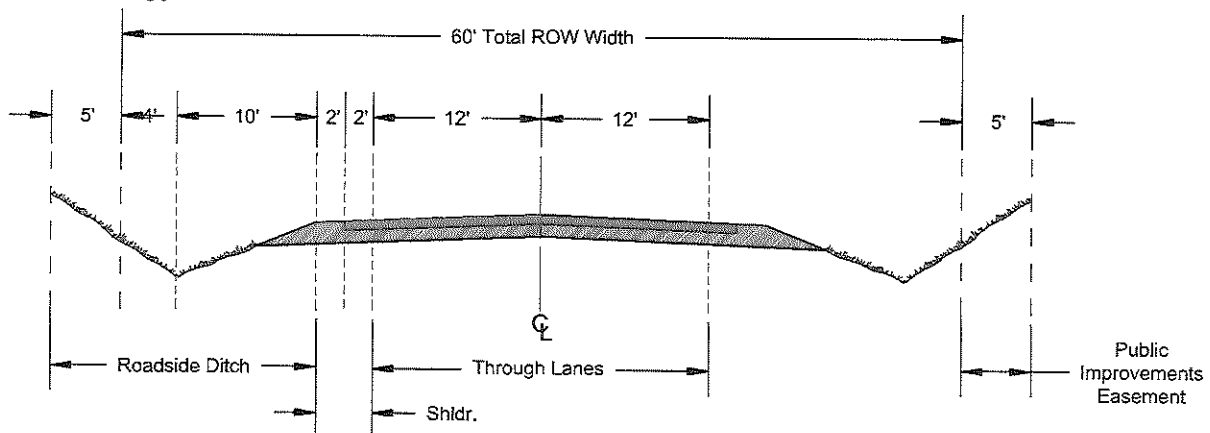
Figure 2-7. Typical Rural Minor Collector Cross Section

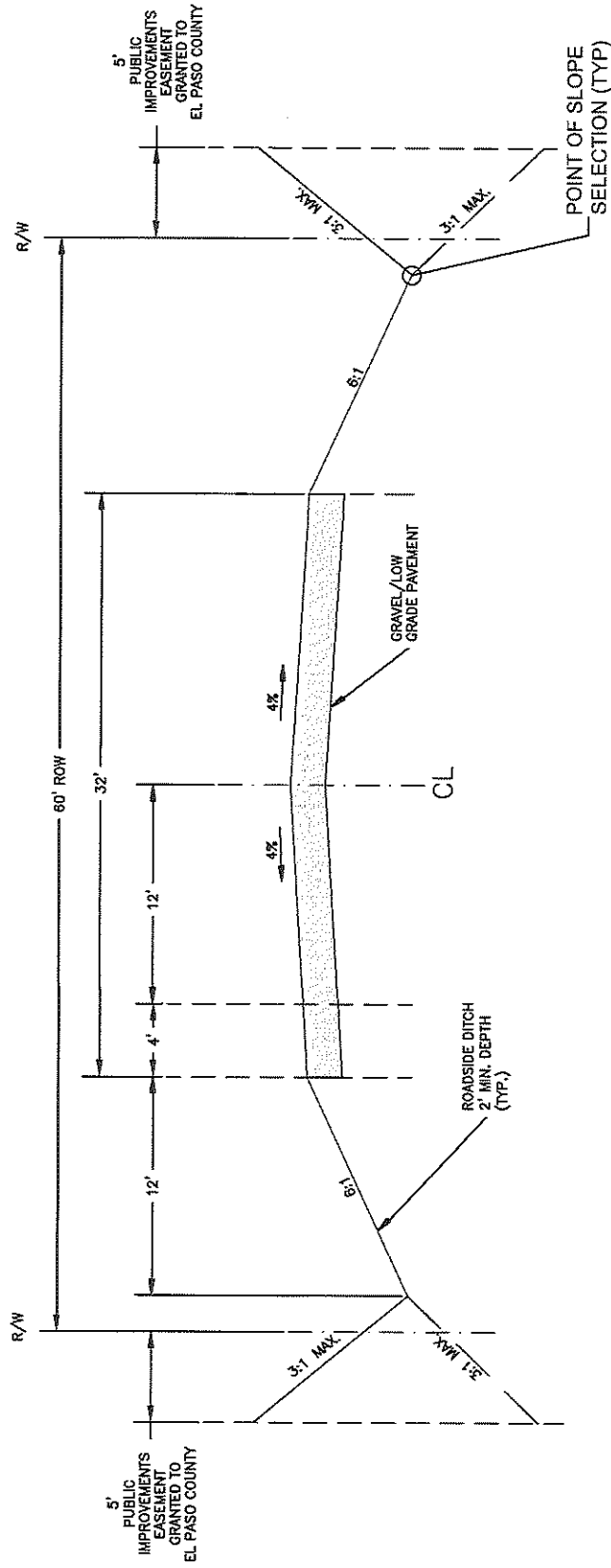


6. Local

Local roadways provide direct lot access and deliver lot-generated trips to collector roadways. Although access needs are high, accesses shall not be allowed to compromise the safety, health or welfare of roadway users (See Figure 2-8).

Figure 2-8. Typical Rural Local Cross Section





Roadway Design Parameters
 Design Speed: 50 mph
 Posted Speed: 45 mph
 Maximum ADT: 199
 Design Vehicle: WB-50

SCALE: NOT TO SCALE



Rural Gravel Local Roadway

Standard Cross Section

REVISION DATE: 12/8/15
 FILE NAME: SD_2-10

9/16/10

DATE APPROVED:

André P. Brackin

DEPARTMENT OF TRANSPORTATION

5. BLACK FOREST FIRE AND RESCUE PROTECTION DISTRICT
LETTER



Black Forest Fire Rescue Protection District
11445 Teachout Road
Colorado Springs, Colorado 80908
Ph-719.495.4300
Fax 719.495.7504
Web- www.bffire.org

"Always Ready, Always Forward, Always Learning."

Office of the Fire Marshal

Thursday, August 27, 2020

Dear Ms. Didleau

Thank you for reaching out to me regarding your future road needs for the Forest Heights Estates subdivision. Per our current code Black Forest Fire Rescue is requiring the following Fire Access to your sub.

1. **403.3 Fire apparatus access road. (2006 WUI code)**When required, fire apparatus access roads shall be all-weather roads with a minimum width of 20 feet (6096 mm) and a clear height of 13 feet 6 inches (4115 mm); shall be designed to accommodate the loads (75,000lbs) and turning radii for fire apparatus; and have a gradient negotiable by the specific fire apparatus normally used at that location within the jurisdiction. Dead-end roads in excess of 150 feet (45 720 mm) in length shall be provided with turnarounds as approved by the code official. An all-weather road surface shall be any surface material acceptable to the code official that would normally allow the passage of emergency service vehicle.
2. Per 2015 IFC (amended), sec D103.4. Requirements for Dead-End Fire Apparatus Access Roads we are requiring a minimum of an 80-foot diameter cul-de-sac with curb and gutter or a 100-foot diameter cul-de-sac without curb and gutter.
3. As the road length is approximately 2200 ft to cul-de-sac, we will require a minimum of two turnouts along the main access roadway for emergency vehicle turnarounds. These turnouts should be spaced and located for maximum efficiency and shall be no less than 30 ft in length and 10 ft deep.

As you begin development of your project please be advised that your project, if 5 or more homes, will require a firefighting water supply source which is generally a water cistern located with the project and accessible to all fire apparatus or departments working in our district. This information is found in the NFPA sec 1142 (Standard on Water Supplies for suburban and Rural Fire Fighting) chapters 7 & 8. I will be happy to sit down and go over these requirements with you as you progress in your project.

Thank you,

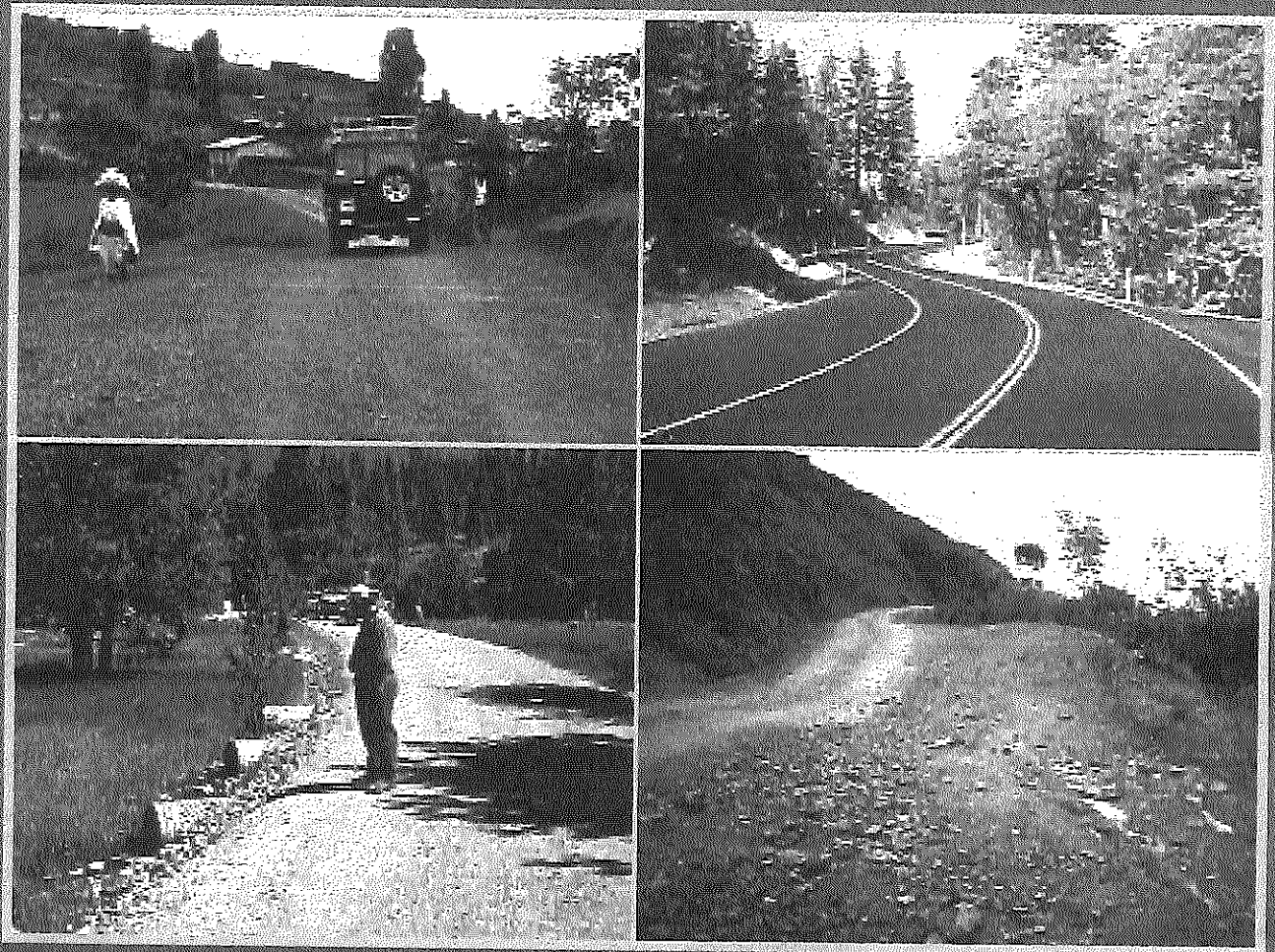
A handwritten signature in black ink that reads 'James Rebitski'.

James Rebitski
Deputy Fire Chief

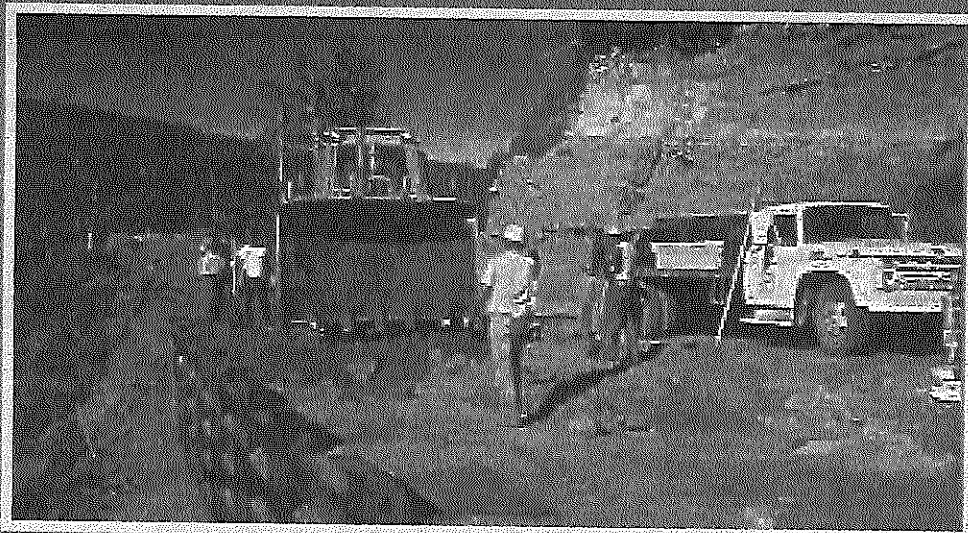
"Serving the citizens of Black Forest since 1945"

6. AASHTO LOW VOLUME TABLES

LOW-VOLUME ROADS ENGINEERING



Best Management Practices Field Guide



Gordon Keller
&
James Sherar

Roadway Geometric Design II

AASHTO provides tables from which desired superelevation rates can be determined based on design speed and curve radius. These tables are incorporated into many state roadway design guides and manuals.

Skid Resistance

With skidding incidents being a major safety concern, roadways need to have adequate skid resistance for typical braking and steering maneuvers. Crashes due to skidding cannot be written off simply as *driver error* or *driving too fast for conditions*. Vertical and horizontal geometric design should incorporate skid reduction measures (pavement types, textures, etc.) for all new and reconstruction roadway projects.

Causes of Poor Skid Resistance

Rutting – causes water accumulation in wheel tracks

Polishing – reduces pavement surface microtexture

Bleeding – covers pavement surface microtexture

Dirty pavements – loses skid resistance when contaminated

Skid resistance corrective actions should produce high initial durability, long term resistance (traffic, time) and minimum resistance decrease with increasing speeds.

LANE WIDTH

The selection of a roadway lane width can affect the facility's cost as well as its performance. Lane widths are influenced by: driver comfort; operational characteristics; crash probability; and level of service.

Drivers typically increase their speeds with wider traffic lanes - so it may be appropriate to use narrower lane widths that are compatible with the alignment and intended speed at locations with low design speeds and restricted alignments. Using a **typical lane width of 12 feet** reduces maintenance costs and provides adequate clearance between heavy vehicles on two-lane, two-way rural highways with high commercial vehicle traffic.

Typical Lane Widths

Range: 9 to 12 feet

High speed, high volume highways: 12 feet (*predominant*)

Urban areas with lane width controls: 11 feet

Low-speed facilities: 10 feet (*acceptable*)

Rural low-volume roads & residential areas: 9 feet (*acceptable*)

Roadway Geometric Design II

Narrow lanes and restricted clearances make vehicles operate closer laterally than normal – affecting the roadway's level of service. The capacity is impacted by the reduced effective width of the traveled way due to restricted lateral clearance. The *Highway Capacity Manual* provides further information regarding the effect of lane width on capacity and level of service.

Although the total roadway width is a critical design decision, pavement marking (stripes) actually determines lane widths. For locations with unequal-width lanes, outside (right) wider lanes provide more space for heavy vehicles, bicycles, and lateral clearance.

At intersections and interchanges, auxiliary lanes (10-ft minimum) should be wide enough to facilitate traffic. An optimal lane width of 10 to 16 feet is appropriate for continuous left-turn lanes.

AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads provides alternative design criteria for local roads and collectors with less than 400 vehicles per day. It may not be cost-effective to design low-volume roadway cross-sections using the same criteria for high volume roads. *NCHRP Report 362 – Roadway Widths for Low-Traffic Volume Roads* contains additional details for low-volume rural and residential roadways.

SHOULDERS

Roadway shoulders are defined by AASHTO as “the portion of the roadway contiguous with the traveled way that accommodates stopped vehicles, emergency use, and lateral support of subbase, base, and surface courses”. Shoulders are one of the most important safety features for roadways.

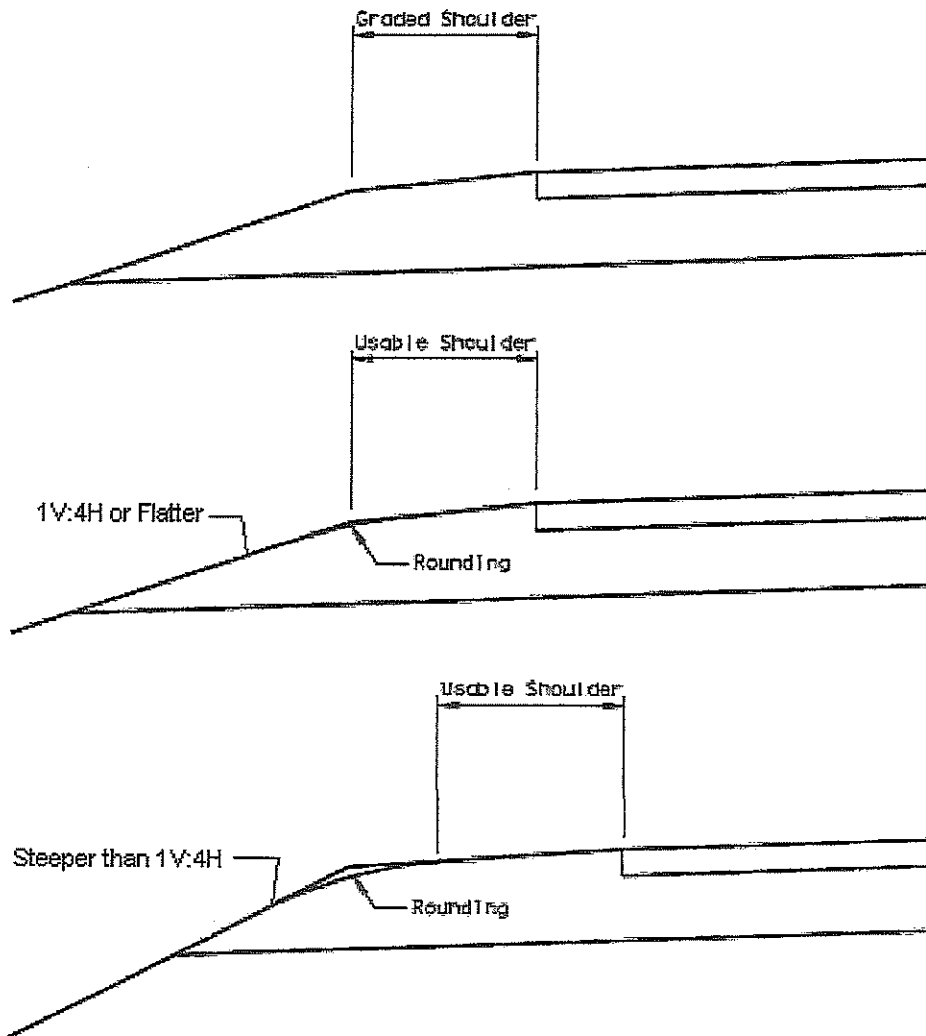
<u>Type of Roadway</u>	<u>Shoulder Width</u>
Minor rural roads (with or without surface)	2 feet
Major roads (with stabilized or paved shoulder)	12 feet

The limits of **graded** shoulders are from the edge of traveled way to the intersection of the shoulder slope and foreslopes. The **usable** shoulder width is the actual shoulder for parking and emergencies. This width is equal to the graded shoulder for sideslopes of 1V:4H or flatter.

Shoulder surfacing provides better all-weather load support versus soil. Typical

Roadway Geometric Design II

shoulder surface materials include: *gravel; mineral/chemical additives; shell; asphaltic/concrete paving; crushed rock; and bituminous surface treatments.*



Shoulder Width

Design guidelines for roadway shoulder widths vary by design speed, functional class, and traffic volume. AASHTO recommends a minimum lateral clearance of 1 foot (preferably 2 feet) between a stopped vehicle on a roadway shoulder and the edge of the traveled way.

<u>Facility</u>	<u>Shoulder Width</u>
High speed, high volume roadways	10 feet normal width
Low volume highways	2 feet 6 to 8 ft preferable
High speed, high volume roadways with trucks	10 feet 12 feet preferable
Bicycles and pedestrians	4 feet no rumble strips

GEOMETRIC DESIGN STANDARDS FOR RURAL LOCAL ROAD SYSTEM (GS-4)

TRAFFIC VOLUME	TERRAIN	DESIGN SPEED (MPH)	MINIMUM RADIUS	(9) MINIMUM STOPPING SIGHT DISTANCE	(2) MINIMUM WIDTH OF SURFACING OR PAVEMENT	(3) (4) (5) MINIMUM WIDTH OF GRADED SHOULDERS CUT & FILL		(6) MINIMUM WIDTH OF DITCH FRONT SLOPE	(7) SLOPE	NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
						With GR	Without GR			
(1) ADT OVER 2000	LEVEL	50	760'	425'	24'	12'	8'	6' @ 4:1	CS-4, 4A / 4C	See Footnote (8)
	ROLLING	45	589'	360'				CS-3, 3A / 3B		
		40	446'	305'						
	MOUNTAINOUS	35	316'	250'				4' @ 3:1		
		30	215'	200'						
(1) ADT 1500 TO 2000	LEVEL	50	760'	425'	22'	10'	6'	6' @ 4:1	CS-4, 4A / 4C	
	ROLLING	45	589'	360'				CS-3, 3A / 3B		
		40	446'	305'						
	MOUNTAINOUS	35	316'	250'				4' @ 3:1		
		30	215'	200'						
(1) ADT 400 TO 1500	LEVEL	50	760'	425'	22'	9'	5'	6' @ 4:1	CS-1	
	ROLLING	45	589'	360'						
		40	446'	305'	20'					
	MOUNTAINOUS	35	316'	250'				4' @ 3:1		
		30	215'	200'						
CURRENT ADT UNDER 400	LEVEL	45	589'	360'	18'	8'	2'	4' @ 3:1	CS-1	
		40	446'	305'						
	ROLLING	35	316'	250'						
		30	215'	200'						
	MOUNTAINOUS	25	135'	155'						
		20	77'	125'						

GENERAL NOTES

Low design speeds are generally applicable to roads with winding alignment in rolling or mountainous terrain where environmental conditions dictate.

High design speeds are generally applicable to roads in level terrain or where other environmental conditions are favorable.

Intermediate design speeds would be appropriate where terrain and other environmental conditions are a combination of those described for low and high speed.

For minimum design speeds for 250 ADT and under, see AASHTO Green Book, Chapter 5, Section 5.2.1, page 5-2, Table 5-1.

Standard TC-5.11R superelevation based on 8% maximum is to be used.

In incorporated towns or other built-up areas, Urban Standard GS-8 may be used. "Built-up" is where there is sufficient development along the roadway that justifies a need to channelize traffic into and out of properties utilizing curb and gutter.

For Passing Sight Distance Criteria See AASHTO Green Book, Chapter 3, Section 3.2.4, page 3-8.

For maximum grades relative to terrain and design speed, see AASHTO Green Book, Chapter 5, Section 5.2.1, page 5-3, Table 5-2.

For Recreational Access Road design standards, see AASHTO Green Book, Chapter 5, Section 5.4.2, page 5-24.

FOOTNOTES

- (1) Use Design Year ADT for new construction and reconstruction projects in accordance with Road Design Manual, Chapter 2A, "REQUEST FOR TRAFFIC DATA" and Form LD-104. For RRR projects or roads with ADT < 400. See Road Design Manual, Appendix A, "GUIDELINES FOR RRR PROJECTS."
- (2) Lane width to be 12' at all interchange locations.
- (3) In mountainous terrain or sections with heavy earthwork, the graded width of shoulder in cuts may be decreased by 2', but in no case shall the cut shoulder width be less than 2'.
- (4) Minimum shoulder slope shall be 8% on low side and same slope as pavement on high side (See Std. GS-12).
- (5) ~~When the mainline is 2 lanes~~ provide 4' wide paved shoulders (right and left) when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage. Provide 5' wide paved shoulder when design year ADT exceeds 2000 VPD, with 5% or more truck and bus usage and the route is an AASHTO approved U.S. Bicycle Route (1, 76 or 176) or designated as a bicycle route on a locally adopted transportation plan. All shoulders not being paved will have the mainline pavement structure extended 1' on the same slope into the shoulder to eliminate raveling at the pavement edge. For additional guidance on shoulder widths, see AASHTO Green Book, Chapter 5, Section 5.2.2, page 5-6.
- (6) A hydraulic analysis is necessary to determine actual depth requirement.
- (7) Additional or modified slope criteria to be applied where shown on typical sections.
- (8) See Manual of the Structure and Bridge Division - Volume V - Part 2 Design Aids - Chapter 6 Geometrics.
- (9) For additional information on sight distance requirements on grades of 3 percent or greater, see AASHTO Green Book, Chapter 3, Section 3.2.2, page 3-2, Table 3-2.

FIGURE A - 1 - 4*

13.3.1 Design and Operation Speed

The design guidelines presented are a function of speed, as follows:

- Low speed – 0 to 45 mph
- High speed – < 45 mph

13.3.2 Traffic Volumes

Traffic volumes on very low-volume roads are stratified into three levels for purposes of these design guidelines. The volume ranges are:

- 100 vehicles per day or less
- 100 to 250 vehicles per day
- 250 to 400 vehicles per day

13.4 CROSS SECTION DESIGN

Cross section design criteria for lower volume roads generally address total roadway width rather than having separate criteria for lane and shoulder width.

13.4.1 Very Low-Volume Local Roads in Rural Areas Cross Section

Table 13-1 illustrates the total roadway width for the six low volume functional classifications for rural conditions. These cross section widths are based on the expected user vehicles.

Total Roadway Width (ft) by Functional Classification						
Design Speed (mph)	Major Access	Minor Access	Recreational and Scenic	Industrial/Commercial Access	Resource Recovery	Agricultural Access
15	-	18.0	18.0	20.0	20.0	22.0
20	-	18.0	18.0	20.0	20.0	24.0
25	18.0	18.0	18.0	21.0	21.0	24.0
30	18.0	18.0	18.0	22.5	22.5	24.0
35	18.0	18.0	18.0	22.5	22.5	24.0
40	18.0	18.0	20.0	22.5	-	24.0
45	20.0	20.0	20.0	23.0	-	26.0
50	20.0	20.0	20.0	24.5	-	-
55	22.0	-	22.0	-	-	-
60	22.0	-	-	-	-	-
Note: Total Roadway width includes the width of both traveled way and shoulders.						

**Table 13-1 (Exhibit 1 of the *Geometric Design of Very Low-Volume Local Roads* (1))
Total Roadway Widths for Rural Conditions**

Table 4-1. Guidelines for Total Roadway Width for New Construction of Low-Volume Roads in Rural Areas

U.S. Customary							
Total Roadway Width (ft) by Functional Subclass ¹							
Major Access Road by Design Volume Level (veh/day)							
Design Speed (mph)	400 or Less	401 to 2,000	Minor Access Road	Recreational and Scenic Road	Industrial/Commercial Access Road	Resource Recovery Road	Agricultural Access Road
15	18.0	23.0 ²	18.0	18.0	20.0	20.0	22.0
20	18.0	23.0 ²	18.0	18.0	20.0	20.0	24.0
25	18.0	23.0 ²	18.0	18.0	21.0	21.0	24.0
30	18.0	23.0 ²	18.0	18.0	22.5	22.5	24.0
35	18.0	23.0 ²	18.0	18.0	22.5	22.5	24.0
40	18.0	23.0 ²	18.0	20.0	22.5	—	24.0
45	20.0	25.0	20.0	20.0	23.0	—	26.0
50	20.0	25.0	20.0	20.0	24.5	—	—
55	22.0	25.0	—	22.0	—	—	—
60	22.0	25.0	—	—	—	—	—
Metric							
Total Roadway Width (m) by Functional Subclass ¹							
Major Access Road by Design Volume Level (veh/day)							
Design Speed (km/h)	400 or Less	401 to 2,000	Minor Access Road	Recreational and Scenic Road	Industrial/Commercial Access Road	Resource Recovery Road	Agricultural Access Road
20	5.4	7.0 ²	5.4	5.4	6.0	6.0	6.6
30	5.4	7.0 ²	5.4	5.4	6.0	6.0	7.2
40	5.4	7.0 ²	5.4	5.4	6.4	6.4	7.2
50	5.4	7.0 ²	5.4	5.4	6.8	6.8	7.2
60	5.4	7.0 ²	5.4	5.4	6.8	6.8	7.2
70	6.0	7.6	6.0	6.0	7.0	—	8.0
80	6.0	7.6	6.0	6.0	7.4	—	—
90	6.6	7.6	—	6.6	—	—	—
100	6.6	7.6	—	—	—	—	—

Note: Total roadway width includes the width of both traveled way and usable shoulders.

¹ All low-volume roads with design volumes greater than 400 veh/day should be treated as major access roads.

² For roads in mountainous terrain with design volumes up to 600 veh/day, use 20.0-ft [6.0-m] total roadway width.

Small differences in the existing or proposed dimensions from those shown in Table 4-1 may be completely acceptable. For example, on roads used by trucks or wider agricultural equipment, designers should have the discretion to consider the actual widths of vehicles expected to use a particular road and modify the width guidelines in Table 4-1 accordingly.

7. MAINTENANCE AGREEMENT

ACCESS EASEMENT GRANT AND MAINTENANCE DECLARATION AND AGREEMENT
FOREST HEIGHTS CIRCLE

THIS ACCESS EASEMENT GRANT AND MAINTENANCE DECLARATION AND AGREEMENT, dated for reference this _____ day of _____, 2020, (Agreement) is made between Phyllis Didleau, Jon P. Didleaux, Lielani A Ritchie, Judith P Von Ahlefeldt, Charles F. Bauer and Shirley L. Bauer, Frederick J. Yonce and Judith P. Von Ahlefeldt (each individually an "Owner" and collectively the "Owners").

RECITALS:

- A. Phyllis Didleau is the owner of the real property situated in the County of El Paso, State of Colorado described on Exhibit A (Assessor Parcel # 5209000121) and the real property situated in El Paso County State of Colorado described on Exhibit A-1 (Assessor Parcel 5209000081).
- B. Phyllis Didleau and Jon Didleaux are the owners of real property situated in the County of El Paso, State of Colorado described on Exhibit B (Assessor Parcel # 5209000120).
- C. Jon P Didleaux is the owner of the real property situated in the County of El Paso, State of Colorado described on Exhibit C (Assessor Parcel # 5209000050).
- D. Lielani A Ritchie is the owner of the real estate situated in the County of El Paso, State of Colorado described on Exhibit D (Assessor Parcel # 5209000103).
- E. Charles, F. Bauer and Shirley L Bauer are the owners of the real property situated in the County of El Paso, State of Colorado described on Exhibit E (Assessor Parcel # 5209000100).
- F. Frederick J. Yonce is the owner of the real property situated in the County of El Paso, State of Colorado described on Exhibit F (Assessor Parcel # 509000119).
- G. Judith P. Von Ahlefeldt is the owner of the real property situated in the County of El Paso, State of Colorado described on Exhibit G.
- H. The Owners wish to establish a private right of way and road across the following described real estate owned by some of them. The real estate over which is the private right of way and road is legally described in Exhibit H (the "Private Road Land"). The Owners who own a portion of the Private Road Land are sometimes referred to herein as "Grantors."
- I. The Owners understand that El Paso County does not maintain private roads such as the one subject to this Agreement.
- J. The Owners wish to provide for and set forth their understandings and agreement with respect to use and maintenance of the private road and improvements thereon.
- K. Some of the Owners are processing the subdivision of their land through the subdivision regulations of El Paso County and desire to have this Agreement meet the requirements of El Paso County for County approval of such subdivision.

NOW THEREFORE, in consideration of the sum of Ten Dollars (\$10.00) and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the following grants, agreement, covenants, declaration and restrictions are made:

1. Grant of Easement. Each of the Grantors hereby grants to each Owner and their successors and assigns, a nonexclusive easement for access, utilities and drainage for the benefit of each such Owner's respective parcel described above across the Private Road Land.
2. Use of the Owners' Real Estate. Use of the Private Road Land by the Owners is not confined to the present configuration of their respective properties, and the Owners or their successors may subdivide, reconfigure, construct improvements on or otherwise modify or use their property. However, the Owners agree to construct no fences or place any other obstructions on their respective properties in a manner which would prevent, or reasonably impede, vehicle or personnel travel, utility access or drainage across the Private Road Land. Otherwise, the respective Owners each shall have full use and occupancy of their respective real estate which is subject to the easement set forth above.
3. Maintenance of the Private Road. As a general standard, the Owners agree that they shall provide maintenance sufficient to provide reasonable access for emergency vehicles. The Owners agree to share the cost and expense of maintaining the improvements on the Private Road Land in good operating condition and to share equally the cost and expense of affecting any repair to said Improvements accruing from and after the date of this Agreement. For purposes of this cost sharing, each Owner shall pay a share for each residential dwelling unit on such Owner's real estate. For example, if there are seven parcels of real estate, and five residences (whether occupied or not), each Owner with a residence on such Owner's property shall pay one fifth (1/5th) of the cost of maintaining the improvements for each such residence on such Owner's property.
4. Maintenance Process. The Owners agree that unless Owners of the real estate with 60% of the dwelling units appoint a different Administrator, Jon P. Dideaux shall be the Administrator of this Agreement. Whenever in the opinion of the Administrator the road requires such maintenance, on behalf of the Owners the Administrator shall order and arrange for sufficient maintenance meet the standard above and to enable the Owners to use the roadway. Such maintenance shall include snow removal, grading, re-gravelling, cleaning culverts, weed treatment, tree and debris removal, and any other maintenance generally desired by Owners. The Administrator shall either (i) pay for such maintenance directly and be reimbursed by each Owner according to each Owner's proportionate share, or (ii) arrange to have each Owner directly pay the proportionate cost of such maintenance, or (iii) use some combination of the foregoing. To the extent the Administrator pays for any Owner's share, the Administrator shall have a lien on each such Owner's respective real estate as set forth above until such Owner's share is paid in full with interest accruing on any unpaid amount at the rate of 10% per annum simple interest and the Administrator shall be entitled to recover the costs of enforcing such lien and collecting such amount, including reasonable legal fees, expert witness fees and costs. The Administrator may refuse to order such maintenance until there is, in the Administrator's opinion, sufficient commitment or actual payment to reimburse the Administrator and pay for such maintenance. Unless otherwise agreed by Owners of the real estate with 60% of the dwelling units, the Administrator shall serve without compensation.

5. Binding Agreement. This Agreement shall be binding upon the undersigned Owners, and their respective successors, assigns, and personal representatives. This Agreement may not be revoked without the written unanimous consent of the affected Owners. This Agreement shall be recorded in the land records of the Office of the Clerk and Recorder of El Paso County, Colorado, and shall be a covenant running with the lands of the Owners as those lands are described herein above, and shall be enforceable by the Owners' successors and assigns and personal representatives. Any persons or other entities who acquire title to the Owners' property hereinabove described, whether by purchase or otherwise, shall be subject to the provisions of this Agreement to the same extent as if such parties had been signatory to this Agreement.

OWNERS:

STATE OF COLORADO

)

) ss.

COUNTY OF EL PASO

)

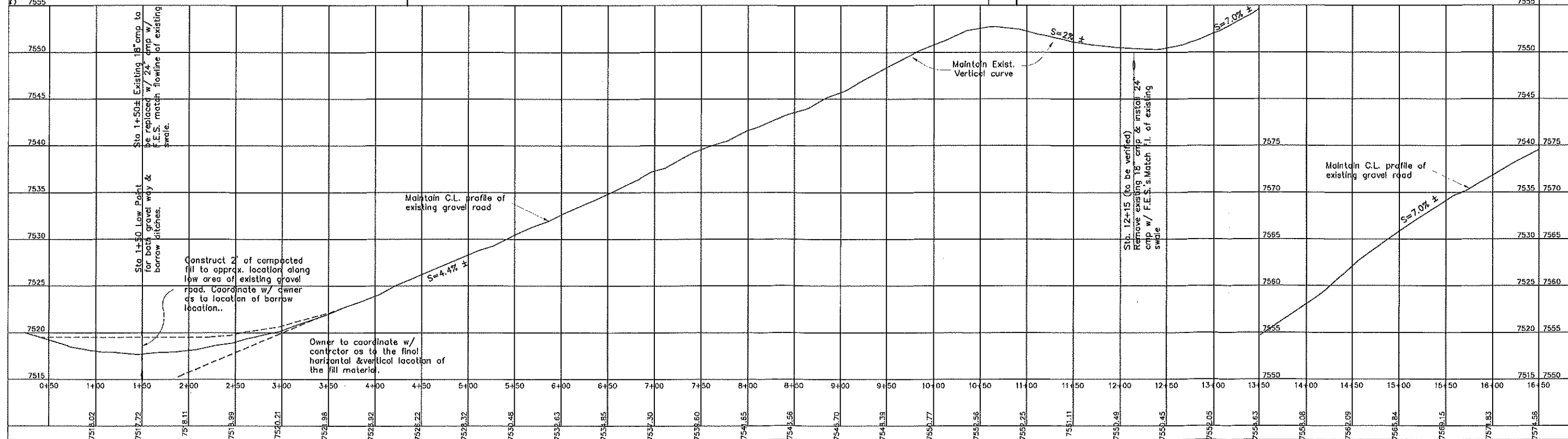
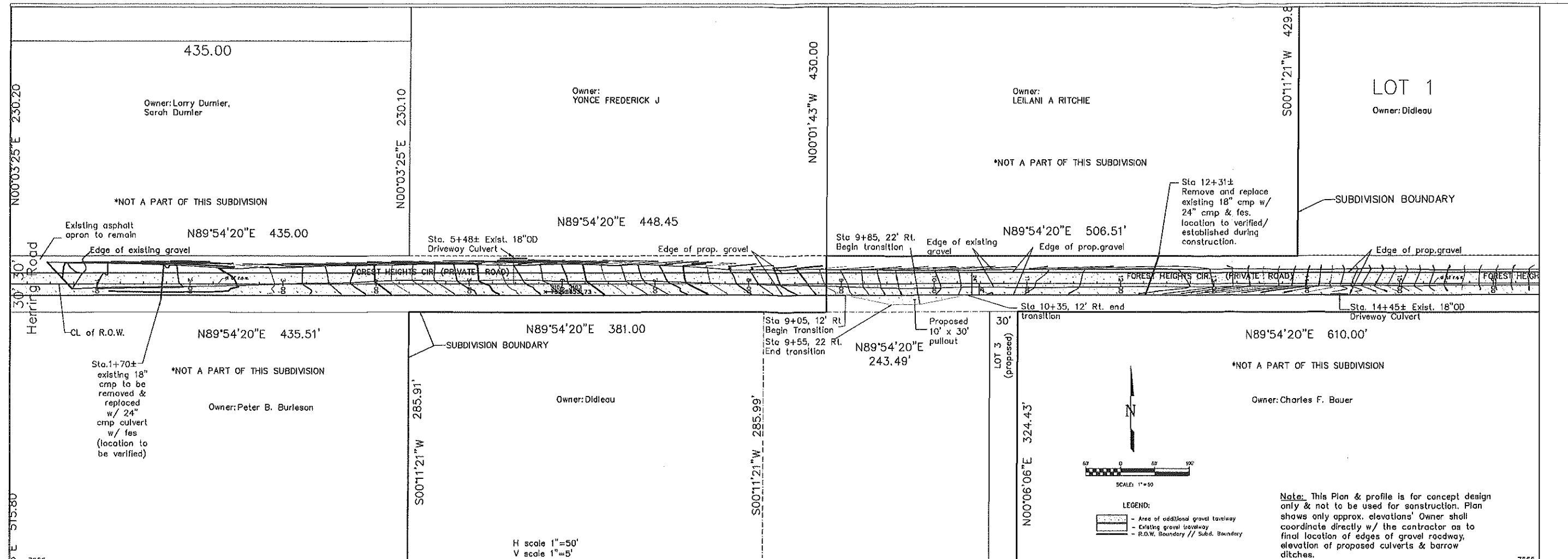
This instrument was acknowledged before me on _____, by _____.

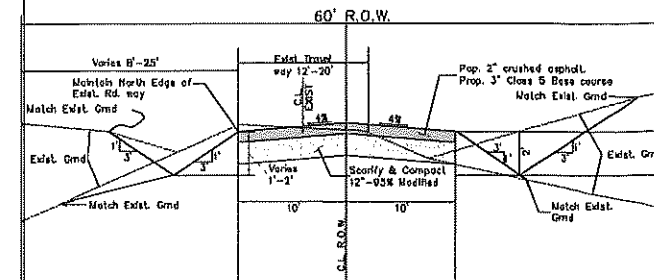
[Seal]

_____, Notary Public

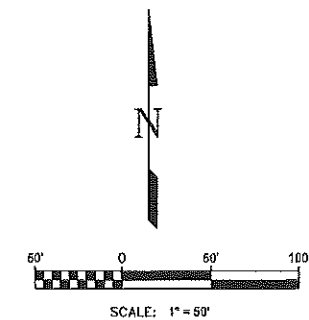
My commission expires: _____

8. CONCEPT PLAN & PROFILE ROADWAY








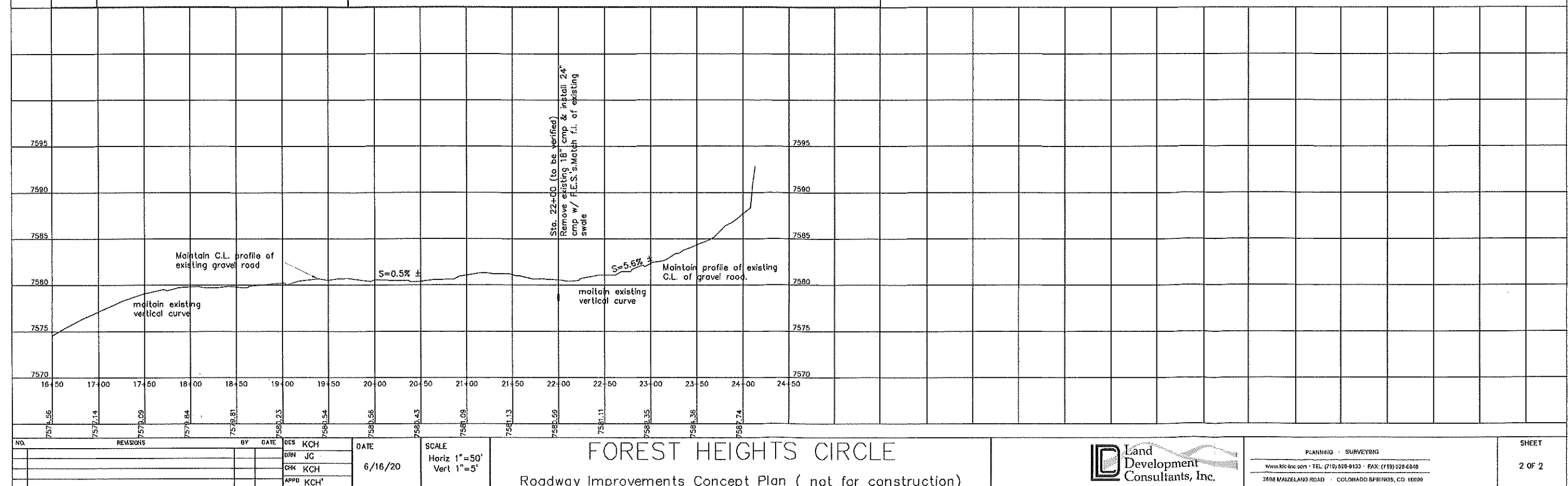
Typical Section
Forest Heights Circle
N.T.S.



LEGEND:

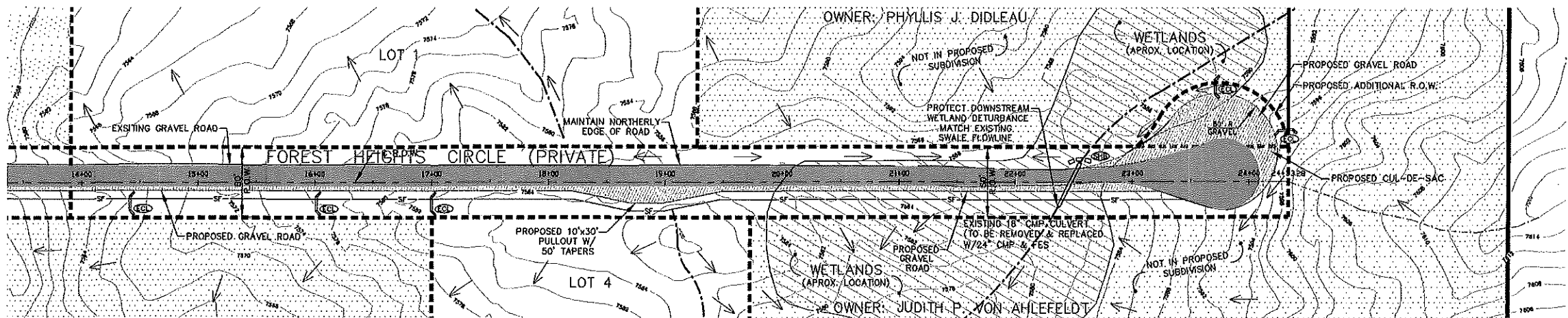
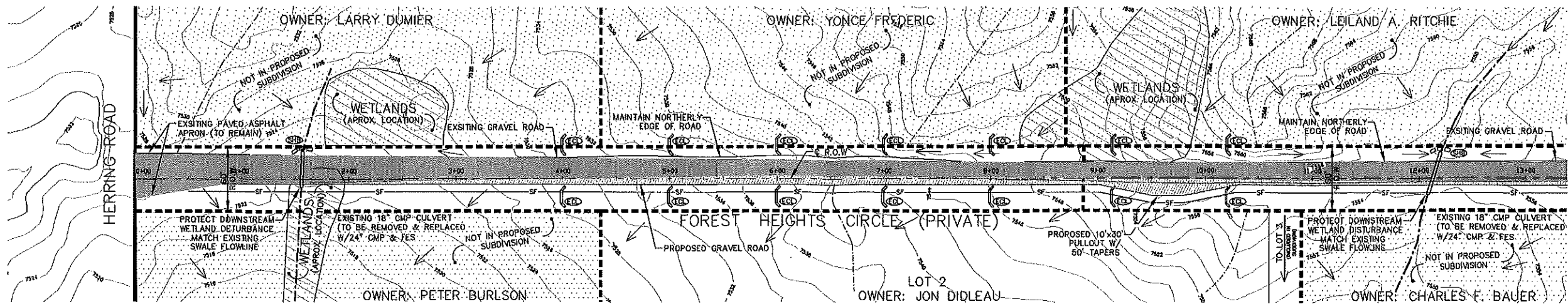
	- Area of additional gravel travelway
	- Existing gravel travelway
	- R.O.W. Boundary // Subd. Boundary

Note: This Plan & profile is for concept design only & not to be used for construction. Plan shows only approx. elevations. Owner shall coordinate directly w/ the contractor as to find location of edges of gravel roadway, elevation of proposed culverts & borrow ditches.



9. GRADING AND EROSION CONTROL PLAN

FOREST HEIGHTS SUBDIVISION
STORM WATER MANAGEMENT / GRADING AND EROSION CONTROL PLAN
SCALE: 1" = 50'

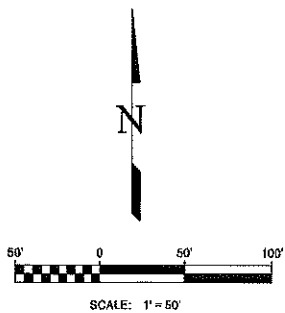


LEGEND:

- R.O.W. BOUNDARY
- CENTER LINE OF R.O.W.
- PROPOSED GRAVEL ROAD ADDITIONAL
- EXISTING GRAVEL ROAD
- EXISTING WETLANDS (APPROX. LOCATION ONLY)
- EXISTING LOTS NOT IN SUBDIVISION
- XXX--- CONTOURS (2 FOOT INTERVALS)
- DIRECTION OF FLOW
- EXISTING SWALE CENTERLINE
- RIDGE LINE

LEGEND (MP IMPROVEMENTS):

- SILT FENCE
- STAKE HAY BALES (SHB)
- STAKE EROSION CONTROL (TEMP) (EC)



According to Colorado law, you must commence any survey within three years after you are notified of the survey. In no event, any action based upon any survey in this plan shall be more than three years from the date of the certification shown herein.

CALL BEFORE YOU DIG ...
811
DIAL 811
AN IMPROVED CALLING SERVICE FOR LOCATING UNDERGROUND UTILITIES
AND WATER

No.	Description	By	Date

H Scale: 1" = 50'
V Scale: N/A
Designed By: KJ
Drawn By: TLC
Checked By: RH
Date: 6/4/2020

Land Development Consultants, Inc.
PLANNING • SURVEYING
www.ldc-inc.com • TEL: (719) 524-4133 • FAX: (719) 524-8448
3593 MAIZE ROAD • COLORADO SPRINGS, CO 80909

FOREST HEIGHTS SUBDIVISION
STORM WATER MANAGEMENT/
GRADING AND EROSION CONTROL PLAN

Project No.: 18070
Sheet: 1 of 1

F:\18070-18070-Diddleau\project\18070-18070-Diddleau\Storm Water Management Plan - Outline Submittal.DWG

10. EROSION CONTROL FACILITIES

1. Check Dam (CD)



COLORADO
Department of Transportation

1. DESCRIPTION:

Check Dams (also referred to as a ditch check) are temporary control structures that can be constructed from rock, silt berms, or erosion logs. Check Dams can be installed across natural or constructed, and temporary or permanent, drainage ditches. They are intended to reduce the velocity of concentrated flows and reduce erosion potential within the ditch.

2. CONTROL MEASURE USES

- ☒ Erosion Control
- ☒ Sediment Control
- ☐ Site/Materials Management

3. RELEVANT SPECIFICATION SECTIONS

Section 208 - Erosion Control

- a) 208.02.(e)/(f) - Materials
- b) 208.05.(g)/(h) - Construction BMPs
- c) 208.11 - Method of Measurement
- d) 208.12 - Basis of Payment

4. RELEVANT M-STANDARD DETAILS

M-208-1, Sheet 11 of 11 (Rock Check Dam)

M-208-1, Sheet 6 of 11 (Drainage Ditch Applications)

5. BASIS OF PAYMENT

Pay item	Description	Pay Unit
208-00041	Rock Check Dam	EACH
208-00004	Silt Berm	LF

6. APPLICATIONS

- Used to intercept and filter concentrated flows and dissipate erosive energy.
- Used to intercept flows along drainage ditches or channels prior to seeding and during establishment of seeded areas.
- Erosion Logs may be used to temporarily construct Check Dam control measures. Refer to the Erosion Logs fact sheet (No. 17) for more information.



Rock check dam along lined drainage ditch

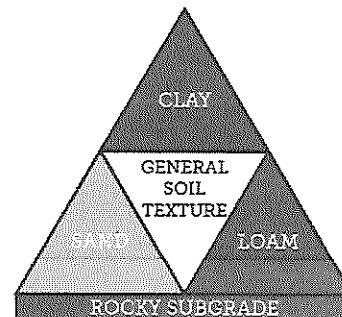
7. LIMITATIONS

- Use only in open channels that receive runoff from an area 10 acres or less.
- Use only in constructed drainage channels and ditches, never in natural live streams.
- For temporary use only, not to be used as primary sediment capture structures.
- For use in unvegetated channels only, not for use in wetland areas or areas where vegetation has been established as they will damage the existing vegetation.

8. CONTROL MEASURE SOILS TRIANGLE

SOIL TEXTURE AND SUBGRADE CONDITIONS

- APPROPRIATE
- ▨ SOMEWHAT APPROPRIATE
- NOT APPROPRIATE



2. Mulching, Agricultural Straw or Hay, and Mulch Tackifier (MU)



COLORADO
Department of Transportation

1. DESCRIPTION:

Mulching is a temporary control measure used for interim and permanent stabilization that consists of mechanically placing a uniform layer of agricultural straw or hay mulch that is crimped in and sprayed with tackifiers over disturbed construction areas. It protects disturbed areas immediately after seeding from the forces of rainfall impacts; it also increases infiltration. Mulching assists with germination success of seeded areas by conserving moisture and protecting against temperature extremes until permanent vegetation is established.



Straw Mulching on disturbed side slope

2. CONTROL MEASURE OBJECTIVES

- ☒ Erosion Control
- ☐ Sediment Control
- ☐ Site/Materials Management

3. RELEVANT SPECIFICATION SECTIONS

Section 213 - Mulching

- a) 213.02.(a)/(c)/(f) - Materials
- b) 213.03.(a)/(d)/(g) - Construction Requirements
- c) 213.04 - Method of Measurement
- d) 213.05 - Basis of Payment

4. RELEVANT M-STANDARD DETAILS

Section not applicable for this control measure.

7. LIMITATIONS

- Material availability can impact feasibility of this control measure.
- Potential for introduction of weeds and other non-native plant materials.
- Potentially costlier due to increased labor requirements
- Permanent stabilization strategies for slope applications steeper than 2.5H:1V should consider Soil Retention Blanket or Mulching (Hydraulically applied)

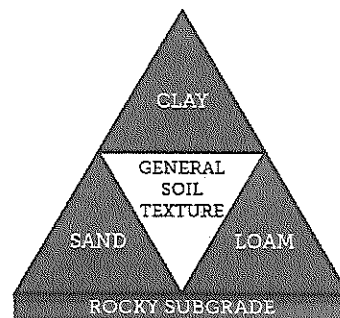
5. BASIS OF PAYMENT

Pay item	Description	Pay Unit
213-00002	Mulching (Weed Free Hay)	ACRE
213-00004	Mulching (Weed Free Straw)	ACRE
213-00061	Mulch Tackifier	LB

8. SOILS TRIANGLE

SOIL TEXTURE AND SUBGRADE CONDITIONS

- APPROPRIATE
- ▨ SOMEWHAT APPROPRIATE
- NOT APPROPRIATE



6. APPLICATIONS

- Use in conjunction with seeding to protect and stabilize disturbed soil.
- Use to cover disturbed areas for extended periods of time as a stabilization strategy.

16. Erosion Bales (EB)



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1. DESCRIPTION:

Erosion Bales are temporary sediment control structures consisting of a row of entrenched and anchored weed free straw or hay bales.

2. CONTROL MEASURE USES

- ☐ Erosion Control
- ☒ Sediment Control
- ☒ Site/Materials Management

3. RELEVANT SPECIFICATION SECTIONS

Section 208 - Erosion Control

- a) 208.02.(a) - Materials
- b) 208.12 - Basis of Payment

4. RELEVANT M-STANDARD DETAILS

M-208-1, Sheet 10 of 11 (Erosion Bale Applications)

5. BASIS OF PAYMENT

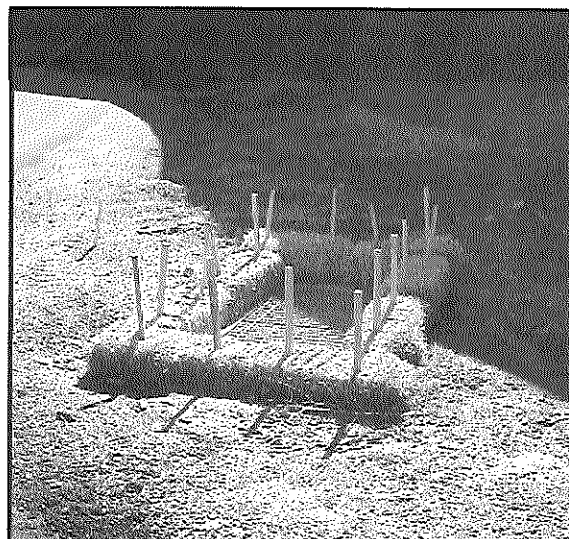
Pay item	Description	Pay Unit
208-00011	Erosion Bales (Weed Free)	EACH

6. APPLICATIONS

- Install along toe of fill areas to use as temporary filters.
- Use to intercept runoff from ditches, swales, and sump areas.
- Use for Temporary Storm Drain Inlet Protection devices.

7. LIMITATIONS

- May be installed in constructed ditches but not in live channels.
- When these structures are used, a secondary sediment control measure must be installed.
- Effectiveness is reduced after 3 months of use.

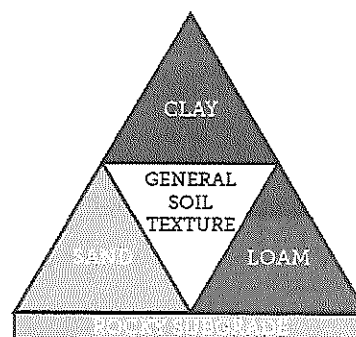


Erosion Bales installation around area inlets

8. CONTROL MEASURE SOILS TRIANGLE

SOIL TEXTURE AND SUBGRADE CONDITIONS

- APPROPRIATE
- ◐ SOMEWHAT APPROPRIATE
- NOT APPROPRIATE



17. Erosion Logs (EL)



COLORADO
Department of Transportation

1. DESCRIPTION:

Erosion Logs are temporary control measures consisting of a bound cylindrical bundle of a combination of excelsior, straw, coconut fibers, wood chips, or compost and anchored to the ground with wooden stakes. It is used to reduce flow velocities, capture sediment and release runoff as sheet flow over stabilized areas.

2. CONTROL MEASURE USES

- ☒ Erosion Control
- ☒ Sediment Control
- ☐ Site/Materials Management

3. RELEVANT SPECIFICATION SECTIONS

Section 208 - Erosion Control

- a) 208.02 (h) - Materials – Erosion Logs
- b) 208.05 (I) - Construction BMPs
- c) 208.11 - Method of Measurement
- d) 208.12 - Basis of Payment

4. RELEVANT M-STANDARD DETAILS

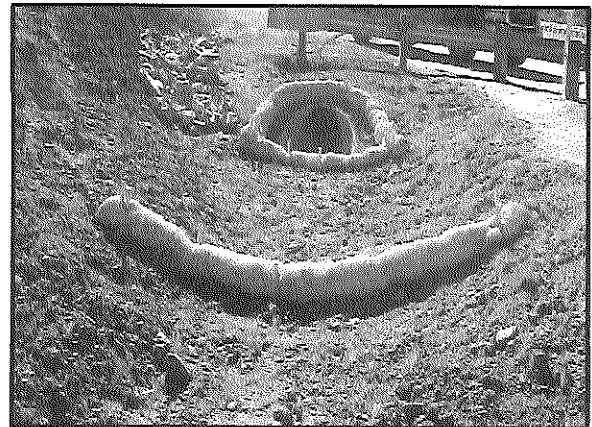
M-208-1, Sheet 2 of 11 (Erosion Log Applications)

M-208-1, Sheet 3 of 11 (Toe of Slope Protection Applications)

M-208-1, Sheet 6 of 11 (Erosion Log Installations)

5. BASIS OF PAYMENT

Pay Item	Description	Pay Unit
208-00012	Erosion Log Type 1 (9 inch)	LF
208-00002	Erosion Log Type 1 (12 inch)	LF
208-00013	Erosion Log Type 1 (20 Inch)	LF
208-00007	Erosion Log Type 2 (8 Inch)	LF
208-00008	Erosion Log Type 2 (12 Inch)	LF
208-00009	Erosion Log Type 2 (18 Inch)	LF
208-00022	Erosion Log Type 3 (9 Inch)	LF
208-00023	Erosion Log Type 3 (12 Inch)	LF
208-00024	Erosion Log Type 3 (20 Inch)	LF
208-00026	Coir Roll	LF



Erosion Logs along construction access road

6. APPLICATIONS

- Use to intercept surface runoff, reduce flow velocities, and capture sediment.
- Where long slopes are present and at grade breaks, use Erosion Logs to prevent formation of concentrated flow paths.
- Upgradient of stormwater inlets, use Erosion Logs to filter sediment and capture debris.
- When vegetation hasn't established, use Erosion Logs as check dams in small drainage ditches.
- Use as perimeter control for stockpiles locations.

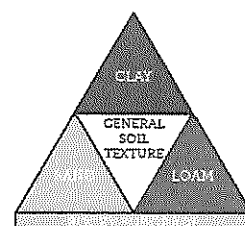
7. LIMITATIONS

- In ditches where continuous flows are expected, avoid using Erosion Logs
- Do not use below the ordinary high-water mark for stream applications.
- Can be dislodged after a storm event if appropriate anchoring is not provided.
- Only use as a temporary measure as bounding net is biodegradable and will release contents when degraded.

8. CONTROL MEASURE SOILS TRIANGLE

SOIL TEXTURE AND
SUBGRADE CONDITIONS

- APPROPRIATE
- ◐ SOMEWHAT APPROPRIATE
- NOT APPROPRIATE



20. Silt Fence (SF)



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Department of Transportation

1. DESCRIPTION:

Silt Fence is a temporary, entrenched sediment barrier made from woven geotextile fabric (in some cases with wire backing) and stretched across supporting wooden posts. It is used to intercept stormwater runoff containing sediment loads. Silt Fence is intended to allow sediment in surface runoff to settle before runoff leaves the project site.

2. CONTROL MEASURE USES

- ☐ Erosion Control
- ☒ Sediment Control
- ☐ Site/Materials Management

3. RELEVANT SPECIFICATION SECTIONS

Section 208 - Erosion Control

- a) 208.02.(b) - Materials
- b) 208.05.(c) - Construction of Control Measures
- c) 208.11 - Method of Measurement
- d) 208.12 - Basis of Payment

4. RELEVANT M-STANDARD DETAILS

M-208-1, Sheet 3 of 11 (Toe of Slope Protection Applications)

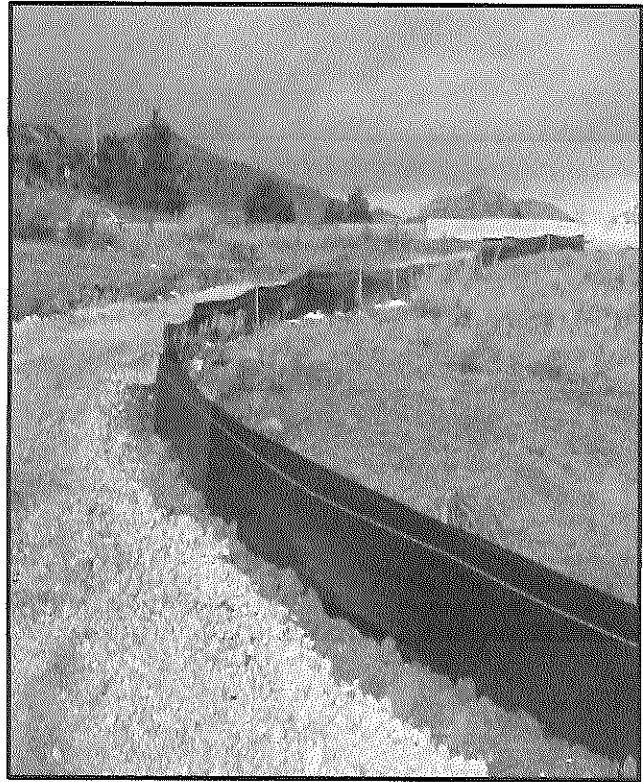
M-208-1, Sheet 8 of 11 (Silt Fence Applications)

5. BASIS OF PAYMENT

Pay item	Description	Pay Unit
208-00020	Silt Fence	LF
208-00021	Silt Fence (Reinforced)	LF

6. APPLICATIONS

- Downgradient of a disturbed area
- Along the perimeter of receiving waters (e.g. streams, ponds, and wetlands)
- Along the perimeter of a construction site (for example, staging area, and stabilized construction roads)
- Around temporary stockpiles
- At the toe of fill of exposed and erodible soils.



Silt fence along perimeter of stabilized construction road

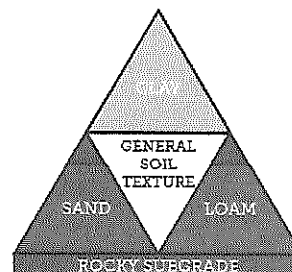
7. LIMITATIONS

- Not for intercepting concentrated flows (streams, channels, drainage paths).
- Limit use to drainage basin areas of 0.25 acres or less.
- Not suitable for mid-slope protection on slopes steeper than 4H:1V.
- Not suitable as flow diversion.
- Not suitable for areas where continuous ponding occurs.

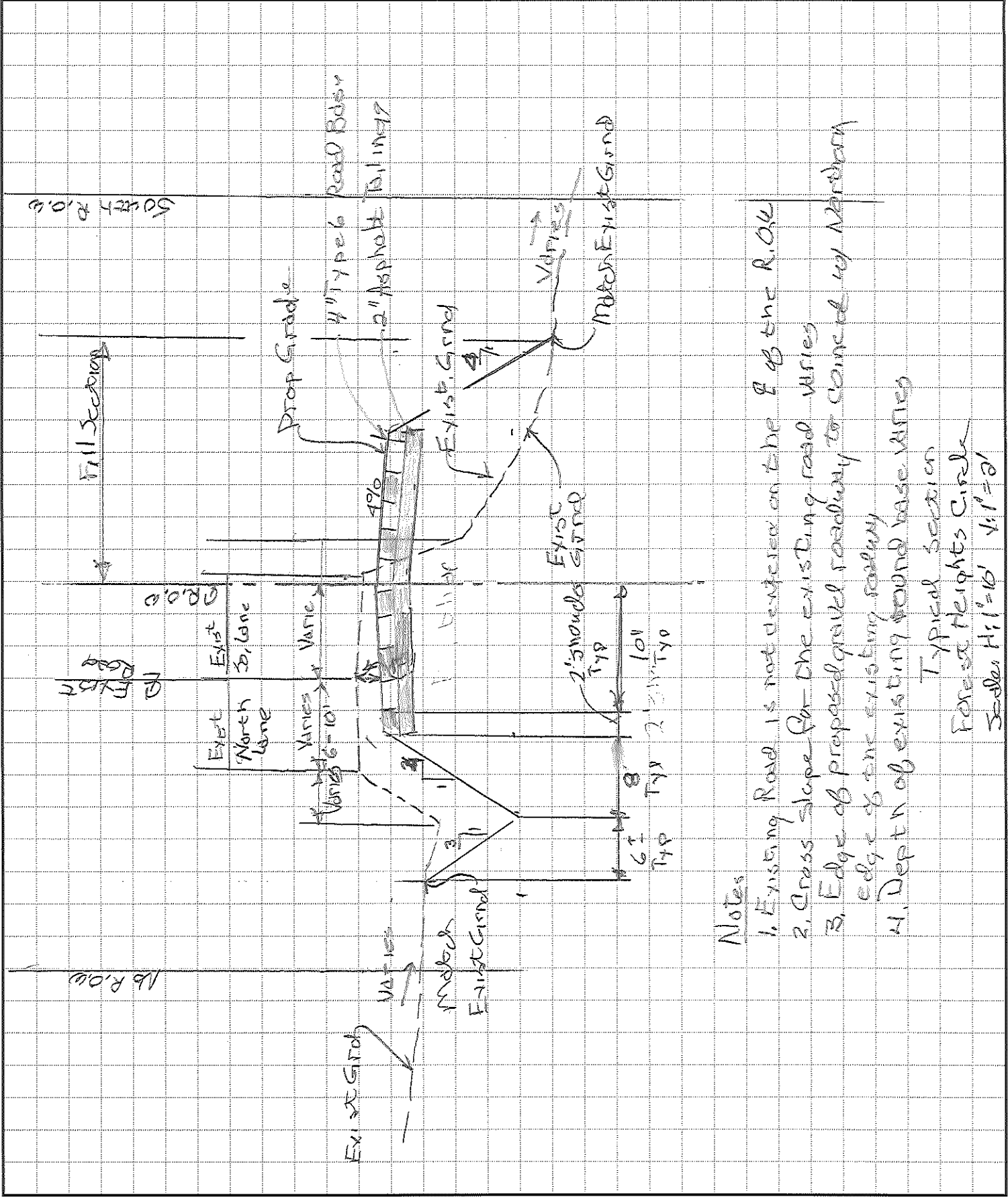
8. CONTROL MEASURE SOILS TRIANGLE

SOIL TEXTURE AND SUBGRADE CONDITIONS

- APPROPRIATE
- SOMEWHAT APPROPRIATE
- NOT APPROPRIATE



11. PROPOSED ROADWAY CROSS SECTION



Notes

1. Existing Road is not centered on the E of the R.O.W
2. Cross slope for the existing road varies
3. Edge of proposed gravel roadway to connect w/ Nadebby edge of the existing roadway
4. Depth of existing ground base varies